

Manual for pgf-PeriodicTable 2.1.6

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`\pgfPT[show title=false,show legend=false]`

Abstract

The purpose of this package is to provide the Periodic Table of Elements in a simple way. It relies on `pgf/TikZ` to offer a full or partial periodic table with a variety of options and displaying the desired data. The data available, from all the actual 118 elements, is: atomic number, element name, chemical symbol, relative atomic mass, standard relative atomic mass, radioactivity, atomic radius (empirical), covalent radius, ionic radius, first ionization energy, electronegativity (Pauling), electroaffinity, oxidation states, melting point (in Kelvin and Celsius degrees), boiling point (in Kelvin and Celsius degrees), electron distribution, electronic configuration (increasing n and increasing $n + \ell$), density, specific heat capacity, thermal conductivity, lattice structure, lattice constants (a , b , c and c/a ratio), discovery year, discovery country and visible range spectral lines. It is possible to get the Periodic Table in different languages: English, French, German, Portuguese (from Portugal and from Brazil), Spanish, Italian and translations provided by user contributions – currently in Dutch, Chinese, Russian, Ukrainian and Slovenian.

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Getting started

Installation

`pgf-PeriodicTable` is placed under the terms of the L^AT_EX Project Public License, version 1.3 or later (<http://www.latex-project.org/lppl.txt>). `pgf-PeriodicTable` loads and requires the `TikZ` and `fontenc` or `fontspec` (at least v2.7h – 2020/02/03) packages.

You need to put the package files (`pgf-PeriodicTable.sty` & *friends*) in a location where PDF_LA_TE_X, Lua_LA_TE_X or Xe_LA_TE_X can find them. According to the TDS conventions this may be a subdirectory named `tex/latex/pgf-PeriodicTable/` or `tex/latex/misc/` in your (site specific) installation tree (insert your appropriate directory delimiter instead of `/`, if needed).

Package loading and options

If you are using PDF_LA_TE_X, Lua_LA_TE_X or Xe_LA_TE_X you can just simply include the style file without any option via the `\usepackage` command, `\usepackage{pgf-PeriodicTable}`

It can also be loaded with a comma separated list of *options* to select the desired default language, to use Devanagari or Mandarin numerals in the Atomic Number, Periods and/or Groups, to fix the interaction with the beamer class or to use links within the Periodic Table.

Language Option

There are six *built-in* languages – English, French, German, Portuguese (from Portugal and Brazil), Spanish and Italian. The default language used in the package may be selected at package loading:

```
\usepackage[language flag]{pgf-PeriodicTable}
```

The *language flags* available are:

-
- | | |
|--|--------------------------------------|
| ✓ en for English (default), | ✓ br for Portuguese (Brazil), |
| ✓ fr for French, | ✓ es for Spanish and |
| ✓ de for German, | ✓ it for Italian. |
| ✓ pt for Portuguese (Portugal), | |
-

A *user language* can also be chosen as default language loading the package with the following option syntax:

```
\usepackage[userlang=<ISO 639-1 CODE>]{pgf-PeriodicTable}
```

The *user language ISO CODES* available are:

-
- | | |
|---------------------------|---------------------------------------|
| ✓ nl for Dutch, | ✓ zh for Chinese (simplified), |
| ✓ ru for Russian, | ✓ sl for Slovenian. |
| ✓ uk for Ukranian, | |
-

Anyone who wishes to contribute with translations for use in this package can go to the [pgf-periodictable](#) project page.

Note that the *built-in* languages are always available for the **languages** option of the `\pgfPT` command, but the *user language* is only available if loaded with the package.

Devanagari numerals

It is possible to get some numbers in the Periodic Table with Devanagari numerals: the atomic number and the numeration of periods and groups. To get this feature enabled the package must be loaded with the option *numerals* set to **dvn**:

```
\usepackage[numerals=dvn]{pgf-PeriodicTable}
```

This option requires the Xe_{La}T_EX engine to typeset the document.

```
% \usepackage[numerals=dvn]{pgf-PeriodicTable}
\pgfPT
```

Periodic Table of Elements

The periodic table displays elements with their symbols, names, and atomic numbers in Devanagari numerals. The layout includes the main body of the table, Lanthanides, and Actinides. A legend box for Carbon (C) provides details: Atomic Number (6), Radioactive (No), Chemical Symbol (C), Name (Carbon), and Relative Atomic Mass (12.011).

It is also possible to load a font for the Devanagari numerals using the following command:

```
\pgfPTdvnfont[font options]{font name}
```

The default font is *Eczar*.

Mandarin numerals

To get some numbers of the Periodic Table with Mandarin numerals (the atomic number and the numeration of periods and groups) the package must be loaded with the above option *numerals* set to **zh**:

```
\usepackage[numerals=zh]{pgf-PeriodicTable}
```

This option works with the Xe_{La}T_EX and Lua_{La}T_EX engines to typeset the document and requires the zhnumber package, which is automatically loaded.

```
% \usepackage[numerals=zh]{pgf-PeriodicTable}
```

```
\pgfPT
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (H) to Oganesson (Og). It includes a legend for element types (Metal, Nonmetal, Metalloid, Gas, Liquid, Solid) and a key for element properties (Z: Atomic Number, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass).

As with the Devanagari numerals, the following command loads the specified font for the Mandarin numerals:

```
\pgfPTzhnumberfont[font options]{font name}
```

For backwards compatibility (up to v2.1.4) the previous `\pgfPTzhfont` command now points to `\pgfPTzhnumberfont`, so older documents do not need any changes.

The default font is *BabelStone Han* (since v2.1.5) loaded with the *AutoFakeBold=4* option. For details on installing this font, see the [Chinese \(zh\) subsection](#) below.

It is also possible to enable or disable the numbers shown in Mandarin with the command:

```
\pgfPTzhnumber[<true|false>]{comma separated list}
```

The list can have **Z** for the atomic number, **per** for the period numbers and **gr** for the group numbers. At package loading, with this option, they are set to **true**.

```
% \usepackage[numerals=zh]{pgf-PeriodicTable}
```

```
\pgfPTzhnumber[false]{Z}
```

```
\pgfPT[Z list={1,...,36}]
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (H) to Oganesson (Og) with Chinese labels. It includes a legend for element types (Metal, Nonmetal, Metalloid, Gas, Liquid, Solid) and a key for element properties (Z: Atomic Number, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass).

This option loads the `hyperref` package and make available the keys `Z links` and `Z links color`. The `Z links` key provides an easy way to create links within the Periodic Table, to any destinations in the document. To learn how it is used, click on the chemical symbol for hydrogen below:

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User languages

User languages are provided by user translations. They are only available if passed as an option when loading the package. In addition to the *built-in* languages, the chosen language is the only one available and becomes the default language for the Periodic Table.

Dutch (nl)

The Dutch language is loaded by:

```
\usepackage[userlang=nl]{pgf-PeriodicTable}
```

```
% \usepackage[userlang=nl]{pgf-PeriodicTable}
\pgfPT
```

Periodiek Systeem van de Elementen

Chinese (zh)

The Chinese language is loaded by:

```
\usepackage[userlang=zh]{pgf-PeriodicTable}
```

The default font is *BabelStone Han* **which is not available in TeX Live**. It can be downloaded for free from the BabelStone website:

<https://www.babelstone.co.uk/Fonts/Han.html>

The use of a font which is not included in the TeX Live software distribution, nor in common Operating Systems, circumvents the missing Ideographs for the most recent elements – from rutherfordium to oganesson. The BabelStone Han has all of them as can be seen in the following table:

<i>BabelStone Fonts</i>		<i>Windows 10 & Windows 11 Fonts</i>				
ELEMENT	BabelStone Han	SimSun	SimSun-ExtB	Microsoft YaHei	Microsoft JhengHei	MingLiU-ExtB
hydrogen	氢	氢	□	氢	氢	□
...	□	□
lawrencium	𬒐	𬒐	□	𬒐	𬒐	□
rutherfordium	𬒑		𬒑	𬒑	□	□
dubnium	𬒒		𬒒	𬒒	□	□
seaborgium	𬒓		𬒓	𬒓	□	□
bohrium	𬒔		𬒔	𬒔	□	□
hassium	𬒕		𬒕	𬒕	□	□
meitnerium	𬒖	𬒖	□	𬒖	𬒖	□
darmstadtium	𬒗		𬒗	𬒗	□	𬒗
roentgenium	𬒘		𬒘	𬒘	□	□
copernicium	𬒙	𬒙	□	𬒙	𬒙	□
nihonium	𬒚	𬒚	□	𬒚	□	□
flerovium	𬒛		𬒛	𬒛	□	𬒛
livermorium	𬒜		𬒜	□	□	𬒜
tennessine	𬒝	𬒝	□	𬒝	□	□
oganesson	𬒞	𬒞	□	𬒞	□	□
<i>TeX Live 2024 Fonts</i>						
ELEMENT	FandolSong	FandolFang	FandolHei	FandolKai	AR PL SungtiL GB	AR PL KaitiM GB
hydrogen	氢	氢	氢	氢	氢	氢
...
lawrencium	𬒐	𬒐	𬒐	𬒐	𬒐	𬒐
rutherfordium	𬒑	𬒑	𬒑	𬒑		
dubnium	𬒒	𬒒	𬒒	𬒒		
seaborgium	𬒓	𬒓	𬒓	𬒓		
bohrium	𬒔	𬒔	𬒔	𬒔		
hassium	𬒕	𬒕	𬒕	𬒕		
meitnerium	𬒖	𬒖	𬒖	𬒖		
darmstadtium	𬒗	𬒗	𬒗	𬒗		
roentgenium	𬒘	𬒘	𬒘	𬒘		
copernicium	𬒙	𬒙	𬒙	𬒙		
nihonium	𬒚	𬒚	𬒚	𬒚		
flerovium	𬒛	𬒛	𬒛	𬒛		
livermorium	𬒜	𬒜	𬒜	𬒜		
tennessine	𬒝	𬒝	𬒝	𬒝		
oganesson	𬒞	𬒞	𬒞	𬒞		

Glyphs available in BabelStone Han font and in some Windows and TeX Live fonts.

To use the BabelStone Han it is necessary to [download it](#), unzip it and install the extracted font file:

- for Windows users, just right click on BabelStoneHan.ttf and choose install for all users. This can also be done in Windows Settings → Personalization → Fonts.
- for Linux users, open the Linux Terminal and type `sudo apt install fonts-BabelStoneHan.ttf`
- for macOS users, just copy or drag the font file (BabelStoneHan.ttf) into `/Library/Fonts` or double-click on BabelStoneHan.ttf to open the preview window. Click on Install font button at the bottom of the preview window.

Make sure the BabelStone Han font is *visible* to the Xe_{La}TeX or Lua_{La}TeX engines.

If you do not want to install this font on your operating system, you can place it in the truetype fonts folder in the TeX Live distribution and *Update filename database* in the TeX Live manager. After that, the font will be known only by the filename BabelStoneHan.ttf instead of its name, BabelStone Han.


```
% \usepackage[userlang=zh]{pgf-PeriodicTable}
```

```
\pgfPT
```

元素周期表

The periodic table displays elements from Hydrogen (H) to Oganesson (Og). It includes the following elements and their atomic weights (approximate):

- Period 1:** H (1.008), He (4.0026)
- Period 2:** Li (6.94), Be (9.0122), B (10.81), C (12.011), N (14.007), O (15.999), F (18.998), Ne (20.18)
- Period 3:** Na (22.99), Mg (24.305), Al (26.982), Si (28.086), P (30.974), S (32.06), Cl (35.45), Ar (39.95)
- Period 4:** K (39.098), Ca (40.078), Sc (44.956), Ti (47.887), V (50.942), Cr (51.996), Mn (54.938), Fe (55.845), Co (58.933), Ni (58.693), Cu (63.546), Zn (65.38), Ga (69.723), Ge (72.63), As (74.922), Se (78.971), Br (79.904), Kr (83.798)
- Period 5:** Rb (85.468), Sr (87.62), Y (88.906), Zr (91.224), Nb (92.906), Mo (95.94), Tc (98), Ru (101.07), Rh (106.42), Pd (106.38), Ag (107.87), Cd (112.41), In (114.82), Sn (118.71), Sb (121.76), Te (127.6), I (126.9), Xe (131.29)
- Period 6:** Cs (132.91), Ba (137.33), La (138.91), Ce (140.12), Pr (140.91), Nd (144.24), Pm (145), Sm (150.36), Eu (151.96), Gd (157.25), Tb (158.93), Dy (162.5), Ho (164.93), Er (167.26), Tm (168.93), Yb (173.05), Lu (174.97)
- Period 7:** Fr (223), Ra (226), Ac (227), Th (232.04), Pa (231.04), U (238.03), Np (237), Pu (244), Am (243), Cm (247), Bk (247), Cf (251), Es (252), Fm (257), Md (258), No (259), Lr (262)

To get the Periodic Table with the atomic number and the period/group numbers in mandarin numerals load the package with the corresponding options:

```
% \usepackage[userlang=zh,numerals=zh]{pgf-PeriodicTable}
```

```
\pgfPT
```

元素周期表

The periodic table displays elements from Hydrogen (H) to Oganesson (Og). It includes the following elements and their atomic weights (approximate):

- Period 1:** H (1.008), He (4.0026)
- Period 2:** Li (6.94), Be (9.0122), B (10.81), C (12.011), N (14.007), O (15.999), F (18.998), Ne (20.18)
- Period 3:** Na (22.99), Mg (24.305), Al (26.982), Si (28.086), P (30.974), S (32.06), Cl (35.45), Ar (39.95)
- Period 4:** K (39.098), Ca (40.078), Sc (44.956), Ti (47.887), V (50.942), Cr (51.996), Mn (54.938), Fe (55.845), Co (58.933), Ni (58.693), Cu (63.546), Zn (65.38), Ga (69.723), Ge (72.63), As (74.922), Se (78.971), Br (79.904), Kr (83.798)
- Period 5:** Rb (85.468), Sr (87.62), Y (88.906), Zr (91.224), Nb (92.906), Mo (95.94), Tc (98), Ru (101.07), Rh (106.42), Pd (106.38), Ag (107.87), Cd (112.41), In (114.82), Sn (118.71), Sb (121.76), Te (127.6), I (126.9), Xe (131.29)
- Period 6:** Cs (132.91), Ba (137.33), La (138.91), Ce (140.12), Pr (140.91), Nd (144.24), Pm (145), Sm (150.36), Eu (151.96), Gd (157.25), Tb (158.93), Dy (162.5), Ho (164.93), Er (167.26), Tm (168.93), Yb (173.05), Lu (174.97)
- Period 7:** Fr (223), Ra (226), Ac (227), Th (232.04), Pa (231.04), U (238.03), Np (237), Pu (244), Am (243), Cm (247), Bk (247), Cf (251), Es (252), Fm (257), Md (258), No (259), Lr (262)

When the Chinese language is loaded four extra commands are defined:

- `\pgfPTzhFontFeatures` can be used to set font features for the loaded Chinese font (set by the `font` option). For more details see the `fontspec` package documentation.
- `\pgfPTzhTextfontSS` is used to set the font for the elements meitnerium, copernicium, nihonium, tennessine and oganesson ($Z=109, 112, 113, 117$ and 118).
- `\pgfPTzhTextfontSSB` is used to set the font for the elements rutherfordium, dubnium, seaborgium, bohrium, hassium, darmstadtium, roentgenium and flerovium ($Z=104, 105, 106, 107, 108, 110, 111$ and 114).
- `\pgfPTzhTextfontLv` is used to set the livermorium ($Z=116$) font.

The defaults for some features of the Periodic Table are also changed:

- the `name font` is switched from `\tiny` to `\footnotesize`.
- the `CS font` is switched from `\small\bfseries` to `\large`.
- the `title font` is switched from `\Large\bfseries` to `\LARGE`.
- when not using the Chinese numerals (loaded with the option `numerals=zh`) the `Z font` is switched from `\tiny\bfseries` to `\scriptsize`, as well the `Z padding` is changed from `0.25ex` to `0ex`.

```
% \usepackage[userlang=zh]{pgf-PeriodicTable}
\pgfPTzhTextfontSS{SimSun}% font for Z={109,112,113,117,118}
% meitnerium, copernicium, nihonium, tennessine, oganesson
\pgfPTzhTextfontSSB{SimSun-ExtB}% font for
% Z={104,105,106,107,108,110,111,114}
% rutherfordium, dubnium, seaborgium, bohrium, hassium,
% darmstadtium, roentgenium, flerovium
\pgfPTzhTextfontLv{SimSun-ExtB}% font for Z=116
% livermorium
\pgfPT[font=SimSun]
```

元素周期表

1																	18		
1	H 氢 1.008																	2	He 氦 4.003
2	Li 锂 6.94	Be 铍 9.0122															10	Ne 氖 20.18	
3	Na 钠 22.99	Mg 镁 24.305															18	Ar 氩 39.95	
4	K 钾 39.09	Ca 钙 40.078	Sc 钪 44.956	Ti 钛 47.887	V 钒 50.942	Cr 铬 51.996	Mn 锰 54.938	Fe 铁 55.845	Co 钴 58.933	Ni 镍 58.693	Cu 铜 63.546	Zn 锌 65.38	Ga 镓 69.723	Ge 锗 72.63	As 砷 74.922	Se 硒 78.971	Br 溴 79.904	Kr 氪 83.798	
5	Rb 铷 85.468	Sr 锶 87.62	Y 钇 88.905	Zr 锆 91.224	Nb 铌 92.906	Mo 钼 95.96	Tc 得 [98]	Ru 钌 101.07	Rh 铑 101.07	Pd 钯 106.42	Ag 银 107.87	Cd 镉 112.41	In 铟 114.82	Sn 锡 118.71	Sb 锑 121.76	Te 碲 127.6	I 碘 126.9	Xe 氙 131.30	
6	Cs 铯 132.91	Ba 钡 137.33	镧系元素		Hf 铪 178.49	Ta 钽 180.94	W 钨 186.21	Re 铼 186.21	Os 锇 190.23	Ir 铱 192.22	Pt 铂 195.08	Au 金 196.97	Hg 汞 200.59	Tl 铊 204.38	Pb 铅 207.2	Bi 铋 208.98	Po 钋 [209]	At 砹 [210]	Rn 氡 [222]
7	Fr 钫 [223]	Ra 镭 [226]	锕系元素		Rf 铀 [261]	Db 钽 [262]	Sg 钨 [266]	Bh 钼 [264]	Hs 钌 [277]	Mt 铑 [276]	Ds 钐 [281]	Rg 银 [281]	Cn 镉 [285]	Nh 铈 [286]	Fl 铁 [289]	Mc 镨 [290]	Lv 钪 [291]	Ts 钪 [294]	Og 氧 [294]
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Періодична таблиця елементів

1																	18
1 H водень 1.008	2 He гелій 4.0026																
3 Li літій 6.94	4 Be берилій 9.0122																
5 Na натрій 22.99	6 Mg магній 24.305	3	4	5	6	7	8	9	10	11	12	13 Al алюміній 26.982	14 Si кремній 28.085	15 P фосфор 30.974	16 S сірка 32.06	17 Cl хлор 35.45	18 Ar аргон 39.95
19 K калій 39.098	20 Ca кальцій 40.078	21 Sc скандій 44.956	22 Ti титан 47.867	23 V ванадій 50.942	24 Cr хром 51.996	25 Mn марганець 54.938	26 Fe залізо 55.845	27 Co кобальт 58.933	28 Ni нікель 58.693	29 Cu мідь 63.546	30 Zn цинк 65.38	31 Ga галій 69.723	32 Ge германій 72.63	33 As миш'як 74.922	34 Se селен 78.971	35 Br бром 79.904	36 Kr криптон 83.798
37 Rb рубідій 85.468	38 Sr стронцій 87.62	39 Y ітрій 88.906	40 Zr цирконій 91.224	41 Nb ніобій 92.906	42 Mo молибден 95.95	43 Tc технецій [98]	44 Ru рутеній 101.07	45 Rh родій 102.91	46 Pd паладій 106.42	47 Ag срібло 107.87	48 Cd кадмій 112.41	49 In індій 114.82	50 Sn олово 118.71	51 Sb сурма 121.76	52 Te телур 127.6	53 I йод 126.9	54 Xe ксенон 131.29
55 Cs цезій 132.91	56 Ba барій 137.33	57-71 лантаноїди	72 Hf hafnium 178.49	73 Ta тантал 180.95	74 W вольфрам 183.84	75 Re рений 186.21	76 Os осмій 190.23	77 Ir ірідій 192.22	78 Pt платина 195.08	79 Au золото 196.97	80 Hg ртуть 200.59	81 Tl талій 204.38	82 Pb свинець 207.2	83 Bi вісмут 208.98	84 Po полоній [209]	85 At астат [210]	86 Rn радон [222]
87 Fr францій [223]	88 Ra радій [226]	89-103 актиноїди	104 Rf рутерфордій [261]	105 Db дубній [268]	106 Sg сборгій [269]	107 Bh борій [270]	108 Hs гаасій [270]	109 Mt майтерія [278]	110 Ds дармштатій [281]	111 Rg регентій [283]	112 Cn коперніцій [285]	113 Nh ніхоній [286]	114 Fl флеровій [289]	115 Mc московій [289]	116 Lv лерерій [293]	117 Ts тенес [294]	118 Og оганесон [294]
6 57 La лантан 138.91	58 Ce церій 140.12	59 Pr прасеодим 140.91	60 Nd неодим 144.24	61 Pm прометій [145]	62 Sm самарій 150.36	63 Eu европій 151.96	64 Gd гадоліній 157.25	65 Tb тербій 158.93	66 Dy диспрозій 162.5	67 Ho гольмій 164.93	68 Er ербій 167.26	69 Tm тульгій 168.93	70 Yb йтербій 173.05	71 Lu лютецій 174.97			
7 89 Ac актиній [227]	90 Th торій 232.04	91 Pa протактиній 231.04	92 U уран 238.03	93 Np нептуній [237]	94 Pu плутоній [244]	95 Am амеріцій [243]	96 Cm куріум [247]	97 Bk берклій [247]	98 Cf каліфорній [251]	99 Es ейзенштейній [252]	100 Fm фермій [257]	101 Md менделєєв [258]	102 No нобелій [259]	103 Lr лоренцій [261]			

Slovenian (sl)

The Slovenian language is loaded by:

```
\usepackage[userlang=sl]{pgf-PeriodicTable}
```

```
% \usepackage[userlang=sl]{pgf-PeriodicTable}
\pgfPT
```

Periodni sistem elementov

1																	18																				
1	H vodik 1.008																	He helij 4.0026																			
2	Li litij 6.94	3	4														17	Ne neon 20.18																			
3	Na natrij 22.99	4	Be berilij 9.0122	5	6	7	8	9	10	11	12	13	14	15	16	17	Ne neon 20.18																				
4	Na natrij 22.99	5	Be berilij 9.0122	6	Mg magnezij 24.305	7	Al aluminij 26.982	8	Si silicij 28.085	9	P fosfor 30.974	10	S žveplo 32.06	11	Cl klor 35.45	12	Ar argon 39.95																				
5	K kalij 39.098	6	Ca kalciј 40.078	7	Sc skandij 44.956	8	Ti titan 47.867	9	V vanadiј 50.942	10	Cr krom 51.996	11	Mn mangan 54.938	12	Fe železo 55.845	13	Co kobalt 58.933	14	Ni nikelj 58.693	15	Cu bakar 63.546	16	Zn cink 65.38	17	Ga galij 69.723	18	Ge germanij 72.63	19	As arzen 74.922	20	Se selen 78.971	21	Br brom 79.904	22	Kr kripton 83.798		
6	Rb rubidij 85.468	7	Sr stroncij 87.62	8	Y itrij 88.906	9	Zr cirkonij 91.224	10	Nb niobij 92.906	11	Mo molibden 95.95	12	Tc tehnecij [98]	13	Ru rutenij 101.07	14	Rh rodij 102.91	15	Pd paladiј 106.42	16	Ag srebro 107.87	17	Cd kadmij 112.41	18	In indiј 114.82	19	Sn kosit 118.71	20	Sb antimon 121.76	21	Te telur 127.6	22	I jod 126.9	23	Xe ksenon 131.29		
7	Cs cezij 132.91	8	Ba barij 137.33	9	lantanoidi			12	Hf hafnij 178.49	13	Ta tantal 180.95	14	W volfram 183.84	15	Re renij 186.21	16	Os osmij 190.23	17	Ir iridij 192.22	18	Pt platina 195.08	19	Au zlato 196.97	20	Hg živo srebro 200.59	21	Tl talij 204.38	22	Pb svinec 207.2	23	Bi bizmut 208.98	24	Po polonij [209]	25	At astat [210]	26	Rn radon [222]
8	Fr francij [223]	9	Ra radij [226]	10	aktinoidi			13	Rf raderfordij [261]	14	Db dubnij [268]	15	Sg siborgij [269]	16	Bh borij [270]	17	Hs hasij [270]	18	Mt majtnerij [278]	19	Ds darmštattj [281]	20	Rg rentgenij [282]	21	Cn kopernicij [285]	22	Nh nihonij [286]	23	Fl flerovij [289]	24	Mc moskovij [290]	25	Lv livermorij [293]	26	Ts tenes [294]	27	Og oganeson [294]
9	La lantan 138.91	10	Ce cerij 140.12	11	Pr praseodim 140.91	12	Nd neodim 144.24	13	Pm prometij [145]	14	Sm samarij 150.36	15	Eu evropsij 151.96	16	Gd gadolinij 157.25	17	Tb terbij 158.93	18	Dy disprozij 162.5	19	Ho holmij 164.93	20	Er erbij 167.26	21	Tm tulgij 168.93	22	Yb iterbij 173.05	23	Lu lutecij 174.97								
10	Ac aktinij [227]	11	Th torij 232.04	12	Pa protaktinij 231.04	13	U uran 238.03	14	Np neptunij [237]	15	Pu plutonij [244]	16	Am americij [243]	17	Cm kurij [247]	18	Bk berkelij [247]	19	Cf kalifornij [251]	20	Es ejnštajnij [252]	21	Fm fermij [257]	22	Md mendeljevij [258]	23	No nobelij [259]	24	Lr lavrencij [261]								

Interaction with other packages

fontspec

To correctly set the font in each cell contents the command `\fontspec` must be used. For example if you want to use *Arial* for the **name font**, it must be set using **name font**=`\fontspec{Arial}\selectfont`.

All other font selection commands, e.g., `\large`, `\itshape`, are used as usual. For example if you want to use *Arial* in *large* size and *bold* weight for the **name font**, then you type **name font**=`\large\bfseries\fontspec{Arial}\selectfont` or **name font**=`\fontspec{Arial}\large\bfseries\selectfont`.

ragged2e

Using `\usepackage[document]{ragged2e}` and `\usepackage{pgf-PeriodicTable}` together, the Periodic Table will be completely fractured and out of the page.

The solution is to use a local group:

```
{\justifying\pgfPT}
```

beamer

beamer, `pgf-PeriodicTable` and PDFL^AT_EX in combination have an issue: the `\textsc` fails to produce the correct small caps. The error given is:

```
Font shape 'T1/cmss/m/sc' undefined
(Font) using 'T1/cmss/m/n' instead on input line ...
```

To avoid this, the `pgf-PeriodicTable` package can be loaded with one of the following options:

beamer which loads the `lmodern` package, setting small caps compatibility with beamer via 'lmodern' package.

```
\usepackage[beamer]{pgf-PeriodicTable}
```

beamer* which sets small caps compatibility with beamer via T1 `cmr` fonts.

```
\usepackage[beamer*]{pgf-PeriodicTable}
```

beamer** which sets small caps compatibility with beamer via T1 `cmr` fonts and loads the `silence` package to suppress small caps font substitution warnings.

```
\usepackage[beamer**]{pgf-PeriodicTable}
```

babel

babel with option `[spanish]` and `pgf-PeriodicTable` in combination have an issue. The error given is:

```
! Missing \endcsname inserted.
<to be read again>
\protect
```

To avoid this add the following to the document preamble:

```
\usepackage[spanish,es-nolayout]{babel}
```

or

```
\def\spanishoptions{es-nolayout}
\usepackage[spanish]{babel}
```

The *es-nolayout* option disables layout changes in the document when spanish is the main language. These changes affect enumerated and itemized lists, enumerations (alphabetic order excludes ñ), and symbolic footnotes. See the [babel-spanish manual](#) for further details.

graphicx (\resizebox) & preview

The command `\resizebox` of package `graphicx` and package `preview` in combination have an issue.

```
\documentclass[a4paper]{article}
\usepackage{pgf-PeriodicTable}
\usepackage[active,tightpage]{preview}
\PreviewEnvironment{tikzpicture}
\setlength\PreviewBorder{0pt}

\begin{document}
\resizebox{.95\linewidth}{!}{\pgfPT}
\end{document}
```

The error given is:

```
! Package graphics Error: Division by 0.
See the graphics package documentation for explanation.
```

To avoid this add the following **line** to the document preamble:

```
\documentclass[a4paper]{article}
\usepackage{pgf-PeriodicTable}
\usepackage[active,tightpage]{preview}
\PreviewEnvironment{tikzpicture}
\PreviewMacro[{\*{}{}{}{}]{\resizebox}
\setlength\PreviewBorder{0pt}

\begin{document}
\resizebox{.95\linewidth}{!}{\pgfPT}
\end{document}
```

extdash

The use of the package `extdash` with the `[shortcuts]` option, raises a lot of errors. The first error is:

```
Undefined control sequence \HyphOrDash ->\let \EXD@break
\@empty \@ifnextchar /\{\EXD@d@sh }\@ifnextch...
```

To avoid this, the `pgf-PeriodicTable` package can be loaded with the following option:

```
\usepackage[extdash]{pgf-PeriodicTable}
\usepackage[shortcuts]{extdash}
```

The data

The data available in [pgf-PeriodicTable](#) was mainly compiled with selected and filtered data from Wikipedia, taken from November 2021 to July 2022.

acronym	description	unit	remarks (compiled from @date)
Ar	Relative Atomic Mass		(Wikidata @09/jan/2022)
Arstar	Standard Relative Atomic Mass		STANDARD ATOMIC WEIGHTS 2021, Commission on Isotopic Abundances and Atomic Weights, © CIAAW, 2007–2022 (https://ciaaw.org/impressum.htm)
radio	Radioactivity		(gperiodic-3.0.3, Dec 26 2018)
R	Atomic Radius	pm	Calculated (Wikidata @04/jul/2022)
Rcov	Covalent Radius	pm	Single bond, Wikidata @04/jul/2022)
Rion	Ionic Radius	pm	(Wikidata @04/jul/2022)
Ei	First Ionization Energy	$\text{kJ} \cdot \text{mol}^{-1}$	(Wikidata @04/jul/2022)
eneg	Electronegativity (Pauling)		(Wikidata @04/jul/2022)
eaff	Electroaffinity	$\text{kJ} \cdot \text{mol}^{-1}$	(Wikidata @04/jul/2022)
O	Oxidation States		(Wikidata @09/jan/2022)
Tmelt	Melting Point	K	at standard pressure (Wikidata @21/dez/2021)
TmeltC	Melting Point	$^{\circ}\text{C}$	at standard pressure (Wikidata @21/dez/2021)
Tboil	Boiling Point	K	at standard pressure (Wikidata @21/dez/2021)
TboilC	Boiling Point	$^{\circ}\text{C}$	at standard pressure (Wikidata @21/dez/2021)
eDist	Electron Distribution		(Wikidata @01/nov/2021)
eConfign	Electronic Configuration (increasing n)		(Wikidata @01/nov/2021)
eConfignl	Electronic Configuration (increasing n + ℓ)		(Wikidata @01/nov/2021)
d	Density	$\text{g} \cdot \text{dm}^{-3}$ for gases $\text{g} \cdot \text{cm}^{-3}$ all other physical states	physical state at 25 $^{\circ}\text{C}$, 1 atm (Wikidata @01/nov/2021)
Cp	Specific heat capacity	$\text{J} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}$	at 25 $^{\circ}\text{C}$ and 100 kPa (Wikidata @20/nov/2021)
kT	Thermal Conductivity	$\text{W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$	at 25 $^{\circ}\text{C}$ (Wikidata @21/nov/2021)
Is	Lattice Structure		(Wikidata @20/dez/2021 and University of Bielefeld)
Isa	Lattice constant: a	pm	(University of Bielefeld @21/dez/2021)
Isb	Lattice constant: b	pm	(University of Bielefeld @21/dez/2021)
Isc	Lattice constant: c	pm	(University of Bielefeld @21/dez/2021)
Isca	Lattice c/a ratio		Calculated from available data and rounded to two digits
DiscY	Discover Year		(Wikidata @22/dez/2021)
DiscC	Discover Country		(Wikidata @22/dez/2021)
spectra	Visible range spectral lines		Elements spectrum made with \pgfspectra . See the pgf-spectra manual for more details

The utilization of the *acronyms* will be explained in [Designing cells with \pgfPTbuildcell](#).

Options for `\pgfPT`: creating a «Periodic Table»

For the commands `\pgfPT` and `\pgfPTstyle` there are a set of options available to draw the Periodic Table or any portion of the Periodic Table, as described below.

The list of options is a comma separated list of any of the following elements:

- a 'key' or a 'key=value' pair,
- a 'style' or a 'style=value' pair,
- a *pseudo style* with a proper syntax: 'style={key 1=value 1, key 2=value 2, ... , key n=value n}', where none of the 'keys' are mandatory.

The options *can be divided* in two subsets, one that affects the *appearance* of the *entire* Periodic Table, the other that concerns the *contents* of each cell of the Periodic Table.

✂ Periodic Table options: keys, styles and *pseudo styles*

The following options and styles are used to *control* the Periodic Table *as a whole* in various aspects, such as the **cell width** or **cell height**, which elements are displayed (**Z list**), whether the title or legend are shown – **show title** or **show legend** – among others.

➡ General layout

Z list

default: *all*

Set's the list of the elements to display in the Periodic Table. It could be a **name** or a **comma separated** list of atomic numbers (*see below*), which in turn supports the *dots notation* as explained in the section *Repeating Things: The Foreach Statement* in the *pgfmanual*.

(*changed in v2.1.5*)

`\pgfPT[Z list={1,...,36}]`

Periodic Table of Elements

The possible **name** is one of the following:

✓ built-in:

- ▷ 'all' is equivalent to `Z list={1,...,118}`, i.e., all known elements.
- ▷ 's', 'p', 'd' or 'f', for the elements in the corresponding blocks.
- ▷ 'sp', 'spd', for the elements resulting from merging the corresponding blocks.
- ▷ 'lanthanoids' or simply 'La', for lanthanoids[†].
- ▷ 'actinoids' or 'Ac', for actinoids[†].
- ▷ 'G1*', 'G1', ..., 'G18', which are used, respectively, for the elements of *group 1 without hydrogen*, *group 1*, ..., *group 18*.
- ▷ 'P1', ..., 'P7', 'P6*', 'P7*', which are used, respectively, for the elements of the *1st period*, ..., *7th period*, *6th period and lanthanoids*[†], *7th period and actinoids*[†].

[†] Depending on the value of the *IUPAC key*, the Lanthanum or Actinium are or are not included.

✓ any **user defined** name via `\pgfPTnewZlist{name}{list}`

Since v2.1.5 the **Z list** supports a new syntax which makes possible to get *empty* cells *anywhere* in the Periodic Table. The **Z list** can be:

- ✓ a list of numbers – **Z list**= $\{1,...,118\}$ or **Z list**= $\{1,2,3,4,5,6,11,12,13,14,15,16\}$.
- ✓ a list of numbers preceded with a star – **Z list**= $\{1,...,5,9,10,...,24\}$ or **Z list**= $\{*(options)\{1,...,5,9,10,...,24\}$.
- ▷ **Z list** preceded only with a star:
It is used to draw the cells skipped in the list without information, but with the atomic number and filling.

`\pgfPT[Z list=*\{1,...,5,9,10,...,18\}]`

Periodic Table of Elements

- ▷ **Z list** is preceded with a star followed by **options**:
It is used to draw the cells skipped in the list without information, with what is shown and how it is shown controlled by the options. There are only two options available – **hide Z** and **back color=<color>** – which can be used separately or as a comma separated pair in any order.

`\pgfPT[Z list=*(hide Z)\{1,...,5,9,10,...,18\}]`

Periodic Table of Elements

`\pgfPT[Z list=*(\back color=white)\{1,...,5,9,10,...,18\}]`

Periodic Table of Elements

`\pgfPT[Z list=*(hide Z,\back color=white)\{1,...,5,9,10,...,18\}]`

Periodic Table of Elements

The *starred* version of the **Z list** can be used as an alternative or a complement to the **Exercise** layout mode of the Periodic Table.

Z links

default: {}

Set's a list of `element(s)/destination` pairs. The `element(s)` can be an `atomic number` or any `name` as explained above in the `Z list` key. The `destination` must be an internal reference defined with `\label`. *The dots notation of the TikZ \foreach statement is not supported.*

NOTE:

The Periodic Table exceeds the text width if default values are used for the cell size. This can usually be avoided by using the `graphicx \resizebox` command. However, when using the `Z links` feature, this results in incorrect placement of the links. The solution requires using the `fittowidth library` and the `\pgfPTfittowidth` command.

(new in v2.1.6)

```
% \usepgfPTlibrary{fittowidth}
```

```
\pgfPTfittowidth[12pt]
```

```
\pgfPT[Z list={1,...,36},Z links={1/option_Z list}]
```

Periodic Table of Elements

```
\pgfPT[Z list={1,...,36},Z links={G1/option_Z list}]
```

Periodic Table of Elements

```
\pgfPTendfittowidth
```

Z links color

default: {}

Set's the `outline color` of the chemical symbol for the elements provided in `Z links`.

(new in v2.1.6)

```
% \usepgfPTlibrary{fittowidth}
```

```
\pgfPTfittowidth[12pt]
```

```
\pgfPT[Z list={1,...,36},Z links={1/option_Z list},Z links color=red]
```

Periodic Table of Elements

```
\pgfPTendfittowidth
```

Z links outline width

default: .3

Set's the **outline width** of the chemical symbol for the elements provided in **Z links**.*(new in v2.1.6)*

```
% \usepgfPTlibrary{fittowidth}
```

```
\pgfPTfittowidth[12pt]
```

```
\pgfPT[Z list={1,...,36},Z links={1/option_Z list},Z links outline width=.5]
```

Periodic Table of Elements

```
\pgfPTendfittowidth
```

cell width

default: 34pt

Sets the width of each base cell of the Periodic Table.

```
\pgfPT[Z list={1,...,36},cell width=40pt]
```

Periodic Table of Elements

cell height

default: 38.25pt

Sets the height of each base cell of the Periodic Table.

```
\pgfPT[Z list={1,...,36},cell height=50pt]
```

Periodic Table of Elements

Legend box content:

Z	Atomic Number
R	Radioactive
CS	Chemical Symbol
N	Name
Ar	Relative Atomic Mass

cell size

default: 38.25pt

Style to set both the width and the height of each base cell of the Periodic Table.

`\pgfPT[Z list={1,...,36},cell size=40pt]`

Periodic Table of Elements

Legend box content:

Z	Atomic Number
R	Radioactive
CS	Chemical Symbol
N	Name
Ar	Relative Atomic Mass

cell line width

default: 0.4pt

Sets the width of the line surrounding the base cell of the Periodic Table.

`\pgfPT[Z list={1,...,36},cell line width=2pt]`

Periodic Table of Elements

Legend box content:

Z	Atomic Number
R	Radioactive
CS	Chemical Symbol
N	Name
Ar	Relative Atomic Mass

cell line color

default: black

Sets the color of the line surrounding the base cell of the Periodic Table.

`\pgfPT[Z list={1,...,36},cell line color=red]`

Periodic Table of Elements

cell style

default: {}

Loads a named cell style, built via `\pgfPTbuildcellstyle`, to use as a layout for each cell of the Periodic Table.

```
\pgfPTbuildcellstyle{myname}(5,3)% 5 rows by 3 columns
[(1;1-2;Z),(1;3;ls),(2-3;1.5-2.5;CS),(4;1-3;name),(5;1-3;eConfig)]
\pgfPT[Z list={1,...,36},cell style=myname]
```

Periodic Table of Elements

cell

default: {w=34pt,h=38.25pt,lw=.4pt,lc=black}

Pseudo style to set the cell **w**idth, the cell **h**eight, the cell **s**ize, the cell **l**ine **w**idth, the cell **l**ine **c**olor and/or the cell **s**tyl**e**. None of the keys – w, h, s, lw, lc and style – are mandatory.

USAGE: cell={w=<length>,h=<length>,s=<length>,lw=<length>,lc=<color>,style=<name>}

```
\pgfPT[Z list={1,...,36},cell={w=40pt,h=50pt,lw=.6pt,lc=blue}]
```

Periodic Table of Elements

font

default: *phv* (pdf \LaTeX); *TeX Gyre Heros* (Xe \LaTeX or Lua \LaTeX);
BabelStone Han (for Chinese)

Sets the font family, via the proper \LaTeX *font name*, to use in the Periodic Table.

When pdf \LaTeX is used to typeset the Periodic Table the *default* font is *phv*, i.e., the Helvetica font. In this case the value of the **font** key can be any \LaTeX *font name* known to the local \LaTeX installation.

When Xe \LaTeX or Lua \LaTeX are used to typeset the Periodic Table the *default* font is *TeX Gyre Heros*, a closest alternative to Helvetica font. In this case the value of the **font** key can be any *font name known to your Operating System or \LaTeX distribution* and with Lua \LaTeX it can also be any *font name available in your TEXMF tree*.

If the Chinese language is loaded the default font is BabelStone Han. See [Chinese](#) user language for more details.

See \LaTeX *font names* below or the [fontspec documentation](#) for further details.
(changed in v2.1.5)

 \LaTeX *font names*:

✓ The \LaTeX font names commonly available in \LaTeX distributions are:

– **Serif fonts**

- ▷ cmr – Computer Modern Roman
- ▷ lmr – Latin Modern Roman
- ▷ pbk – Bookman
- ▷ bch – Charter
- ▷ pnc – New Century Schoolbook
- ▷ ppl – Palatino
- ▷ ptm – Times

– **Sans Serif fonts**

- ▷ cmss – Computer Modern Sans Serif
- ▷ lmss – Latin Modern Sans Serif
- ▷ pag – Avant Garde
- ▷ phv – Helvetica

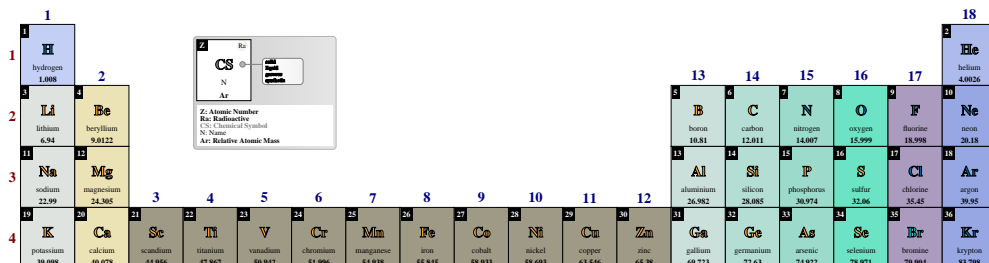
✓ There are other fonts available to \LaTeX that require installation of the corresponding packages:

- ▷ the [roboto package](#) provides the following fonts:
 - Roboto-TLF – Roboto tabular lining
 - Roboto-LF – Roboto proportional lining
 - Roboto-OsF – Roboto proportional oldstyle
 - Roboto-TOsF – Roboto tabular oldstyle
 - RobotoSlab-TLF – RobotoSlab proportional lining
 - RobotoSlab-OsF – RobotoSlab proportional oldstyle
 - RobotoSlab-TOsF – RobotoSlab tabular oldstyle
 - RobotoMono-TLF – RobotoMono proportional lining
- ▷ the [frcursive package](#) provides the *frc* – French Cursive font.
- ▷ the [miama package](#) provides the *fmr* – Miama Nueva font.
- ▷ ...

For more information about fonts visit the [TUG Font Catalogue](#)

Examples with pdfL^AT_EX:`\pgfPT[Z list={1,...,36},font=ptm]`

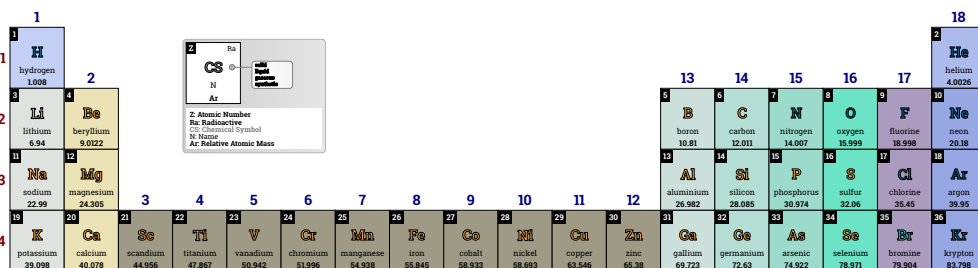
Periodic Table of Elements



The periodic table is rendered using the ptm font. It includes element symbols, names, atomic numbers, and relative atomic masses. A legend box in the upper left corner defines the fields: Z (Atomic Number), Ra (Radioactive), CS (Chemical Symbol), N (Name), and Ar (Relative Atomic Mass). The table is color-coded by groups, with a distinct color for each column.

`\pgfPT[Z list={1,...,36},font=RobotoSlab-TLF]`

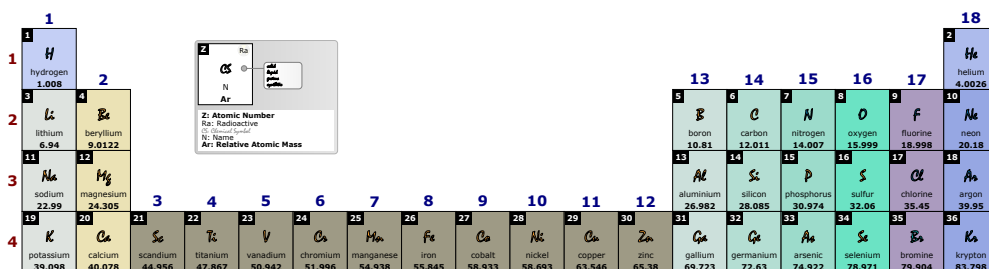
Periodic Table of Elements



The periodic table is rendered using the RobotoSlab-TLF font. It includes element symbols, names, atomic numbers, and relative atomic masses. A legend box in the upper left corner defines the fields: Z (Atomic Number), Ra (Radioactive), CS (Chemical Symbol), N (Name), and Ar (Relative Atomic Mass). The table is color-coded by groups, with a distinct color for each column.

Examples with XeL^AT_EX or LuaL^AT_EX:`\pgfPT[Z list={1,...,36},font=Verdana,CS font=\fontspec{Mistral}\selectfont]`

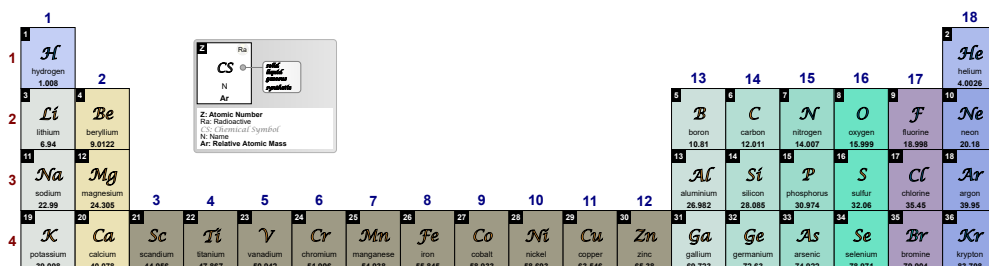
Periodic Table of Elements



The periodic table is rendered using the Verdana font for element names and atomic numbers, and the Mistral font for chemical symbols. A legend box in the upper left corner defines the fields: Z (Atomic Number), Ra (Radioactive), CS (Chemical Symbol), N (Name), and Ar (Relative Atomic Mass). The table is color-coded by groups, with a distinct color for each column.

`\pgfPT[Z list={1,...,36},font=Arial,CS font=\fontspec{LCALLIG.TTF}\selectfont]`

Periodic Table of Elements



The periodic table is rendered using the Arial font for element names and atomic numbers, and the LCALLIG.TTF font for chemical symbols. A legend box in the upper left corner defines the fields: Z (Atomic Number), Ra (Radioactive), CS (Chemical Symbol), N (Name), and Ar (Relative Atomic Mass). The table is color-coded by groups, with a distinct color for each column.

back colordefault: *white*

Sets the background of each cell of the Periodic Table. It only takes effect if the **back color scheme** key is set to **solid**

```
\pgfPT[Z list={1,...,36},back color=black!15]
```

Periodic Table of Elements

```
\pgfPT[Z list={1,...,36},back color scheme=solid,back color=black!15]
```

Periodic Table of Elements

back color schemedefault: *pgfPTdefault*

Sets a **named** back color scheme for the Periodic Table.

```
\pgfPT[back color scheme=pgfPTSoft]
```

Periodic Table of Elements

The possible **name** is one of the following:

✓ **built-in:**

- ▷ 'pgfPTSoft'
A soft color scheme that distinguishes metals, non metals, silicon and germanium, lanthanoids and actinoids.
 - ▷ 'pgfPTJmol'
Is the color scheme used in the computer software [Jmol](#): an open-source Java viewer for chemical structures in 3D.
 - ▷ 'pgfPTCPK'
Is the color scheme of the popular color convention for distinguishing atoms of different chemical elements in molecular models. The scheme is named after the CPK molecular models designed by chemists Robert Corey and Linus Pauling, and improved by Walter Koltun.
 - ▷ 'pgfPTRasmol'
Is the color scheme used in the computer software [RasMol](#), a program for molecular graphics visualization originally developed by Roger Sayle.
 - ▷ 'pgfPTRasmolNew'
Is a color scheme used in RasMol with revision of CPK colors made by C. Chigbo (RasMol 2.7.3).
 - ▷ 'pgfPTWikipediaII'
Is the color scheme based on the most recent ([November 2020 to present](#)) [Wikipedia Periodic Table of Elements](#).
 - ▷ 'pgfPTWikipediaI'
Is the color scheme based on the previous ([until October 2020](#)) [Wikipedia Periodic Table of Elements](#).
- The higher the number on Wikipedia, the more recent the color scheme.
For backwards compatibility (and also for simplicity) pgfPTWikipedia points to pgfPTWikipediaII.
- ▷ 'pgfPTMNM'
Is designed to show **M**etals and **N**on **M**etals in two different colors, showing also the semi-metals in a third color.
 - ▷ 'pgfPTPS'
Is designed to show the **P**hysical **S**tate of the elements at normal temperature and pressure (NTP) in different colors.
 - ▷ 'pgfPTRadio'
Is designed to show the **R**adioactive elements in one color and the non radioactive elements in another color.
 - ▷ 'pgfPTBlocks'
For showing the elements in each block of the Periodic Table with the same color.
 - ▷ 'solid'
To show the background of each cell of the Periodic Table with the same color specified by the key 'back color'.

✓ any **user defined** name via `\pgfPTnewColorScheme{name}{color list}`

It is possible to set the *back color scheme* key with the built-in names using the following styles:

csSolid

default: white

A style equivalent to `back color scheme=solid,back color=#1`

\pgfPT[csSolid]

Periodic Table of Elements

Periodic Table of Elements

Legend:

- Z: Atomic Number
- Ra: Radioactive
- N: Chemical Symbol
- N: Name
- Ar: Relative Atomic Mass

Elements shown include: H, He, Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Cs, Ba, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Fr, Ra, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr, and many others.

\pgfPT[csSolid=black!15]

Periodic Table of Elements

Periodic Table of Elements

Legend:

- Z: Atomic Number
- Ra: Radioactive
- N: Chemical Symbol
- N: Name
- Ar: Relative Atomic Mass

Elements shown include: H, He, Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Cs, Ba, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Fr, Ra, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr, and many others.

csSoft

no value

A style equivalent to `back color scheme=pgfPTSoft`

\pgfPT[csSoft]

Periodic Table of Elements

csJmol

no value

A style equivalent to `back color scheme=pgfPTJmol`

\pgfPT[csJmol]

Periodic Table of Elements

csCPK*no value*A style equivalent to `back color scheme=pgfPTCPK``\pgfPT[csCPK]`

Periodic Table of Elements

Legend:

- Z: Atomic Number
- Ra: Radioactive
- CS: Chemical Symbol
- N: Name
- Ar: Relative Atomic Mass

csRasmol*no value*A style equivalent to `back color scheme=pgfPTRasmol``\pgfPT[csRasmol]`

Periodic Table of Elements

Legend:

- Z: Atomic Number
- Ra: Radioactive
- CS: Chemical Symbol
- N: Name
- Ar: Relative Atomic Mass

csRasmolNew

no value

A style equivalent to `back color scheme=pgfPTRasmolNew``\pgfPT[csRasmolNew]`

Periodic Table of Elements

csWikipedia

no value

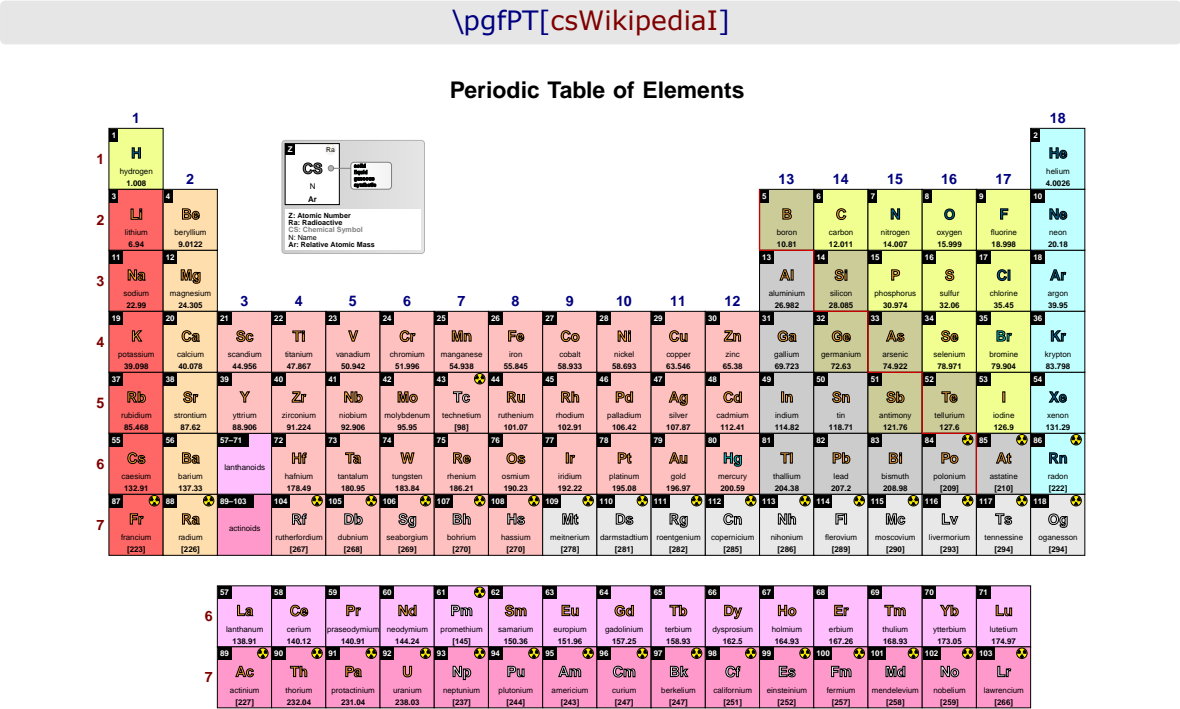
A style equivalent to `back color scheme=pgfPTWikipediaII``\pgfPT[csWikipedia]`

Periodic Table of Elements

csWikipediaI

no value

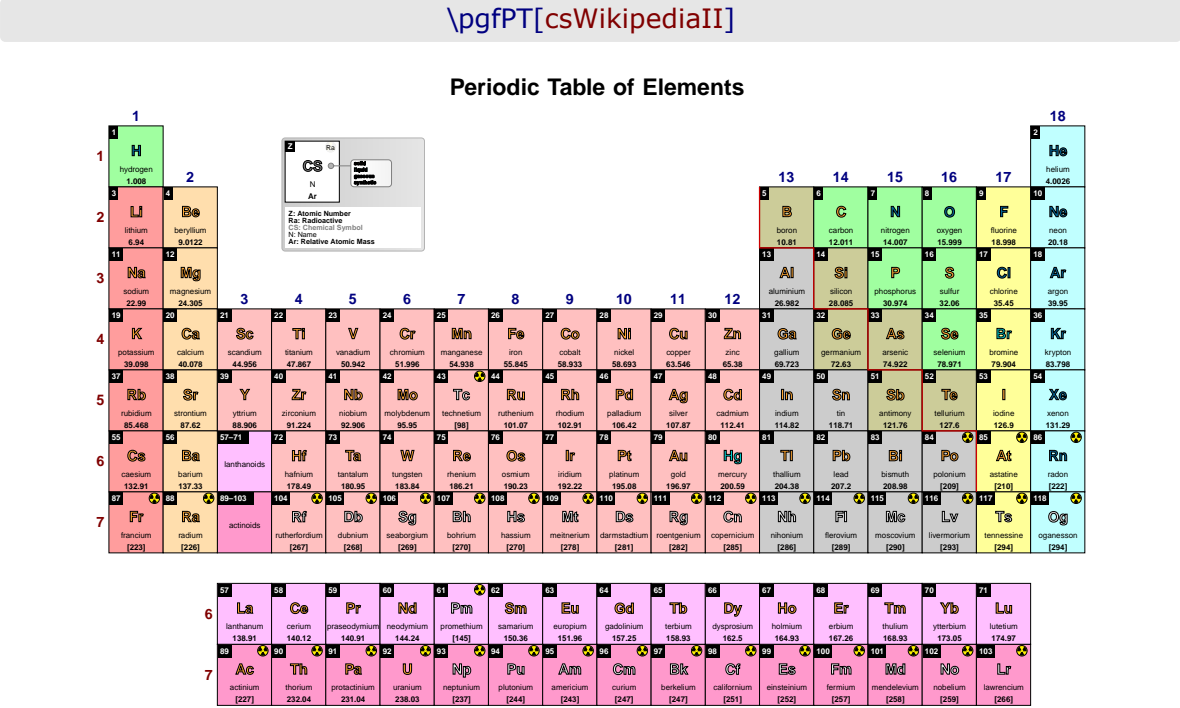
A style equivalent to back color scheme=pgfPTWikipediaI



csWikipediaII

no value

A style equivalent to back color scheme=pgfPTWikipediaII

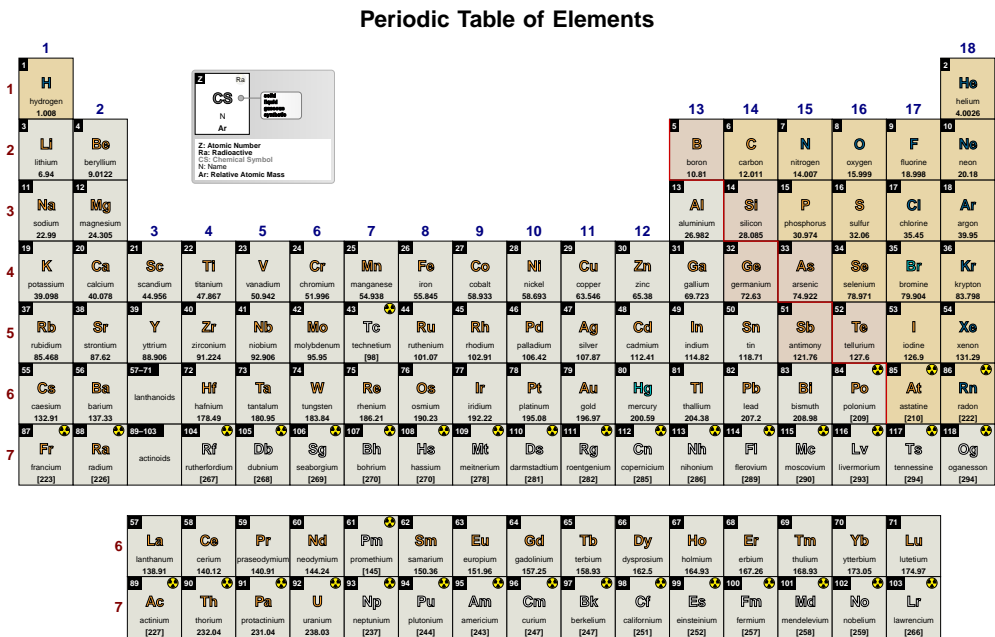


csMNM

no value

A style equivalent to back color scheme=pgfPTMNM

\pgfPT[csMNM]

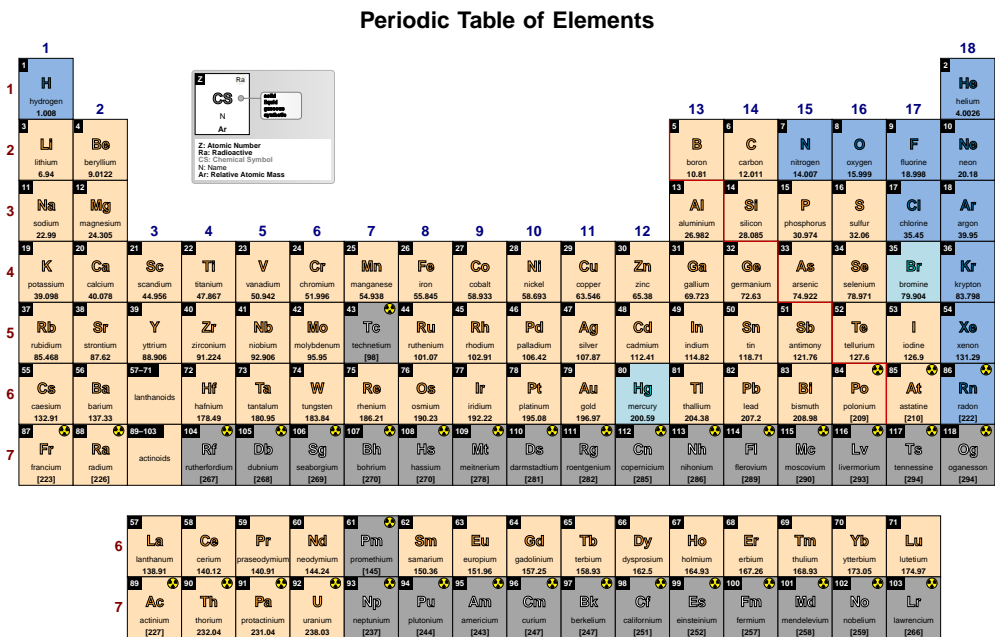


csPS

no value

A style equivalent to back color scheme=pgfPTPS

\pgfPT[csPS]



no value

`\pgfPT[csRadio]`

1																	18																						
1	H hydrogen 1.008																	He helium 4.0026																					
3	Li lithium 6.94	4	Be beryllium 9.0122																																				
11	Na sodium 22.99	12	Mg magnesium 24.305	3			5			7			9			17	F fluorine 18.998	10	Ne neon 20.18																				
19	K potassium 39.098	20	Ca calcium 40.078	21	Sc scandium 44.955	22	Ti titanium 47.867	23	V vanadium 50.942	24	Cr chromium 51.996	25	Mn manganese 54.938	26	Fe iron 55.845	27	Co cobalt 58.933	28	Ni nickel 58.693	29	Cu copper 63.546	30	Zn zinc 65.38	31	Ga gallium 69.723	32	Ge germanium 72.63	33	As arsenic 74.922	34	Se selenium 78.971	35	Br bromine 79.904	36	Kr krypton 83.798				
37	Rb rubidium 85.468	38	Sr strontium 87.62	39	Y yttrium 88.906	40	Zr zirconium 91.224	41	Nb niobium 92.906	42	Mo molybdenum 95.95	43	Tc technetium [98]	44	Ru ruthenium 101.07	45	Rh rhodium 102.91	46	Pd palladium 106.42	47	Ag silver 107.87	48	Cd cadmium 112.41	49	In indium 114.82	50	Sn tin 118.71	51	Sb antimony 121.76	52	Te tellurium 127.6	53	I iodine 126.9	54	Xe xenon 131.29				
55	Cs cesium 132.91	56	Ba barium 137.33	57-71	lanthanoids					72	Hf hafnium 178.49	73	Ta tantalum 180.95	74	W tungsten 183.84	75	Re rhenium 186.21	76	Os osmium 190.23	77	Ir iridium 192.22	78	Pt platinum 195.08	79	Au gold 196.97	80	Hg mercury 200.59	81	Tl thallium 204.38	82	Pb lead 207.2	83	Bi bismuth 208.98	84	Po polonium [209]	85	At astatine [210]	86	Rn radon [222]
87	Fr francium [223]	88	Ra radium [226]	89-103	actinoids					104	Rf rutherfordium [261]	105	Db dubnium [268]	106	Sg seaborgium [269]	107	Bh bohrium [270]	108	Hs hassium [270]	109	Mt meitnerium [278]	110	Ds darmstadtium [281]	111	Rg roentgenium [282]	112	Cn copernicium [285]	113	Nh nihonium [286]	114	Fl flerovium [289]	115	Mc moscovium [290]	116	Lv livermorium [293]	117	Ts tennessine [294]	118	Og oganeson [294]
6																			12																				
57	La lanthanum 138.91	58	Ce cerium 140.91	59	Pr praseodymium 140.91	60	Nd neodymium 144.24	61	Pm promethium [145]	62	Sm samarium 150.36	63	Eu europium 151.96	64	Gd gadolinium 157.25	65	Tb terbium 158.93	66	Dy dysprosium 162.5	67	Ho holmium 164.93	68	Er erbium 167.26	69	Tm thulium 168.93	70	Yb ytterbium 173.05	71	Lu lutetium 174.97										
89	Ac actinium [227]	90	Th thorium 232.04	91	Pa protactinium 231.04	92	U uranium 238.03	93	Np neptunium [237]	94	Pu plutonium [244]	95	Am americium [243]	96	Cm curium [247]	97	Bk berkelium [247]	98	Cf californium [251]	99	Es einsteinium [252]	100	Fm fermium [257]	101	Md mendelevium [258]	102	No nobelium [259]	103	Lr lawrencium [260]										

no value

`\pgfPT[csBlocks]`

1																	2		
1	H hydrogen 1.008																	2	He helium 4.0026
3	Li lithium 6.94	Be beryllium 9.0122																	
4	Na sodium 22.99	Mg magnesium 24.305																	
5	K potassium 39.098	Ca calcium 40.078	Sc scandium 44.956	Ti titanium 47.867	V vanadium 50.942	Cr chromium 51.996	Mn manganese 54.938	Fe iron 55.845	Co cobalt 58.933	Ni nickel 58.693	Cu copper 63.546	Zn zinc 65.38	Ga gallium 69.723	Ge germanium 72.63	As arsenic 74.922	Se selenium 78.971	Br bromine 79.904	Kr krypton 83.798	
6	Rb rubidium 85.468	Sr strontium 87.62	Y yttrium 88.906	Zr zirconium 91.224	Nb niobium 92.906	Mo molybdenum 95.95	Tc technetium [98]	Ru ruthenium 101.07	Rh rhodium 102.91	Pd palladium 106.42	Ag silver 107.87	Cd cadmium 112.41	In indium 114.82	Sn tin 118.71	Sb antimony 121.76	Te tellurium 127.6	I iodine 126.9	Xe xenon 131.29	
7	Cs caesium 132.91	Ba barium 137.33	La lanthanoids [57-71]	Hf hafnium 178.49	Ta tantalum 180.95	W tungsten 183.84	Re rhenium 186.21	Os osmium 190.23	Ir iridium 192.22	Pt platinum 195.08	Au gold 196.97	Hg mercury 200.59	Tl thallium 204.38	Pb lead 207.2	Bi bismuth 208.98	Po polonium [209]	At astatine [210]	Rn radon [222]	
8	Fr francium [223]	Ra radium [226]	Ac actinoids [89-103]	Rf rutherfordium [261]	Hf hafnium [268]	Sg seaborgium [266]	Bh bohrium [264]	Hs hassium [277]	Mt meitnerium [268]	Ds darmstadtium [281]	Rg roentgenium [282]	Cn copernicium [285]	Nh nihonium [286]	Fl flerovium [289]	Mc moscovium [290]	Lv livermorium [293]	Ts tennessine [294]	Og oganesson [294]	
9	La lanthanum 138.91	Ce cerium 140.12	Pr praseodymium 140.91	Nd neodymium 144.24	Pm promethium [145]	Sm samarium 150.36	Eu europium 151.96	Gd gadolinium 157.25	Tb terbium 158.93	Dy dysprosium 162.5	Ho holmium 164.93	Er erbium 167.26	Tm thulium 168.93	Yb ytterbium 173.05	Lu lutetium 174.97				
10	Ac actinium 227	Th thorium 232	Pa protactinium 231	U uranium 238	Np neptunium 237	Pu plutonium 244	Am americium 243	Cm curium 247	Bk berkelium 247	Cf californium 251	Es einsteinium 252	Fm fermium 257	Md mendelevium 258	No nobelium 259	Lr lawrencium 262				

background

default: {}

A style to set the background of the Periodic Table, built with any of the `TikZ` keys that can be applied to a path construction.

```
\pgfPT[background={draw=red,line width=2pt,fill=red!10}]
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (H) to Oganesson (Og). It includes a legend for element symbols and a color-coded background. The table is organized into groups and periods, with lanthanides and actinides shown separately at the bottom.

```
\usetikzlibrary{shadows}
```

```
\pgfPT[background={left color=red!10,right color=green!10,postaction={drop shadow={left color=red!10,right color=green!10}}}]
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (H) to Oganesson (Og). It includes a legend for element symbols and a color-coded background. The table is organized into groups and periods, with lanthanides and actinides shown separately at the bottom.

IUPAC default: *true*

When set to true draws the periodic table with *lanthanum* and *actinium* appended to block f and the labels *lanthanoids* and *actinoids* are placed at group 3, substituting *lanthanum* and *actinium*. When **IUPAC** is set to false, *lanthanum* and *actinium* are shown in group 3 and the labels *lanthanoids* and *actinoids* are placed near the *f* block (if the key **show label LaAc** is set to true).

\pgfPT

Periodic Table of Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen 1.008																	2 He helium 4.0026
3 Li lithium 6.94	4 Be beryllium 9.0122											5 B boron 10.81	6 C carbon 12.011	7 N nitrogen 14.007	8 O oxygen 15.999	9 F fluorine 18.998	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305											13 Al aluminum 26.982	14 Si silicon 28.085	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798
37 Rb rubidium 85.468	38 Sr strontium 87.62	39 Y yttrium 88.906	40 Zr zirconium 91.224	41 Nb niobium 92.906	42 Mo molybdenum 95.95	43 Tc technetium [98]	44 Ru ruthenium 101.07	45 Rh rhodium 102.91	46 Pd palladium 106.42	47 Ag silver 107.87	48 Cd cadmium 112.41	49 In indium 114.82	50 Sn tin 118.71	51 Sb antimony 121.76	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.29
55 Cs caesium 132.91	56 Ba barium 137.33	57-71 lanthanoids	72 Hf hafnium 178.49	73 Ta tantalum 180.95	74 W tungsten 183.84	75 Re rhenium 186.21	76 Os osmium 190.23	77 Ir iridium 192.22	78 Pt platinum 195.08	79 Au gold 196.97	80 Hg mercury 200.59	81 Tl thallium 204.38	82 Pb lead 207.2	83 Bi bismuth 208.98	84 Po polonium [209]	85 At astatine [210]	86 Rn radon [222]
87 Fr francium [223]	88 Ra radium [226]	89-103 actinoids	104 Rf rutherfordium [267]	105 Db dubnium [268]	106 Sg seaborgium [269]	107 Bh bohrium [270]	108 Hs hassium [271]	109 Mt meitnerium [272]	110 Ds darmstadtium [281]	111 Rg roentgenium [282]	112 Cn copernicium [285]	113 Nh nihonium [286]	114 Fl flerovium [289]	115 Mc moscovium [290]	116 Lv livermorium [293]	117 Ts tennessine [294]	118 Og oganeson [294]
6 57 La lanthanum 138.91	58 Ce cerium 140.12	59 Pr praseodymium 140.91	60 Nd neodymium 144.24	61 Pm promethium [145]	62 Sm samarium 150.36	63 Eu europium 151.96	64 Gd gadolinium 157.25	65 Tb terbium 158.93	66 Dy dysprosium 162.5	67 Ho holmium 164.93	68 Er erbium 167.26	69 Tm thulium 168.93	70 Yb ytterbium 173.05	71 Lu lutetium 174.97			
7 89 Ac actinium [227]	90 Th thorium 232.04	91 Pa protactinium 231.04	92 U uranium 238.03	93 Np neptunium [237]	94 Pu plutonium [244]	95 Am americium [243]	96 Cm curium [247]	97 Bk berkelium [247]	98 Cf californium [251]	99 Es einsteinium [252]	100 Fm fermium [257]	101 Md mendelevium [258]	102 No nobelium [259]	103 Lr lawrencium [260]			

\pgfPT[IUPAC=false]

Periodic Table of Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen 1.008																	2 He helium 4.0026
3 Li lithium 6.94	4 Be beryllium 9.0122											5 B boron 10.81	6 C carbon 12.011	7 N nitrogen 14.007	8 O oxygen 15.999	9 F fluorine 18.998	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305											13 Al aluminum 26.982	14 Si silicon 28.085	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798
37 Rb rubidium 85.468	38 Sr strontium 87.62	39 Y yttrium 88.906	40 Zr zirconium 91.224	41 Nb niobium 92.906	42 Mo molybdenum 95.95	43 Tc technetium [98]	44 Ru ruthenium 101.07	45 Rh rhodium 102.91	46 Pd palladium 106.42	47 Ag silver 107.87	48 Cd cadmium 112.41	49 In indium 114.82	50 Sn tin 118.71	51 Sb antimony 121.76	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.29
55 Cs caesium 132.91	56 Ba barium 137.33	57 La lanthanum 138.91	58 Ce cerium 140.12	59 Pr praseodymium 140.91	60 Nd neodymium 144.24	61 Pm promethium [145]	62 Sm samarium 150.36	63 Eu europium 151.96	64 Gd gadolinium 157.25	65 Tb terbium 158.93	66 Dy dysprosium 162.5	67 Ho holmium 164.93	68 Er erbium 167.26	69 Tm thulium 168.93	70 Yb ytterbium 173.05	71 Lu lutetium 174.97	
87 Fr francium [223]	88 Ra radium [226]	89 Ac actinium [227]	90 Th thorium 232.04	91 Pa protactinium 231.04	92 U uranium 238.03	93 Np neptunium [237]	94 Pu plutonium [244]	95 Am americium [243]	96 Cm curium [247]	97 Bk berkelium [247]	98 Cf californium [251]	99 Es einsteinium [252]	100 Fm fermium [257]	101 Md mendelevium [258]	102 No nobelium [259]	103 Lr lawrencium [260]	
		lanthanoids															
		6															
		actinoids															
		7															

show label LaAc

default: {}

Determines when the labels 'lanthanoids' and 'actinoids' are shown (**true**) or not shown (**false**) near the f block. When the **IUPAC** key is set to true, the default behavior is to show the labels and when the **IUPAC** key is set to false, the default behavior is to hide the labels. This *default behavior can be overridden by this key* setting it to true, to show the labels, or to false to hide them, independently of the value of the **IUPAC** key.

```
\pgfPTnewZlist{myZlist}{55,...,118}
\pgfPTstyle[show title=false,show legend=false,show group numbers=false]
\pgfPT[Z list=myZlist]
```

6	55	56	57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
	Cs	Ba	lanthanoids	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
	caesium 132.91	barium 137.33		hafnium 178.49	tantalum 180.95	tungsten 183.84	rhenium 186.21	osmium 190.23	iridium 192.22	platinum 195.08	gold 196.97	mercury 200.59	thallium 204.38	lead 207.2	bismuth 208.98	polonium [209]	astatine [210]	radon [222]
7	87	88	89-103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
	Fr	Ra	actinoids	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
	francium [223]	radium [226]		rutherfordium [267]	dubnium [268]	seaborgium [269]	bohrium [270]	hassium [271]	meitnerium [278]	darmstadtium [281]	roentgenium [282]	copernicium [285]	nihonium [286]	flerovium [289]	moscovium [290]	livermorium [293]	tennessine [294]	oganeson [294]

6	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	lanthanum 138.91	cerium 140.12	praseodymium 140.91	neodymium 144.24	promethium [145]	samarium 150.36	euporium 151.96	gadolinium 157.25	terbium 158.93	dysprosium 162.5	holmium 164.93	erbium 167.26	thulium 168.93	ytterbium 173.05	lutetium 174.97
7	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
	actinium [227]	thorium 232.04	protactinium 231.04	uranium 238.03	neptunium [237]	plutonium [244]	americium [243]	curium [247]	berkelium [247]	californium [251]	einsteinium [252]	fermium [257]	mendelevium [258]	nobelium [259]	lawrencium [261]

```
\pgfPT[Z list=myZlist,show label LaAc=true]
```

6	55	56	57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
	Cs	Ba	lanthanoids	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
	caesium 132.91	barium 137.33		hafnium 178.49	tantalum 180.95	tungsten 183.84	rhenium 186.21	osmium 190.23	iridium 192.22	platinum 195.08	gold 196.97	mercury 200.59	thallium 204.38	lead 207.2	bismuth 208.98	polonium [209]	astatine [210]	radon [222]
7	87	88	89-103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
	Fr	Ra	actinoids	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
	francium [223]	radium [226]		rutherfordium [267]	dubnium [268]	seaborgium [269]	bohrium [270]	hassium [271]	meitnerium [278]	darmstadtium [281]	roentgenium [282]	copernicium [285]	nihonium [286]	flerovium [289]	moscovium [290]	livermorium [293]	tennessine [294]	oganeson [294]

lanthanoids	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	lanthanum 138.91	cerium 140.12	praseodymium 140.91	neodymium 144.24	promethium [145]	samarium 150.36	euporium 151.96	gadolinium 157.25	terbium 158.93	dysprosium 162.5	holmium 164.93	erbium 167.26	thulium 168.93	ytterbium 173.05	lutetium 174.97
actinoids	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
	actinium [227]	thorium 232.04	protactinium 231.04	uranium 238.03	neptunium [237]	plutonium [244]	americium [243]	curium [247]	berkelium [247]	californium [251]	einsteinium [252]	fermium [257]	mendelevium [258]	nobelium [259]	lawrencium [261]

```
\pgfPT[Z list=myZlist,IUPAC=false]
```

6	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
	caesium 132.91	barium 137.33	lanthanum 138.91	hafnium 178.49	tantalum 180.95	tungsten 183.84	rhenium 186.21	osmium 190.23	iridium 192.22	platinum 195.08	gold 196.97	mercury 200.59	thallium 204.38	lead 207.2	bismuth 208.98	polonium [209]	astatine [210]	radon [222]
7	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
	francium [223]	radium [226]	actinium [227]	rutherfordium [267]	dubnium [268]	seaborgium [269]	bohrium [270]	hassium [271]	meitnerium [278]	darmstadtium [281]	roentgenium [282]	copernicium [285]	nihonium [286]	flerovium [289]	moscovium [290]	livermorium [293]	tennessine [294]	oganeson [294]

lanthanoids	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	cerium 140.12	praseodymium 140.91	neodymium 144.24	promethium [145]	samarium 150.36	euporium 151.96	gadolinium 157.25	terbium 158.93	dysprosium 162.5	holmium 164.93	erbium 167.26	thulium 168.93	ytterbium 173.05	lutetium 174.97
actinoids	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
	thorium 232.04	protactinium 231.04	uranium 238.03	neptunium [237]	plutonium [244]	americium [243]	curium [247]	berkelium [247]	californium [251]	einsteinium [252]	fermium [257]	mendelevium [258]	nobelium [259]	lawrencium [261]

```
\pgfPT[Z list=myZlist,IUPAC=false,show label LaAc=false]
```

6	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
	caesium 132.91	barium 137.33	lanthanum 138.91	hafnium 178.49	tantalum 180.95	tungsten 183.84	rhenium 186.21	osmium 190.23	iridium 192.22	platinum 195.08	gold 196.97	mercury 200.59	thallium 204.38	lead 207.2	bismuth 208.98	polonium [209]	astatine [210]	radon [222]
7	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
	francium [223]	radium [226]	actinium [227]	rutherfordium [267]	dubnium [268]	seaborgium [269]	bohrium [270]	hassium [271]	meitnerium [278]	darmstadtium [281]	roentgenium [282]	copernicium [285]	nihonium [286]	flerovium [289]	moscovium [290]	livermorium [293]	tennessine [294]	oganeson [294]

6	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	cerium 140.12	praseodymium 140.91	neodymium 144.24	promethium [145]	samarium 150.36	euporium 151.96	gadolinium 157.25	terbium 158.93	dysprosium 162.5	holmium 164.93	erbium 167.26	thulium 168.93	ytterbium 173.05	lutetium 174.97
7	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
	thorium 232.04	protactinium 231.04	uranium 238.03	neptunium [237]	plutonium [244]	americium [243]	curium [247]	berkelium [247]	californium [251]	einsteinium [252]	fermium [257]	mendelevium [258]	nobelium [259]	lawrencium [261]

label LaAc fontdefault: `\footnotesize\itshape`

Sets the font for the labels 'lanthanoids' and 'actinoids'.

`\pgfPT[label LaAc font=\bfseries,Z list=myZlist,IUPAC=false]`

The image displays a periodic table with the lanthanoid and actinoid series separated below the main table. The lanthanoids are labeled from Ce (60) to Lu (71), and the actinoids from Th (90) to Lr (103). The labels for these series are in a bold, italicized font, as specified by the `label LaAc font` option.

\pgfPTresetstyle**languages**default: `{}`

Sets a language list to use in the Periodic Table. It is a comma separated list of language flags: 'pt', 'en', 'fr', 'de', 'it', 'es' or 'br'. If a user language has been loaded, the corresponding ISO 639-1 code can also be used as a language flag. *This key locally overrides the default language, that is, the language loaded at package inclusion.*

(changed in v2.1.0)

`\pgfPT[Z list={1,...,36},languages=pt]`**Tabela Periódica dos Elementos**

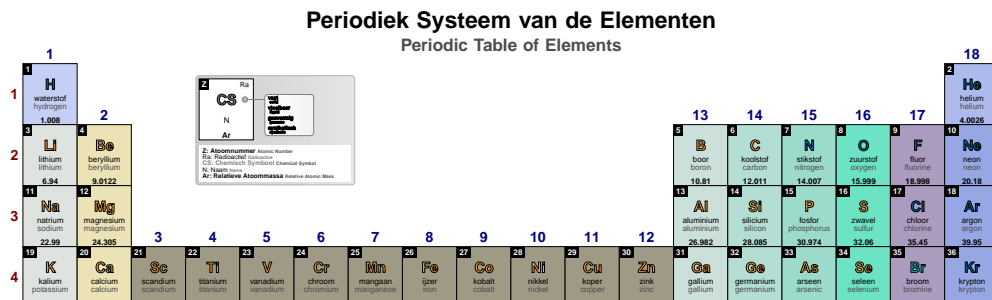
The image shows a periodic table with elements labeled in Portuguese. The first two rows are highlighted in blue and yellow. A legend box in the top left corner defines the symbols for Atomic Number (Z), Atomic Weight (A), Radioactive (R), Chemical (C), and Atomic Mass (Ar).

`\pgfPT[Z list={1,...,36},cell style=pgfPT2lang,languages={en,fr}]`**Periodic Table of Elements****Tableau Périodique des Éléments**

The image shows a periodic table with elements labeled in English. The first two rows are highlighted in blue and yellow. A legend box in the top left corner defines the symbols for Atomic Number (Z), Atomic Weight (A), Radioactive (R), Chemical (C), and Atomic Mass (Ar).

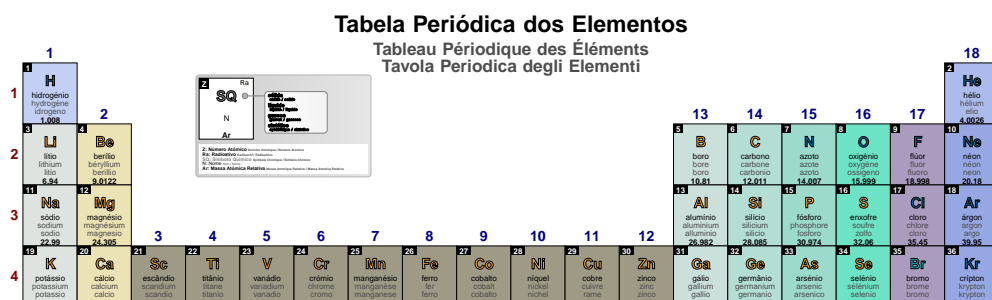
```
% \usepackage[userlang=nl]{pgf-PeriodicTable}
\pgfPT[Z list={1,...,36},cell style=pgfPT2lang,languages={nl,en}]
```

Periodiek Systeem van de Elementen
Periodic Table of Elements



```
\pgfPT[Z list={1,...,36},cell style=pgfPT3lang,languages={pt,fr,it}]
```

Tabela Periódica dos Elementos
Tableau Périodique des Éléments
Tavola Periodica degli Elementi



When using a set of languages, space to accommodate the names in each cell must be provided by building a suitable cell - typically one cell row per language. The cell styles used in the two examples above are built-in and serve this purpose.

✓ Built-in style **pgfPT2lang**

The build command:

```
\pgfPTbuildcell(6,3)%
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4-5;1-3;name),(6;1-3;Ar)]
```

	1	2	3
1	Z		radio
2		CS	
3			
4			
5			
6		Ar	

scale 1.5:1

✓ Built-in style **pgfPT3lang**

The build command:

```
\pgfPTbuildcell(7,3)%
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4-6;1-3;name),(7;1-3;Ar)]
```

	1	2	3
1	Z		radio
2		CS	
3			
4			
5			
6			
7		Ar	

scale 1.5:1

Also, the space for the title should be taken into account – if using more than three languages, the legend must be *turned off*, otherwise the title overlaps the legend.

other languages font

default: `\tiny`

Sets the font used in *other languages*, i.e., the languages started at the second entry of the list provide to the `languages` key.

```
\pgfPT[Z list={1,...,36},cell style=pgfPT3lang,languages={en,es,br}, other languages
font=\tiny\bfseries]
```

Periodic Table of Elements
Tabla Periódica de los Elementos
Tabela Periódica dos Elementos

other languages colordefault: *black!70*Sets the color of the font used in *other languages*.

```
\pgfPT[Z list={1,...,36},cell style=pgfPT3lang,languages={en,pt,br}, other languages
color=purple]
```

Periodic Table of Elements
Tabela Periódica dos Elementos
Tabela Periódica dos Elementos

other langdefault: $\{f=\tiny,c=black!70\}$ *Pseudo style* to set the keys: other languages font and/or other languages color. None of the keys – f and c – are mandatory.**USAGE:** other lang= $\{f=<\text{font commands}>,c=<\text{color}>\}$

```
\pgfPT[Z list={1,...,36},cell style=pgfPT3lang,languages={en,fr,de}, other
lang={f=\tiny\itshape,c=blue}]
```

Periodic Table of Elements
Tableau Périodique des Eléments
Periodensystem der Elemente

show MNM linedefault: *true*If set to *true* a line separating metals from non metals is shown in the Periodic Table. The line starts at the upper left corner of the cell of boron (2nd period, group 13) and ends at the lower right corner of polonium (6th period, group 16). If set to *false* no line is drawn.

`\pgfPT[Z list=spd]`

Periodic Table of Elements

Periodic Table of Elements (Z list=spd)

Legend: Z: Atomic Number, A: Relative Atomic Mass, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass

1	2																	18																		
1	H																	2	He																	
2	Li	3	Be											10	Ne																					
3	Na	4	Mg	5	Al	6	Si	7	P	8	S	9	Cl	10	Ar																					
4	K	19	Ca	20	Sc	21	Ti	22	V	23	Cr	24	Mn	25	Fe	26	Co	27	Ni	28	Cu	29	Zn	30	Ga	31	Ge	32	As	33	Se	34	Br	35	Kr	
5	Rb	37	Sr	38	Y	39	Zr	40	Nb	41	Mo	42	Tc	43	Ru	44	Rh	45	Pd	46	Ag	47	Cd	48	In	49	Sn	50	Sb	51	Te	52	I	53	Xe	
6	Cs	55	Ba	56	La	57-71	72	Hf	73	Ta	74	W	75	Re	76	Os	77	Ir	78	Pt	79	Au	80	Hg	81	Tl	82	Pb	83	Bi	84	Po	85	At	86	Rn
7	Fr	87	Ra	88	Ac	89-103	104	Rf	105	Db	106	Sg	107	Bh	108	Hs	109	Mt	110	Ds	111	Rg	112	Cn	113	Nh	114	Fl	115	Mc	116	Lv	117	Ts	118	Og

`\pgfPT[show MNM line=false]`

Periodic Table of Elements

Periodic Table of Elements (show MNM line=false)

Legend: Z: Atomic Number, A: Relative Atomic Mass, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass

1	2																	18																		
1	H																	2	He																	
2	Li	3	Be											10	Ne																					
3	Na	4	Mg	5	Al	6	Si	7	P	8	S	9	Cl	10	Ar																					
4	K	19	Ca	20	Sc	21	Ti	22	V	23	Cr	24	Mn	25	Fe	26	Co	27	Ni	28	Cu	29	Zn	30	Ga	31	Ge	32	As	33	Se	34	Br	35	Kr	
5	Rb	37	Sr	38	Y	39	Zr	40	Nb	41	Mo	42	Tc	43	Ru	44	Rh	45	Pd	46	Ag	47	Cd	48	In	49	Sn	50	Sb	51	Te	52	I	53	Xe	
6	Cs	55	Ba	56	La	57-71	72	Hf	73	Ta	74	W	75	Re	76	Os	77	Ir	78	Pt	79	Au	80	Hg	81	Tl	82	Pb	83	Bi	84	Po	85	At	86	Rn
7	Fr	87	Ra	88	Ac	89-103	104	Rf	105	Db	106	Sg	107	Bh	108	Hs	109	Mt	110	Ds	111	Rg	112	Cn	113	Nh	114	Fl	115	Mc	116	Lv	117	Ts	118	Og
6	La	58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu							
7	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr							

`\pgfPT[Z list={1,...,36}]`

Periodic Table of Elements

																												18							
1		H																		2		He													
hydrogen		1.008																		helium		4.0026													
3		4																10		Ne															
Li		Be																Neon		20.18															
lithium		beryllium																argon		39.95															
6.94		9.0122																16.999		20.18															
11		12																18		Ar															
Na		Mg																Ar		39.95															
sodium		magnesium																chlorine		35.45															
22.99		24.305																35.45		39.95															
19		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35		36	
K		Ca		Sc		Ti		V		Cr		Mn		Fe		Co		Ni		Cu		Zn		Ga		Ge		As		Se		Br		Kr	
potassium		calcium		scandium		titanium		vanadium		chromium		manganese		iron		cobalt		nickel		copper		zinc		gallium		germanium		arsenic		selenium		bromine		krypton	
39.098		40.078		44.956		47.867		50.942		51.996		54.938		55.845		58.933		58.933		63.546		65.38		69.723		72.63		74.922		78.971		79.904		83.798	

2

CS

Ra

N

Ar

radioactive

chemical symbol

name

relative atomic mass

Z: Atomic Number

Ra: Radioactive

CS: Chemical Symbol

N: Name

Ar: Relative Atomic Mass

MNM line colordefault: *red!80!black*Sets the color of the *MNM line*.

\pgfPT[MNM line color=green]

Periodic Table of Elements

Periodic Table of Elements showing elements from Hydrogen (1) to Oganesson (118). The table includes the f-block elements (lanthanides and actinoids) and the MNM line (between groups 12 and 13) is highlighted in green.

MNM line widthdefault: *.8pt*Sets the width of the *MNM line*.

\pgfPT[MNM line width=1.5pt]

Periodic Table of Elements

Periodic Table of Elements showing elements from Hydrogen (1) to Oganesson (118). The table includes the f-block elements (lanthanides and actinoids) and the MNM line (between groups 12 and 13) is highlighted with a thicker green line.

MNMdefault: $\{c=\text{red!80!black}, w=.8\text{pt}\}$

Pseudo style to set the *MNM line* color and/or width. None of the keys – c and w – are mandatory. The key **show MNM line** is set to **true**.

USAGE: `MNM={c=<color>,w=<length>}`
`\pgfPT[MNM={w=1.5pt,c=red}]`

Periodic Table of Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen 1.008																	2 He helium 4.0026
3 Li lithium 6.94	4 Be beryllium 9.0122											5 B boron 10.81	6 C carbon 12.011	7 N nitrogen 14.007	8 O oxygen 15.999	9 F fluorine 18.998	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305											13 Al aluminum 26.982	14 Si silicon 28.085	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798
37 Rb rubidium 85.468	38 Sr strontium 87.62	39 Y yttrium 88.906	40 Zr zirconium 91.224	41 Nb niobium 92.906	42 Mo molybdenum 95.95	43 Tc technetium [98]	44 Ru ruthenium 101.07	45 Rh rhodium 102.91	46 Pd palladium 106.42	47 Ag silver 107.87	48 Cd cadmium 112.41	49 In indium 114.82	50 Sn tin 118.71	51 Sb antimony 121.76	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.29
55 Cs caesium 132.91	56 Ba barium 137.33	57-71 La-Lu lanthanoids	72 Hf hafnium 178.49	73 Ta tantalum 180.95	74 W tungsten 183.84	75 Re rhenium 186.21	76 Os osmium 190.23	77 Ir iridium 192.22	78 Pt platinum 195.08	79 Au gold 196.97	80 Hg mercury 200.59	81 Tl thallium 204.38	82 Pb lead 207.2	83 Bi bismuth 208.98	84 Po polonium [209]	85 At astatine [210]	86 Rn radon [222]
87 Fr francium [223]	88 Ra radium [226]	89-103 Ac-Lr actinoids	104 Rf rutherfordium [261]	105 Db dubnium [268]	106 Sg seaborgium [269]	107 Bh bohrium [270]	108 Hs hassium [271]	109 Mt meitnerium [272]	110 Ds darmstadtium [281]	111 Rg roentgenium [282]	112 Cn copernicium [285]	113 Nh nihonium [286]	114 Fl flerovium [289]	115 Mc moscovium [290]	116 Lv livermorium [293]	117 Ts tennessine [294]	118 Og oganeson [294]
57 La lanthanum 138.91	58 Ce cerium 140.12	59 Pr praseodymium 140.91	60 Nd neodymium 144.24	61 Pm promethium [145]	62 Sm samarium 150.36	63 Eu europium 151.96	64 Gd gadolinium 157.25	65 Tb terbium 158.93	66 Dy dysprosium 162.5	67 Ho holmium 164.93	68 Er erbium 167.26	69 Tm thulium 168.93	70 Yb ytterbium 173.05	71 Lu lutetium 174.97			
89 Ac actinium [227]	90 Th thorium 232.04	91 Pa protactinium 231.04	92 U uranium 238.03	93 Np neptunium [237]	94 Pu plutonium [244]	95 Am americium [243]	96 Cm curium [247]	97 Bk berkelium [247]	98 Cf californium [251]	99 Es einsteinium [252]	100 Fm fermium [257]	101 Md mendelevium [258]	102 No nobelium [259]	103 Lr lawrencium [260]			

→ Title and Legend

show titledefault: *true*

When set to **true** the title is shown, otherwise the title (Periodic Table of elements) is not shown.

`\pgfPT[Z list={1,...,36}]`

Periodic Table of Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen 1.008																	2 He helium 4.0026
3 Li lithium 6.94	4 Be beryllium 9.0122											5 B boron 10.81	6 C carbon 12.011	7 N nitrogen 14.007	8 O oxygen 15.999	9 F fluorine 18.998	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305											13 Al aluminum 26.982	14 Si silicon 28.085	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

```
\pgfPT[Z list={1,...,36},show title=false]
```

Periodic Table of Elements (Title font: $\Large\bfseries$)

title font

Sets the font used in the title.

default: $\Large\bfseries$

```
\pgfPT[Z list={1,...,36},title font=\Huge\itshape]
```

Periodic Table of Elements

Periodic Table of Elements (Title font: $\Huge\itshape$)

title color

Sets the title color.

default: *black*

```
\pgfPT[Z list={1,...,36},title color=green!50!black]
```

Periodic Table of Elements

Periodic Table of Elements (Title color: green!50!black)

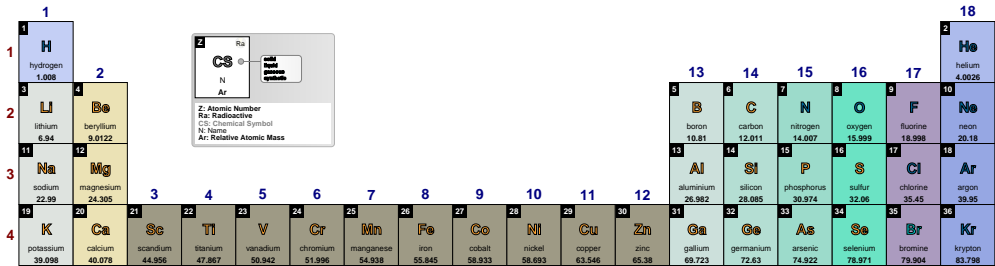
titledefault: $\{f=\Large\bfseries,c=black\}$

Pseudo style to set the keys: title **f**ont and/or title **c**olor. None of the keys – f and c – are mandatory. The key **show title** is set to **true**.

USAGE: title={f=,c=<color>}

```
\pgfPT[Z list={1,...,36},title={f=\Huge,c=teal}]
```

Periodic Table of Elements

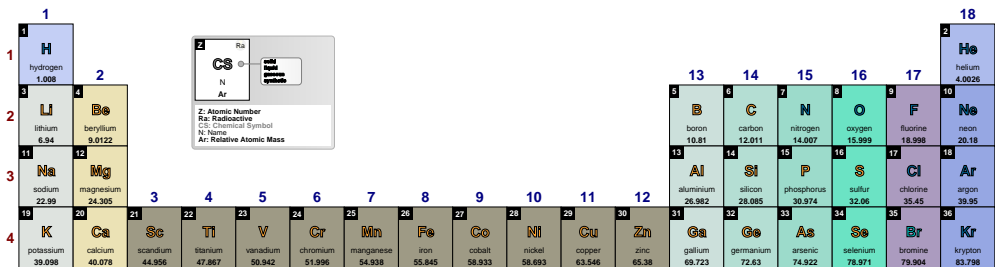


show legend default: *true*

When set to *true* the legend is shown, otherwise it is not shown.

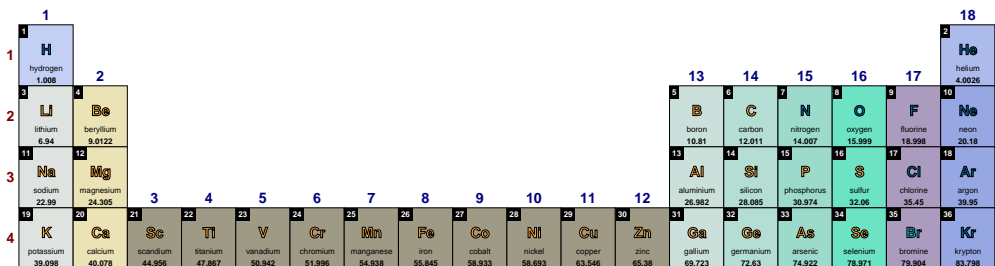
```
\pgfPT[Z list={1,...,36}]
```

Periodic Table of Elements



```
\pgfPT[Z list={1,...,36},show legend=false]
```

Periodic Table of Elements



legend acronymsdefault: *true*

When set to *true*, the legend consists of a cell using acronyms for its contents and the corresponding descriptions below that cell. When set to *false*, only the cell is displayed with the descriptions in place of the acronyms. In the latter case, the description font size is automatically adjusted to the available box, which can *spoil the appearance of the whole caption*, depending on the described content.

\pgfPT[Z list={1,...,36}]

Periodic Table of Elements

1	2											18					
1 H hydrogen 1.008												2 He helium 4.0026					
3 Li lithium 6.94	4 Be beryllium 9.0122											13 B boron 10.81	14 C carbon 12.011	15 N nitrogen 14.007	16 O oxygen 15.999	17 F fluorine 18.998	18 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305	3	4	5	6	7	8	9	10	11	12	13 Al aluminum 26.982	14 Si silicon 28.085	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

\pgfPT[Z list={1,...,36},legend acronyms=false]

Periodic Table of Elements

1	2											18					
1 H hydrogen 1.008												2 He helium 4.0026					
3 Li lithium 6.94	4 Be beryllium 9.0122											13 B boron 10.81	14 C carbon 12.011	15 N nitrogen 14.007	16 O oxygen 15.999	17 F fluorine 18.998	18 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305	3	4	5	6	7	8	9	10	11	12	13 Al aluminum 26.982	14 Si silicon 28.085	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

legend acronyms at rightdefault: *false*

When set to *true*, the legend acronyms descriptions are shown to the right of the cell.

NOTE:

If the cell contains both *Is* and *DiscC*, *legend acronyms at right* will be automatically set to false.

\pgfPT[Z list={1,...,36},legend acronyms at right=true]

Periodic Table of Elements

1

1

H

hydrogen

1.008

2

2

He

helium

4.0026

3

3

Li

lithium

6.94

4

4

Be

beryllium

9.0122

11

11

Na

sodium

22.99

12

12

Mg

magnesium

24.305

13

13

B

boron

10.81

14

14

C

carbon

12.011

15

15

N

nitrogen

14.007

16

16

O

oxygen

15.999

17

17

F

fluorine

18.998

18

18

Ne

neon

20.18

19

19

K

potassium

39.098

20

20

Ca

calcium

40.078

21

21

Sc

scandium

44.956

22

22

Ti

titanium

47.867

23

23

V

vanadium

50.942

24

24

Cr

chromium

51.996

25

25

Mn

manganese

54.938

26

26

Fe

iron

55.845

27

27

Co

cobalt

58.933

28

28

Ni

nickel

58.693

29

29

Cu

copper

63.546

30

30

Zn

zinc

65.38

31

31

Ga

gallium

69.723

32

32

Ge

germanium

72.63

33

33

As

arsenic

74.922

34

34

Se

selenium

78.971

35

35

Br

bromine

79.904

36

36

Kr

krypton

83.798

2

Ra

CS

⊕

Ar

Z: Atomic Number

Ra: Radioactive

CS: Chemical Symbol

N: Name

Ar: Relative Atomic Mass

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

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33

34

35

36

```
\pgfPTbuildcellstyle{myname}(6,3)% 6 rows by 3 columns
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5.25-6.75;1-3;DiscC)]
\pgfPT[Z list={1,...,36},legend acronyms at right=true,cell style=myname]
```

Periodic Table of Elements

The periodic table displays elements 1 through 36. Each element cell contains its symbol, name, and a small flag. A legend box in the center provides details for the cell styles: Z (Atomic Number), Ra (Radioactive), CS (Chemical Symbol), N (Name), and cd (Country of Discovery). A list of countries is also provided, each with a small flag and its name.

```
\pgfPTbuildcellstyle{myname}(6,3)% 6 rows by 3 columns
[(1;1-2;Z),(1;3;ls),(2-3;1.5-3.5;CS),(4;1-3;name),(5.25-6.75;1-3;DiscC)]
\pgfPT[Z list={1,...,36},legend acronyms at right=true,cell style=myname]
```

Periodic Table of Elements

This periodic table is similar to the first one but includes a legend for cell styles that also includes 'ls' (Lattice Structure). The legend also lists various crystal structures: body centered cubic, face centered orthorhombic, body centered tetragonal, diamond, face centered cubic, face centered orthorhombic, hexagonal close packed, hexagonal, monoclinic, orthorhombic, simple cubic, simple tetragonal, and trigonal.

legend acronyms font size

default: *document font size*

Sets the font size of the text used in the **legend acronyms** description. It must be a valid \TeX dimension and *it only works when the key **legend acronyms** is set to **true**.*

(new in v2.1.5)

```
\pgfPT[Z list={1,...,36},legend acronyms font size=14pt]
```

Periodic Table of Elements

This periodic table shows elements 1 through 36 with numerical values for atomic number (Z), relative atomic mass (Ar), and chemical symbol (CS). The legend box in the center provides details for the cell styles: Z (Atomic Number), Ra (Radioactive), CS (Chemical Symbol), N (Name), and Ar (Relative Atomic Mass). A list of countries is also provided, each with a small flag and its name.

legend boxdefault: `left color=black!20,right color=black!10,draw=black!30`

Style to define the appearance of the box around the legend, legend pins and acronym descriptions, built with any of the `TikZ` keys that can be applied to a path construction. *It only works when the key `legend acronyms` is set to `true`.*

`\pgfPT[Z list={1,...,36}]`**Periodic Table of Elements**

The periodic table displays elements 1 through 36. A legend box is positioned above the table, showing details for elements Ra, Cs, N, and Ar. The legend box has a black border and a black background. The details for each element are as follows:

Element	Z	Atomic Number	Ra	Radioactive	Cs	Chemical Symbol	N	Name	Ar	Relative Atomic Mass
Ra	88	88	88	Radioactive						
Cs	55	55	55	Radioactive	55	Cs	Cesium			132.90545196
N	7	7	7		7	N	Nitrogen			14.00643
Ar	18	18	18		18	Ar	Argon			39.948

`\pgfPT[Z list={1,...,36},legend box={draw=blue!20,fill=blue!10}]`**Periodic Table of Elements**

The periodic table displays elements 1 through 36. A legend box is positioned above the table, showing details for elements Ra, Cs, N, and Ar. The legend box has a blue border and a blue background. The details for each element are as follows:

Element	Z	Atomic Number	Ra	Radioactive	Cs	Chemical Symbol	N	Name	Ar	Relative Atomic Mass
Ra	88	88	88	Radioactive						
Cs	55	55	55	Radioactive	55	Cs	Cesium			132.90545196
N	7	7	7		7	N	Nitrogen			14.00643
Ar	18	18	18		18	Ar	Argon			39.948

`\pgfPT[Z list={1,...,36},legend box={draw=blue!20,fill=blue!10},legend acronyms=false]`**Periodic Table of Elements**

The periodic table displays elements 1 through 36. A legend box is positioned above the table, showing details for elements Ra, Cs, N, and Ar. The legend box has a white border and a white background. The details for each element are as follows:

Element	Z	Atomic Number	Ra	Radioactive	Cs	Chemical Symbol	N	Name	Ar	Relative Atomic Mass
Ra	88	88	88	Radioactive						
Cs	55	55	55	Radioactive	55	Cs	Cesium			132.90545196
N	7	7	7		7	N	Nitrogen			14.00643
Ar	18	18	18		18	Ar	Argon			39.948

`\pgfPT[Z list={1,...,36},legend box={}]`**Periodic Table of Elements**

The periodic table displays elements 1 through 36. A legend box is positioned above the table, showing details for elements Ra, Cs, N, and Ar. The legend box has a black border and a black background. The details for each element are as follows:

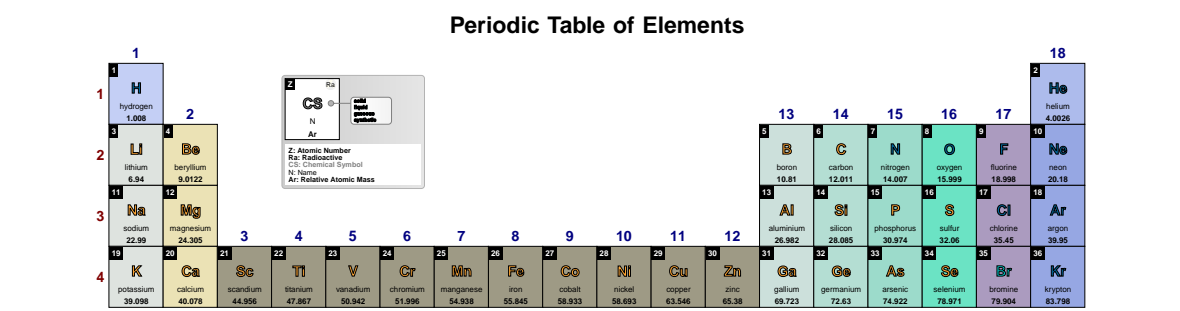
Element	Z	Atomic Number	Ra	Radioactive	Cs	Chemical Symbol	N	Name	Ar	Relative Atomic Mass
Ra	88	88	88	Radioactive						
Cs	55	55	55	Radioactive	55	Cs	Cesium			132.90545196
N	7	7	7		7	N	Nitrogen			14.00643
Ar	18	18	18		18	Ar	Argon			39.948

legend Z color

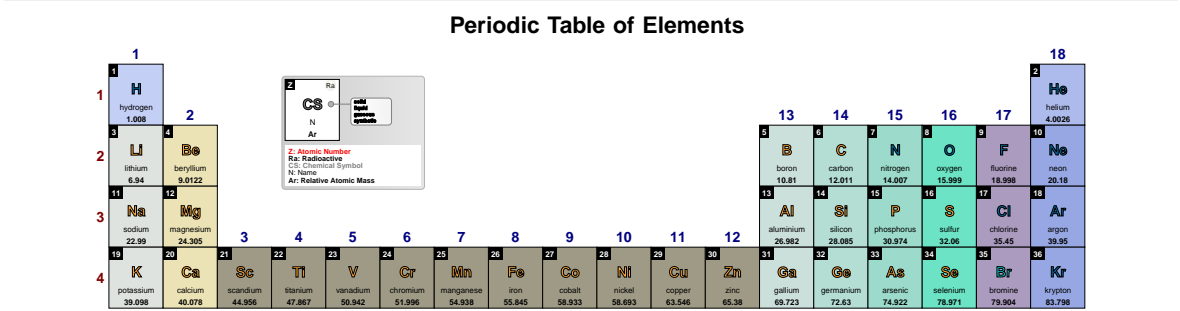
default: {}

Sets the color of the atomic number description (only applies when the key **legend acronyms** is set to **true**.)

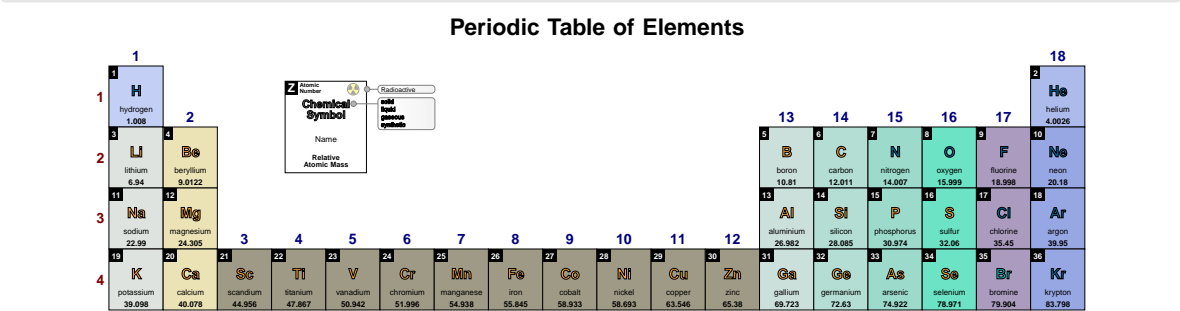
```
\pgfPT[Z list={1,...,36}]
```



```
\pgfPT[Z list={1,...,36},legend Z color=red]
```



```
\pgfPT[Z list={1,...,36},legend Z color=red,legend acronyms=false]
```




```
\pgfPT[Z list={1,...,36},cell style=pgfPTdisc]
```

Periodic Table of Elements

```
\pgfPT[Z list={1,...,36},cell style=pgfPTdisc,extra legend={draw=red,fill=red!10}]
```

Periodic Table of Elements

```
\pgfPT[Z list={1,...,36},cell style=pgfPTdisc,legend acronyms=false,extra legend={draw=red,fill=red!10}]
```

Periodic Table of Elements

legend

default: {bc=white,pins=true,extra=true,acro=true}

Pseudo style to set the keys: legend **back** color, show legend **pins**, show **extra** legend, legend **acronyms**, legend **radio** color, legend **CS** color, legend **Z** color, legend **pins** (style), **extra** legend (style) and/or legend **box** (style). None of the keys – bc, pins, extra, acro, radio, CS, Z, pins style, extra style and box – are mandatory. The key **show legend** is set to **true**.

USAGE:

```
legend={bc=<color>,pins=<true|false>,extra=<true|false>,acro=<true|false>,
radio=<color>,CS=<color>,Z=<color>,pins style=<tikz path keys>,
extra style=<tikz path keys>,box=<tikz path keys>}
```

```
\pgfPT[Z list={1,...,36},cell style=myname,legend={bc=black!10,extra=false}]
```

Periodic Table of Elements

Legend box content:

- Z: Atomic Number
- Ra: Radioactive
- CS: Chemical Symbol
- N: Name
- cd: Country of Discovery

```
\pgfPT[Z list={1,...,36},cell style=myname,legend={acro=false,extra=false}]
```

Periodic Table of Elements

Legend box content:

- Z: Atomic Number
- Ra: Radioactive
- CS: Chemical Symbol
- N: Name
- cd: Country of Discovery

► Periods and Groups

show period numbers

default: *true*When set to *true* the period numbers are shown, otherwise they are not shown.

```
\pgfPT[Z list={1,...,36}]
```

Periodic Table of Elements

Legend box content:

- Z: Atomic Number
- Ra: Radioactive
- CS: Chemical Symbol
- N: Name
- cd: Country of Discovery

```
\pgfPT[Z list={1,...,36},show period numbers=false]
```

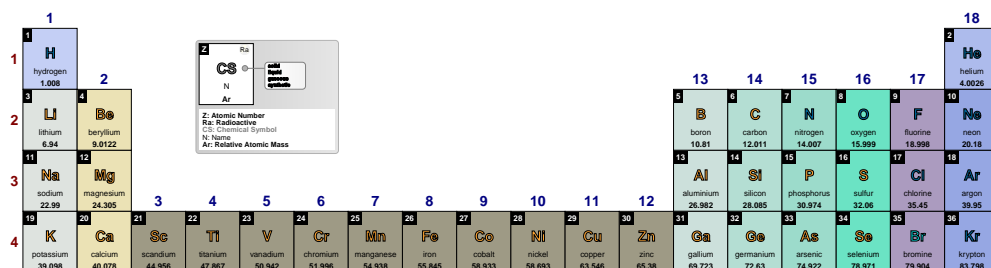
Periodic Table of Elements

Legend box content:

- Z: Atomic Number
- Ra: Radioactive
- CS: Chemical Symbol
- N: Name
- cd: Country of Discovery

show group numbersdefault: *true*When set to *true* the group numbers are shown, otherwise they are not shown.`\pgfPT[Z list={1,...,36}]`

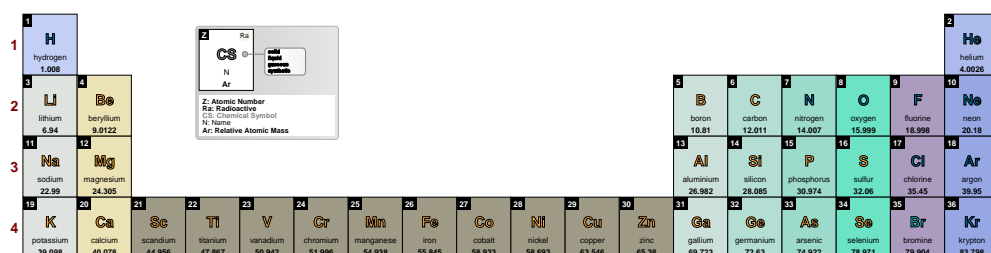
Periodic Table of Elements



The periodic table shows elements with their atomic number (Z), chemical symbol, name, and relative atomic mass (Ar). Group numbers 1 through 18 are displayed above the columns. A callout box for Carbon (C) shows its properties: Z: 6, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

`\pgfPT[Z list={1,...,36},show group numbers=false]`

Periodic Table of Elements



The periodic table shows elements with their atomic number (Z), chemical symbol, name, and relative atomic mass (Ar). Group numbers are not displayed. A callout box for Carbon (C) shows its properties: Z: 6, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

group numbersdefault: *arabic*

This key controls how group numbering is displayed:

- ✓ **arabic**: group numbers are shown in arabic numerals as recommended by IUPAC since 1988.
- ✓ **CAS**: group numbers are shown in Roman numerals and 'A' or 'B' suffix. This is an older naming scheme, used by the Chemical Abstract Service (CAS), more popular in the United States.
- ✓ **IUPAC**: group numbers are shown in Roman numerals and 'A' or 'B' suffix. This is an older naming scheme, used by IUPAC before 1988, more popular in Europe.
- ✓ **CAS***: combines the option **CAS** and **arabic**. Roman numerals and 'A' or 'B' suffix are above the group and the arabic numerals above them.
- ✓ **IUPAC***: combines the option **IUPAC** and **arabic**. Roman numerals and 'A' or 'B' suffix are above the group and the arabic numerals above them.
- ✓ **USER DEFINED LIST**: a comma separated list with groups labels. The list can be of any size, and the labels will be set in the order in which they appear. *If less than eighteen labels are provided, the remaining groups will have no label. In the same way, if more than eighteen labels are provided, only the first eighteen will be used.*

(new in v2.1.1 – changed in v2.1.6)


```
\pgfPT[Z list={1,...,36},group numbers={1,2,3}]
```

Periodic Table of Elements

```
\pgfPT[Z list={1,...,36},group
numbers={1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20}]
```

Periodic Table of Elements

```
\def\mylabels{I,II,,,,,,III,IV,V,VI,VII,VIII}
```

```
\pgfPT[Z list={1,...,36},group numbers=\mylabels]
```

Periodic Table of Elements

period label color

Sets the period label color.

default: *red!50!black*

```
\pgfPT[Z list={1,...,36},period label color=black]
```

Periodic Table of Elements

group label colordefault: *blue!50!black*

Sets the group label color.

`\pgfPT[Z list={1,...,36},group label color=black]`

Periodic Table of Elements

Roman label colordefault: *blue!70!black*

Sets the Roman group label color.

(new in v2.1.1)

Periodic Table of Elements

`\pgfPT[Z list={1,...,36},group numbers=CAS*,Roman label color=purple,group label color=teal]`

Periodic Table of Elements

label font

Sets the label font.

default: `\small\bfseries``\pgfPT[Z list={1,...,36},label font=\itshape]`

Periodic Table of Elements

1																	18	
1	H																	He
	hydrogen																	helium
	1.008																	4.0026
2	3	4											9	10				
	Li	Be											B	C	N	O	F	Ne
	lithium	beryllium											boron	carbon	nitrogen	oxygen	fluorine	neon
	6.94	9.0122											10.81	12.011	14.007	15.999	18.998	20.18
3	11	12											13	14	15	16	17	18
	Na	Mg											Al	Si	P	S	Cl	Ar
	sodium	magnesium											aluminum	silicon	phosphorus	sulfur	chlorine	argon
	22.99	24.305											26.982	28.085	30.974	32.06	35.45	39.95
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798

perdefault: `{gr=true,c=red!50!black,f=\small\bfseries}`

Pseudo style to set the keys: show **g**roup numbers, period label **color** and/or label **font**. None of the keys – gr, c and f – are mandatory. The key **show period numbers** is set to **true**.

USAGE: `per={gr=<true|false>,c=<color>,f=}``\pgfPT[Z list={1,...,36},per={gr=false,c=green!50!black}]`

Periodic Table of Elements

1

H

hydrogen

1.008

2

Li

lithium

6.94

3

Na

sodium

22.99

4

K

potassium

39.098

5

Be

beryllium

9.0122

6

Mg

magnesium

24.305

7

Ca

calcium

40.078

8

Sc

scandium

44.956

9

Ti

titanium

47.867

10

V

vanadium

50.942

11

Cr

chromium

51.996

12

Mn

manganese

54.938

13

Fe

iron

55.845

14

Co

cobalt

58.933

15

Ni

nickel

58.693

16

Cu

copper

63.546

17

Zn

zinc

65.38

18

Ga

gallium

69.723

19

Ge

germanium

72.63

20

As

arsenic

74.922

21

Se

selenium

78.971

22

Br

bromine

79.904

23

Kr

krypton

83.798

24

Ra

radioactive

chemical symbol

name

relative atomic mass

25

He

helium

4.0026

26

Ne

neon

20.18

27

Ar

argon

39.95

28

Kr

krypton

83.798

29

Xe

xenon

131.29

30

Rn

radon

222

grdefault: `{per=true,c=blue!50!black,f=\small\bfseries}`

Pseudo style to set the keys: show **p**eriod numbers, group label **color** and/or label **font**. None of the keys – per, c and f – are mandatory. The key **show group numbers** is set to **true**.

USAGE: `gr={per=<true|false>,c=<color>,f=}``\pgfPT[Z list={1,...,36},gr={per=false,c=green!50!black}]`

Periodic Table of Elements

1																	18	
1	H																	He
	hydrogen																	helium
	1.008																	4.0026
2	3	4											9	10				
	Li	Be											B	C	N	O	F	Ne
	lithium	beryllium											boron	carbon	nitrogen	oxygen	fluorine	neon
	6.94	9.0122											10.81	12.011	14.007	15.999	18.998	20.18
3	11	12											13	14	15	16	17	18
	Na	Mg											Al	Si	P	S	Cl	Ar
	sodium	magnesium											aluminum	silicon	phosphorus	sulfur	chlorine	argon
	22.99	24.305											26.982	28.085	30.974	32.06	35.45	39.95
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798

per+gr default: $\{pc=red!50!black,gc=blue!50!black,f=\small\bfseries\}$

Pseudo style: use **c** to set both keys group label color and period label color with the same color; use **pc** to set period label color, **gc** to set group label color and/or **f** to set label font. None of the keys – c, pc, gc and f – are mandatory. The keys **show period numbers** and **show group numbers** are set to **true**.

USAGE: per+gr={c=<color>,pc=<color>,gc=<color>,f=}

$\backslash\text{pgfPT}[Z\text{ list}=\{1,\dots,36\},\text{per+gr}=\{c=\text{green!50!black},f=\text{\fontfamily\frf}\selectfont\normalsize\bfseries\}]$

Periodic Table of Elements

1	2											13	14	15	16	17	18
1 H hydrogen 1.008												5 B boron 10.81	6 C carbon 12.011	7 N nitrogen 14.007	8 O oxygen 15.999	9 F fluorine 18.998	10 Ne neon 20.18
3 Li lithium 6.94	4 Be beryllium 9.0122											11 Al aluminum 26.982	12 Si silicon 28.085	13 P phosphorus 30.974	14 S sulfur 32.06	15 Cl chlorine 35.45	16 Ar argon 39.95
11 Na sodium 22.99	12 Mg magnesium 24.305	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

► Blocks and Families

show blocks

default: *false*

When set to **true** the blocks **s**, **p**, **d** and **f** are drawn overlaying the Periodic Table and their labels are shown. Note that blocks are only shown when the **Z list** contains, at least, all elements of blocks **s**, **p** and **d**.

$\backslash\text{pgfPT}[Z\text{ list}=\{1,\dots,36\},\text{show blocks}=\text{true},\text{show title}=\text{false}]$

1	2											13	14	15	16	17	18
1 H hydrogen 1.008												5 B boron 10.81	6 C carbon 12.011	7 N nitrogen 14.007	8 O oxygen 15.999	9 F fluorine 18.998	10 Ne neon 20.18
3 Li lithium 6.94	4 Be beryllium 9.0122											11 Al aluminum 26.982	12 Si silicon 28.085	13 P phosphorus 30.974	14 S sulfur 32.06	15 Cl chlorine 35.45	16 Ar argon 39.95
11 Na sodium 22.99	12 Mg magnesium 24.305	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

\pgfPT[show blocks,show title=false]

Periodic table showing elements with their atomic numbers (Z), chemical symbols (CS), names (N), and relative atomic masses (Ar). The table is color-coded by blocks: s-block (yellow), p-block (green), d-block (red), and f-block (blue). The legend indicates: Z: Atomic Number, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

\pgfPT[Z list=spd,show blocks,show title=false]

Periodic table showing elements with their atomic numbers (Z), chemical symbols (CS), names (N), and relative atomic masses (Ar). The table is color-coded by blocks: s-block (yellow), p-block (green), d-block (red), and f-block (blue). The legend indicates: Z: Atomic Number, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

\pgfPT[Z list=spd,show blocks,show title=false,IUPAC=false]

Periodic table showing elements with their atomic numbers (Z), chemical symbols (CS), names (N), and relative atomic masses (Ar). The table is color-coded by blocks: s-block (yellow), p-block (green), d-block (red), and f-block (blue). The legend indicates: Z: Atomic Number, R: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

blocks fontdefault: `\small\bfseries`

Sets the font used in the block labels.

```
\pgfPT[Z list=spd,show blocks,show title=false,blocks
font=\small\bfseries\fontfamily{ptm}\selectfont]
```

The diagram shows a periodic table with the following blocks highlighted:

- s-block:** Yellow, containing groups 1 and 2.
- p-block:** Green, containing groups 13 through 18.
- d-block:** Pink, containing groups 3 through 10.
- f-block:** Light blue, containing the lanthanide and actinide series.

A legend box for Cesium (Cs) is shown, displaying its atomic number (55), symbol, name, and relative atomic mass (132.91).

s block colordefault:  RGB: 255,231,132

Sets the block s color.

s block font color

default: {}

Sets the s block label font color. If no color is provided, the **s block color** will be used as the font color.**s block line width**

default: 0.8pt

Sets the width of the line surrounding the s block.

p block colordefault:  RGB: 170,255,172

Sets the block p color.

p block font color

default: {}

Sets the p block label font color. If no color is provided, the **p block color** will be used as the font color.**p block line width**

default: 0.8pt

Sets the width of the line surrounding the p block.

d block colordefault:  RGB: 255,187,187

Sets the block d color.

d block font color

default: {}

Sets the d block label font color. If no color is provided, the **d block color** will be used as the font color.**d block line width**

default: 0.8pt

Sets the width of the line surrounding the d block.

f block colordefault:  RGB: 177,203,228

Sets the block f color.

f block font color

default: {}

Sets the f block label font color. If no color is provided, the **f block color** will be used as the font color.

f block line widthdefault: *0.8pt*

Sets the width of the line surrounding the f block.

blocks font colordefault: *black*Style to set a common color for the labels of s, p, d and f blocks. The key `show blocks` is set to `true`.

\pgfPT[blocks font color,show title=false]

The image displays a periodic table with the following features:

- s-block:** Groups 1 and 2 (Hydrogen, Helium, Lithium, Beryllium, Sodium, Magnesium, Potassium, Calcium, Scandium, Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Gallium, Germanium, Arsenic, Selenium, Bromine, Krypton, Rubidium, Strontium, Yttrium, Zirconium, Niobium, Molybdenum, Technetium, Ruthenium, Rhodium, Palladium, Silver, Cadmium, Indium, Tin, Antimony, Tellurium, Iodine, Xenon, Barium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Thorium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium).
- p-block:** Groups 13-18 (Boron, Carbon, Nitrogen, Oxygen, Fluorine, Neon, Aluminum, Silicon, Phosphorus, Sulfur, Chlorine, Argon, Gallium, Germanium, Arsenic, Selenium, Bromine, Krypton, Indium, Tin, Antimony, Tellurium, Iodine, Xenon, Barium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Thorium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium).
- d-block:** Groups 3-10 (Scandium, Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Gallium, Germanium, Arsenic, Selenium, Bromine, Krypton, Rubidium, Strontium, Yttrium, Zirconium, Niobium, Molybdenum, Technetium, Ruthenium, Rhodium, Palladium, Silver, Cadmium, Indium, Tin, Antimony, Tellurium, Iodine, Xenon, Barium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Thorium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium).
- f-block:** Groups 11-12 (Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Thorium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium).

A legend box in the top left corner defines the symbols used in the table:

- Z:** Atomic Number
- R:** Radioactive
- CS:** Chemical Symbol
- N:** Name
- Ar:** Relative Atomic Mass

blocks line widthdefault: *0.8pt*Style to set a common width of the lines surrounding the s, p, d and f blocks. The key `show blocks` is set to `true`.

\pgfPT[blocks line width=1.5pt]

Periodic Table of Elements

The image displays a periodic table with the following features:

- s-block:** Groups 1 and 2 (Hydrogen, Helium, Lithium, Beryllium, Sodium, Magnesium, Potassium, Calcium, Scandium, Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Gallium, Germanium, Arsenic, Selenium, Bromine, Krypton, Rubidium, Strontium, Yttrium, Zirconium, Niobium, Molybdenum, Technetium, Ruthenium, Rhodium, Palladium, Silver, Cadmium, Indium, Tin, Antimony, Tellurium, Iodine, Xenon, Barium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Thorium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium).
- p-block:** Groups 13-18 (Boron, Carbon, Nitrogen, Oxygen, Fluorine, Neon, Aluminum, Silicon, Phosphorus, Sulfur, Chlorine, Argon, Gallium, Germanium, Arsenic, Selenium, Bromine, Krypton, Indium, Tin, Antimony, Tellurium, Iodine, Xenon, Barium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Thorium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium).
- d-block:** Groups 3-10 (Scandium, Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Gallium, Germanium, Arsenic, Selenium, Bromine, Krypton, Rubidium, Strontium, Yttrium, Zirconium, Niobium, Molybdenum, Technetium, Ruthenium, Rhodium, Palladium, Silver, Cadmium, Indium, Tin, Antimony, Tellurium, Iodine, Xenon, Barium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Thorium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium).
- f-block:** Groups 11-12 (Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Thorium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium).

A legend box in the top left corner defines the symbols used in the table:

- Z:** Atomic Number
- R:** Radioactive
- CS:** Chemical Symbol
- N:** Name
- Ar:** Relative Atomic Mass

blocks default: `{sc=blocos,pc=blocop,dc=blocod,fc=blocof,lw=.8pt,font=\small\bfseries}`

Pseudo style to set the keys: block **s** color, block **p** color, block **d** color, block **f** color, the common line widths of the blocks, the **s** block line width, the **p** block line width, the **d** block line width, the **f** block line width, blocks font, **s** block font color, **p** block font color, **d** block font color and/or **f** block font color. None of the keys – `sc`, `pc`, `dc`, `fc`, `lw`, `slw`, `plw`, `dlw`, `flw`, `sfc`, `pf`, `dfc` and `ffc` – are mandatory. The key `show blocks` is set to `true`.

NOTE:

The colors provided to the color keys of the blocks – `sc`, `pc`, `dc` and `fc` – could be any defined color via the command `\definecolor` or by *mixing* colors, using, for instance, the syntax `color1!value!color2` or `color1!value`, as explained in the `xcolor` package documentation.

USAGE:

```
blocks={sc=<color>,pc=<color>,dc=<color>,fc=<color>,lw=<lenght>,
slw=<lenght>,plw=<lenght>,dlw=<lenght>,flw=<lenght>,f=<font commands>,
sfc=<color>,pf=<color>,dfc=<color>,ffc=<color>}
```

`\pgfPT[blocks={sc=red!70!white,pc=green!70!white,dc=yellow!70!white,lw=2pt},
show title=false,Z list=spd]`

1	2											13	14	15	16	17	18	
1 H hydrogen 1.008	2 He helium 4.0026											13 B boron 10.81	14 C carbon 12.011	15 N nitrogen 14.007	16 O oxygen 15.999	17 F fluorine 18.998	18 Ne neon 20.18	
3 Li lithium 6.94	4 Be beryllium 9.0122											13 Al aluminum 26.982	14 Si silicon 28.086	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95	
5 Na sodium 22.99	6 Mg magnesium 24.305											13 Ga gallium 69.723	14 Ge germanium 72.63	15 As arsenic 74.922	16 Se selenium 78.971	17 Br bromine 79.904	18 Kr krypton 83.796	
7 K potassium 39.098	8 Ca calcium 40.078	9 Sc scandium 44.956	10 Ti titanium 47.867	11 V vanadium 50.942	12 Cr chromium 51.996	13 Mn manganese 54.938	14 Fe iron 55.845	15 Co cobalt 58.933	16 Ni nickel 58.693	17 Cu copper 63.546	18 Zn zinc 65.38	19 Ga gallium 69.723	20 Ge germanium 72.63	21 As arsenic 74.922	22 Se selenium 78.971	23 Br bromine 79.904	24 Kr krypton 83.796	
9 Rb rubidium 85.468	10 Sr strontium 87.62	11 Y yttrium 88.906	12 Zr zirconium 91.224	13 Nb niobium 92.906	14 Mo molybdenum 95.95	15 Tc technetium [98]	16 Ru ruthenium 98.906	17 Rh rhodium 101.07	18 Pd palladium 106.32	19 Ag silver 107.87	20 Cd cadmium 112.41	21 In indium 114.82	22 Sn tin 118.71	23 Sb antimony 121.76	24 Te tellurium 127.6	25 I iodine 126.9	26 Xe xenon 131.29	
11 Cs cesium 132.91	12 Ba barium 137.33	lanthanoids		14 Hf hafnium 178.49	15 Ta tantalum 180.95	16 W tungsten 183.84	17 Re rhenium 186.21	18 Os osmium 190.23	19 Ir iridium 192.22	20 Pt platinum 195.08	21 Au gold 196.97	22 Hg mercury 200.59	23 Tl thallium 204.38	24 Pb lead 207.2	25 Bi bismuth 208.98	26 Po polonium [209]	27 At astatine [210]	28 Rn radon [222]
13 Fr francium [223]	14 Ra radium [226]	actinoids		15 Rf rutherfordium [261]	16 Db dubnium [268]	17 Sg seaborgium [266]	18 Bh bohrium [264]	19 Hs hassium [277]	20 Mt meitnerium [268]	21 Ds darmstadtium [281]	22 Rg roentgenium [289]	23 Cn copernicium [285]	24 Nh nihonium [286]	25 Fl flerovium [289]	26 Mc moscovium [289]	27 Lr lawrencium [260]	28 Ts tennessine [294]	29 Og oganesson [294]

`\pgfPT[blocks={sc=red!70!white,pc=green!70!white,dc=yellow!70!white,
dfc=yellow!70!black,lw=2pt},show title=false]`

1	2											13	14	15	16	17	18	
1 H hydrogen 1.008	2 He helium 4.0026											13 B boron 10.81	14 C carbon 12.011	15 N nitrogen 14.007	16 O oxygen 15.999	17 F fluorine 18.998	18 Ne neon 20.18	
3 Li lithium 6.94	4 Be beryllium 9.0122											13 Al aluminum 26.982	14 Si silicon 28.086	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95	
5 Na sodium 22.99	6 Mg magnesium 24.305											13 Ga gallium 69.723	14 Ge germanium 72.63	15 As arsenic 74.922	16 Se selenium 78.971	17 Br bromine 79.904	18 Kr krypton 83.796	
7 K potassium 39.098	8 Ca calcium 40.078	9 Sc scandium 44.956	10 Ti titanium 47.867	11 V vanadium 50.942	12 Cr chromium 51.996	13 Mn manganese 54.938	14 Fe iron 55.845	15 Co cobalt 58.933	16 Ni nickel 58.693	17 Cu copper 63.546	18 Zn zinc 65.38	19 Ga gallium 69.723	20 Ge germanium 72.63	21 As arsenic 74.922	22 Se selenium 78.971	23 Br bromine 79.904	24 Kr krypton 83.796	
9 Rb rubidium 85.468	10 Sr strontium 87.62	11 Y yttrium 88.906	12 Zr zirconium 91.224	13 Nb niobium 92.906	14 Mo molybdenum 95.95	15 Tc technetium [98]	16 Ru ruthenium 98.906	17 Rh rhodium 101.07	18 Pd palladium 106.32	19 Ag silver 107.87	20 Cd cadmium 112.41	21 In indium 114.82	22 Sn tin 118.71	23 Sb antimony 121.76	24 Te tellurium 127.6	25 I iodine 126.9	26 Xe xenon 131.29	
11 Cs cesium 132.91	12 Ba barium 137.33	lanthanoids		14 Hf hafnium 178.49	15 Ta tantalum 180.95	16 W tungsten 183.84	17 Re rhenium 186.21	18 Os osmium 190.23	19 Ir iridium 192.22	20 Pt platinum 195.08	21 Au gold 196.97	22 Hg mercury 200.59	23 Tl thallium 204.38	24 Pb lead 207.2	25 Bi bismuth 208.98	26 Po polonium [209]	27 At astatine [210]	28 Rn radon [222]
13 Fr francium [223]	14 Ra radium [226]	actinoids		15 Rf rutherfordium [261]	16 Db dubnium [268]	17 Sg seaborgium [266]	18 Bh bohrium [264]	19 Hs hassium [277]	20 Mt meitnerium [268]	21 Ds darmstadtium [281]	22 Rg roentgenium [289]	23 Cn copernicium [285]	24 Nh nihonium [286]	25 Fl flerovium [289]	26 Mc moscovium [289]	27 Lr lawrencium [260]	28 Ts tennessine [294]	29 Og oganesson [294]
6 La lanthanum 138.91	58 Ce cerium 140.12	59 Pr praseodymium 140.91	60 Nd neodymium 144.24	61 Pm promethium [145]	62 Sm samarium 150.36	63 Eu europium 151.96	64 Gd gadolinium 157.25	65 Tb terbium 158.93	66 Dy dysprosium 162.5	67 Ho holmium 164.93	68 Er erbium 167.26	69 Tm thulium 168.93	70 Yb ytterbium 173.05	71 Lu lutetium 174.97				
7 Ac actinium [227]	90 Th thorium 232.04	91 Pa protactinium 231.04	92 U uranium 238.03	93 Np neptunium [237]	94 Pu plutonium [244]	95 Am americium [243]	96 Cm curium [247]	97 Bk berkelium [247]	98 Cf californium [251]	99 Es einsteinium [252]	100 Fm fermium [257]	101 Md mendelevium [258]	102 No nobelium [259]	103 Lr lawrencium [260]				

show familiesdefault: *false*

When set to **true** the main families – **r**epresentative elements, **t**ransition metals and **i**nternal transition metals – are drawn overlaying the Periodic Table and their labels are shown. *Note that families are only shown when the **Z list** contains, at least, all elements of blocks s, p and d.*

```
\pgfPT[Z list={1,...,111},show families]
```

Periodic Table of Elements

1	H	hydrogen	1.008	2	He	helium	4.0026
3	Li	lithium	6.94	4	Be	beryllium	9.0122
11	Na	sodium	22.99	12	Mg	magnesium	24.305
19	K	potassium	39.098	20	Ca	calcium	40.078
27	Rb	rubidium	85.468	38	Sr	strontium	87.62
55	Cs	caesium	132.91	56	Ba	barium	137.33
87	Fr	francium	[223]	88	Ra	radium	[226]
13	B	boron	10.81	14	C	carbon	12.011
15	N	nitrogen	14.007	16	O	oxygen	15.999
17	F	fluorine	18.998	18	Ne	neon	20.18
29	Cu	copper	63.546	30	Zn	zinc	65.38
47	Ag	silver	107.87	48	Cd	cadmium	112.41
79	Au	gold	196.97	80	Hg	mercury	200.59
111	Rg	roentgenium	[282]	112	Cn	copernicium	[285]
113	Nh	nihonium	[286]	114	Fl	flerovium	[289]
115	Mc	moscovium	[290]	116	Lv	livermorium	[293]
117	Ts	tennessine	[294]	118	Og	oganesson	[294]

```
\pgfPT[show families]
```

Periodic Table of Elements

1	H	hydrogen	1.008	2	He	helium	4.0026
3	Li	lithium	6.94	4	Be	beryllium	9.0122
11	Na	sodium	22.99	12	Mg	magnesium	24.305
19	K	potassium	39.098	20	Ca	calcium	40.078
27	Rb	rubidium	85.468	38	Sr	strontium	87.62
55	Cs	caesium	132.91	56	Ba	barium	137.33
87	Fr	francium	[223]	88	Ra	radium	[226]
13	B	boron	10.81	14	C	carbon	12.011
15	N	nitrogen	14.007	16	O	oxygen	15.999
17	F	fluorine	18.998	18	Ne	neon	20.18
29	Cu	copper	63.546	30	Zn	zinc	65.38
47	Ag	silver	107.87	48	Cd	cadmium	112.41
79	Au	gold	196.97	80	Hg	mercury	200.59
111	Rg	roentgenium	[282]	112	Cn	copernicium	[285]
113	Nh	nihonium	[286]	114	Fl	flerovium	[289]
115	Mc	moscovium	[290]	116	Lv	livermorium	[293]
117	Ts	tennessine	[294]	118	Og	oganesson	[294]

\pgfPT[show families,show title=false,IUPAC=false]

Periodic table showing families and representative elements. The table is color-coded by groups. A callout box for 'REPRESENTATIVE ELEMENTS' points to groups 1, 2, 13, 14, 15, 16, and 17. Another callout box for 'TRANSITION METALS' points to groups 3 through 10. A third callout box for 'INTERNAL TRANSITION METALS' points to the lanthanoid and actinoid series.

families font

Sets the font used in the family labels.

default: `\small\bfseries`

\pgfPT[show families,show title=false,families font=\normalsize]

Periodic table showing families and representative elements with normal font. The table is color-coded by groups. A callout box for 'REPRESENTATIVE ELEMENTS' points to groups 1, 2, 13, 14, 15, 16, and 17. Another callout box for 'TRANSITION METALS' points to groups 3 through 10. A third callout box for 'INTERNAL TRANSITION METALS' points to the lanthanoid and actinoid series.

r family color

Sets the representative elements *block* color.

default: RGB: 170,255,172

r family font color

Sets the representative elements *block* label font color. If no color is provided, the **r family color** will be used as the font color.

default: `{}`

r family line width

default: 0.8pt

Sets the width of the line surrounding the representative elements *block*.**tm family color**default:  RGB: 255,187,187Sets the transition metals *block* color.**tm family font color**

default: {}

Sets the transition metals *block* label font color. If no color is provided, the **tm family color** will be used as the font color.**tm family line width**

default: 0.8pt

Sets the width of the line surrounding the transition metals *block*.**itm family color**default:  RGB: 177,203,228Sets the internal transition metals *block* color.**itm family font color**

default: {}

Sets the internal transition metals *block* label font color. If no color is provided, the **itm family color** will be used as the font color.**itm family line width**

default: 0.8pt

Sets the width of the line surrounding the internal transition metals *block*.**families font color**

default: black

Style to set a common color for the labels of representative elements, transition metals and internal transition metals *blocks*. The key **show blocks** is set to **true**.

\pgfPT[show title=false,families font color=blue!50!black]

families line width

default: 0.8pt

Style to set a common width of the lines surrounding the representative elements, transition metals and internal transition metals *blocks*. The key **show families** is set to **true**.

\pgfPT[show title=false,show families,families line width=1.5pt]

REPRESENTATIVE ELEMENTS

TRANSITION METALS

INTERNAL TRANSITION METALS

Legend:
 Z: Atomic Number
 Ra: Radioactive
 CS: Chemical Symbol
 N: Name
 Ar: Relative Atomic Mass

familiesdefault: $\{rc=blocor,tc=blocot,ic=blocoi,lw=.8pt,f=\small\backslash bfseries\}$

Pseudo style to set the keys: **r** family color, **tm** family color, **itm** family color, the common line widths of the families, the **r** family line width, the **tm** family line width, the **itm** family line width, the families font, **r** family font color, **tm** family font color and/or **itm** family font color. None of the keys – rc, tc, ic, lw, rlw, ilw, f, rfc, tfc and ifc – are mandatory. The key **show families** is set to **true**.

NOTE:

The colors provided for the color keys of the families could be any defined color via the command `\definecolor` or by *mixing* colors, using, for instance, the syntax `color1!value!color2`, as explained in the `xcolor` package documentation.

USAGE:

families={rc=<color>,tc=<color>,ic=<color>,lw=<lenght>,rlw=<lenght>,
 tlw=<lenght>,ilw=<lenght>,f=,rfc=<color>,
 tfc=<color>,ifc=<color>}

`\pgfPT[families={rc=red!70!white,ic=yellow!70!white,lw=2pt},show title=false]`

REPRESENTATIVE ELEMENTS

TRANSITION METALS

INTERNAL TRANSITION METALS

Legend:
 Z: Atomic Number
 Ra: Radioactive
 CS: Chemical Symbol
 N: Name
 Ar: Relative Atomic Mass

\pgfPT[families={rc=blue,ic=yellow!70!white,rlw=2pt},show title=false]

The periodic table is color-coded according to the options. Representative elements (groups 1, 2, and 13-18) are highlighted in blue. Internal transition metals (lanthanides and actinides) are highlighted in yellow. The table includes element symbols, atomic numbers, and names. A callout box for 'REPRESENTATIVE ELEMENTS' points to the blue-colored groups. A legend box shows the color coding: 'Z: Atomic Number', 'R: Radioactive', 'CS: Chemical Symbol', 'N: Name', 'Ar: Relative Atomic Mass'.

\pgfPT[families={rc=blue,ic=yellow!70!white,rlw=2pt,ifc=yellow!70!black},show title=false]

This version of the periodic table is similar to the first one, but the internal transition metals (lanthanides and actinides) are highlighted in yellow with black borders. The rest of the table remains the same, with representative elements in blue. The callout box and legend are also present.

► Periodic variations

show periodic variations

default: *false*

When set to *true* the periodic variations – for atomic radius, ionization energy and/or electron affinity – are shown with two *arrows*. One horizontal arrow is placed at the top of the Periodic Table for the variation over the period and the other vertically to the left of the Periodic Table for the variation over the group.

NOTE:

The variations are only shown when the *base cell* of the Periodic Table contains the atomic radius, the ionization energy and/or the electron affinity. If none of them is present setting this key (*show periodic variations*) has no effect.

```
\pgfPTstyle[Z list=spd,show title=false]
```

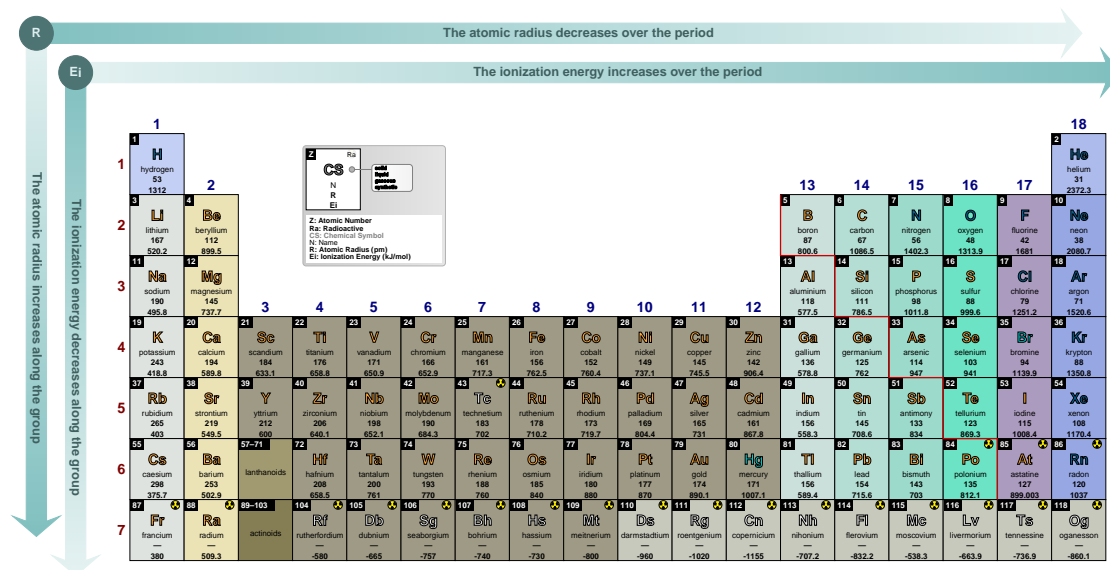
```
\pgfPT[show periodic variations]
```

The periodic table displays elements with their atomic numbers, symbols, and names. Arrows indicate trends for atomic radius, ionization energy, and electron affinity. A legend box in the top left corner defines the symbols used in the table: Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

```
\pgfPT[show periodic variations,cell style=pgfPTR]
```

The periodic table displays elements with their atomic numbers, symbols, and names. Arrows indicate trends for atomic radius, ionization energy, and electron affinity. A legend box in the top left corner defines the symbols used in the table: Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, R: Atomic Radius (pm). The table uses the pgfPTR cell style, which includes a vertical arrow on the left indicating that the atomic radius increases along the group.

\pgfPT[show periodic variations,cell style=pgfPTREi]



varR color

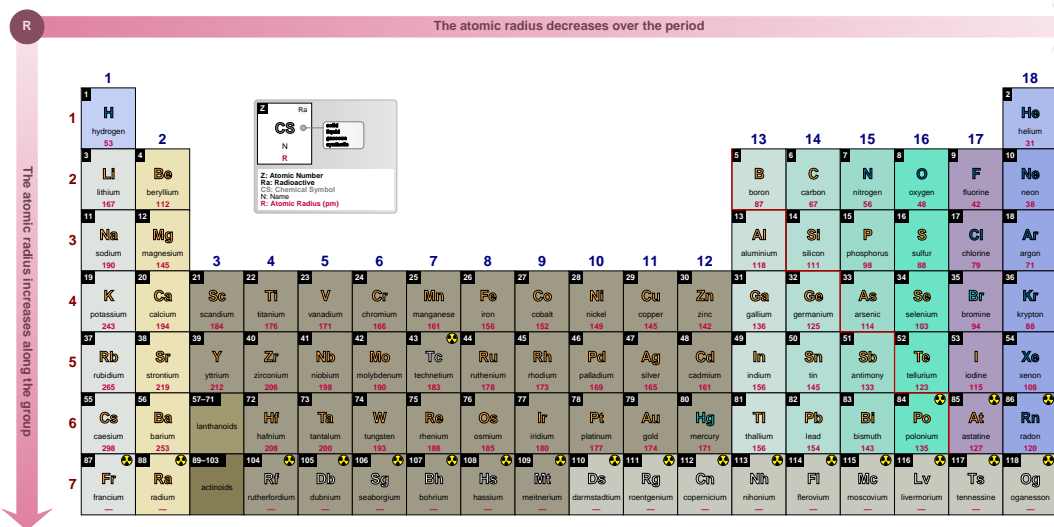
default: RGB: 128,191,191

Sets the color used in the filling of the *arrows* for the atomic radius variations.

NOTE:

The color provided to **varR color** could be any defined color via the command `\definecolor` or by *mixing* colors, using, for instance, the syntax `color1!value!color2`, as explained in the [xcolor](#) package documentation.

\pgfPT[show periodic variations,cell style=pgfPTR,varR color=purple!50!white,R color=purple]

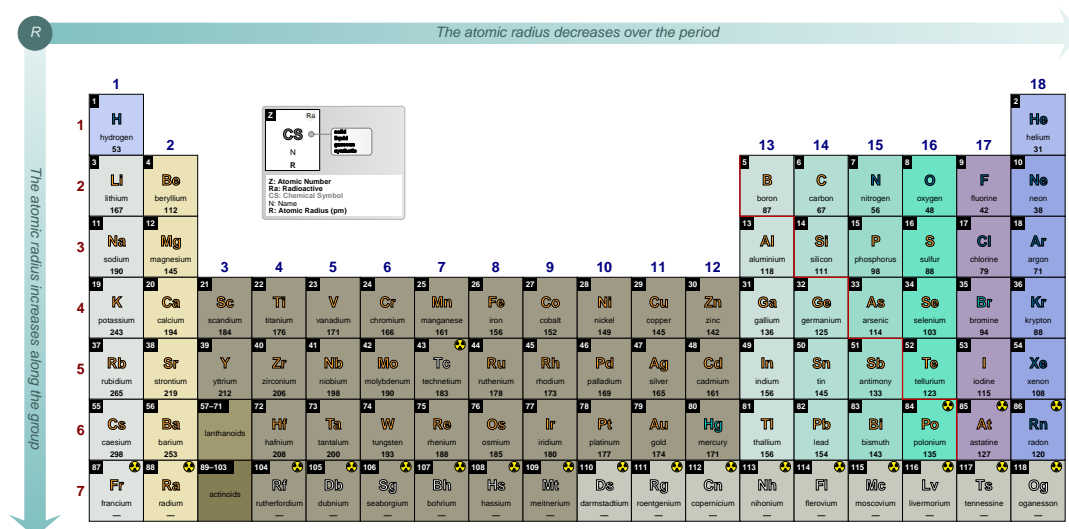


varR font

default: `\footnotesize\bfseries`

Sets the font for the text displayed inside the arrow, describing the variation of the atomic radius.

\pgfPT[show periodic variations,cell style=pgfPTR,varR font=\small\itshape]

**varR font color**default: (value of varR color)!50!black

Sets the color of the text showing the atomic radius variations displayed inside the corresponding arrows.

See the note in *varR color*.

varEi colordefault: RGB: 128,191,191

Sets the color used in the filling of the arrows for the ionization energy variations.

See the note in *varR color*.

varEi font

default: \footnotesize\bfseries

Sets the font for the text displayed inside the arrow, describing the variation of the ionization energy.

varEi font colordefault: (value of varEi color)!50!black

Sets the color of the text showing the ionization energy variations displayed inside the corresponding arrows.

See the note in *varR color*.

vareaff colordefault: RGB: 128,191,191

Sets the color used in the filling of the arrows for the electron affinity variations.

See the note in *varR color*.

vareaff font

default: \footnotesize\bfseries

Sets the font for the text displayed inside the arrow, describing the variation of the electron affinity.

vareaff font colordefault: (value of vareaff color)!50!black

Sets the color of the text showing the electron affinity variations displayed inside the corresponding arrows.

See the note in *varR color*.

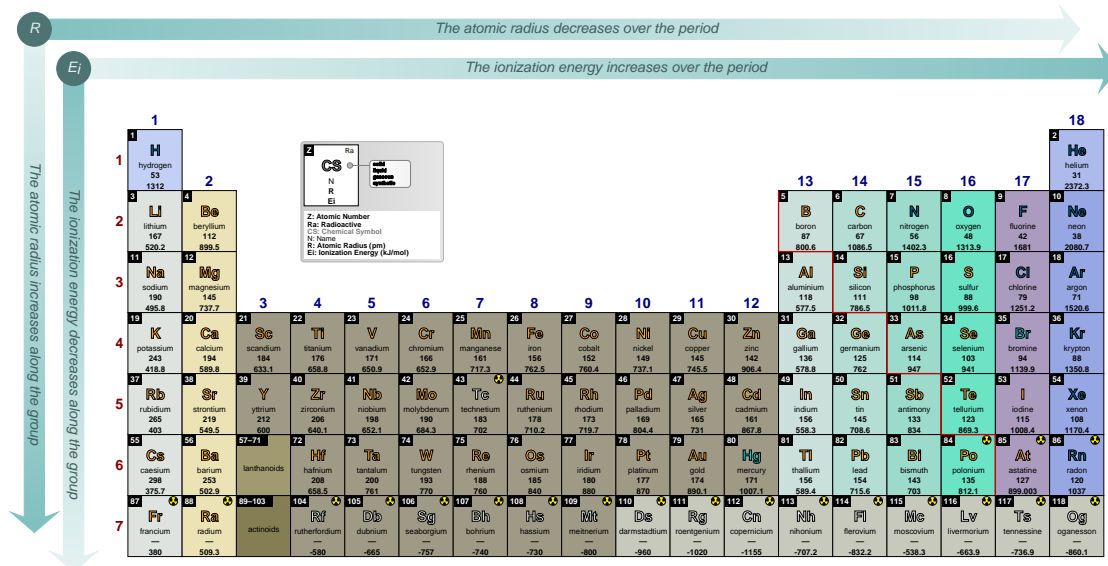
var font

default: \footnotesize\bfseries

Style to set a common font for the variations along the Periodic Table.

Setting `var font=` is equivalent to setting `{varR font=, varEi font=, vareaff font=}`.

\pgfPT[show periodic variations,cell style=pgfPTREi,var font=\small\itshape]



var color

default: RGB: 128,191,191

Style to set a common color for the variations along the Periodic Table.

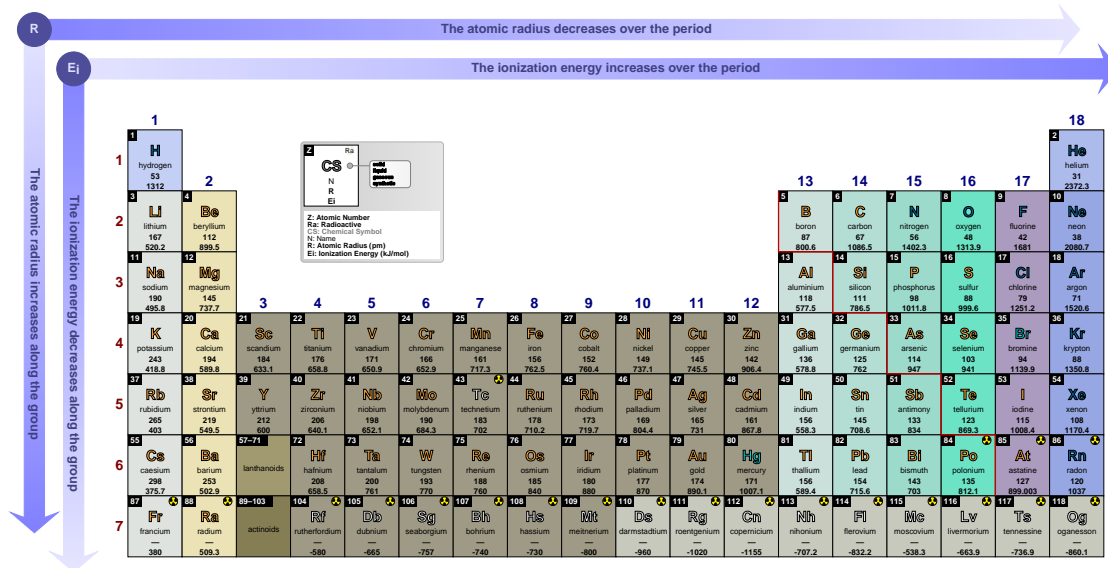
Setting `var color=<color>` is equivalent to setting `{varR color=<color>,varEi color=<color>,vareaff color=<color>}`.

NOTE:

The color provided to `var color` could be any defined color via the command `\definecolor` or by *mixing* colors, using, for instance, the syntax `color1!value!color2`, as explained in the `xcolor` package documentation.

Keep in mind that setting the variations colors also changes the default text colors for them.

\pgfPT[show periodic variations,cell style=pgfPTREi,var color=blue!50!white]



varRdefault: $\{c=colorvariations,f=\footnotesize\bfseries\}$

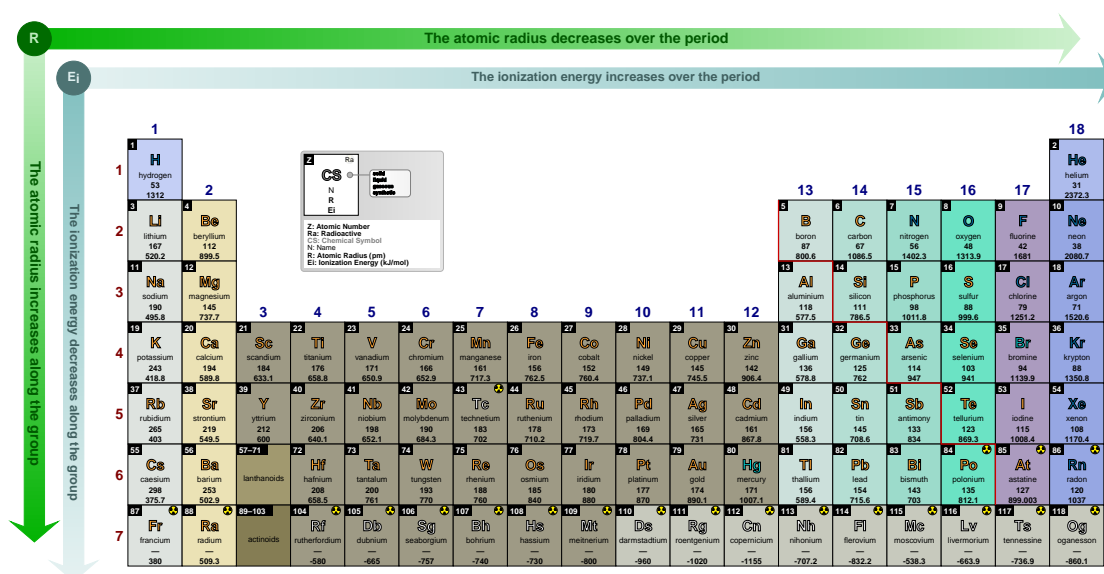
Pseudo style to set the keys: varR color, varR font and/or varR font color. None of the keys – c, f and fc – are mandatory.

NOTE:

The color provided to varR color could be any defined color via the command `\definecolor` or by *mixing* colors, using, for instance, the syntax `color1!value!color2`, as explained in the `xcolor` package documentation.

USAGE: `varR={c=<color>,f=,fc=<color>}`

`\pgfPT[show periodic variations,cell style=pgfPTREi,`
`varR={c=green!70!black,f=\small\bfseries}]`

**varEi**default: $\{c=colorvariations,f=\footnotesize\bfseries\}$

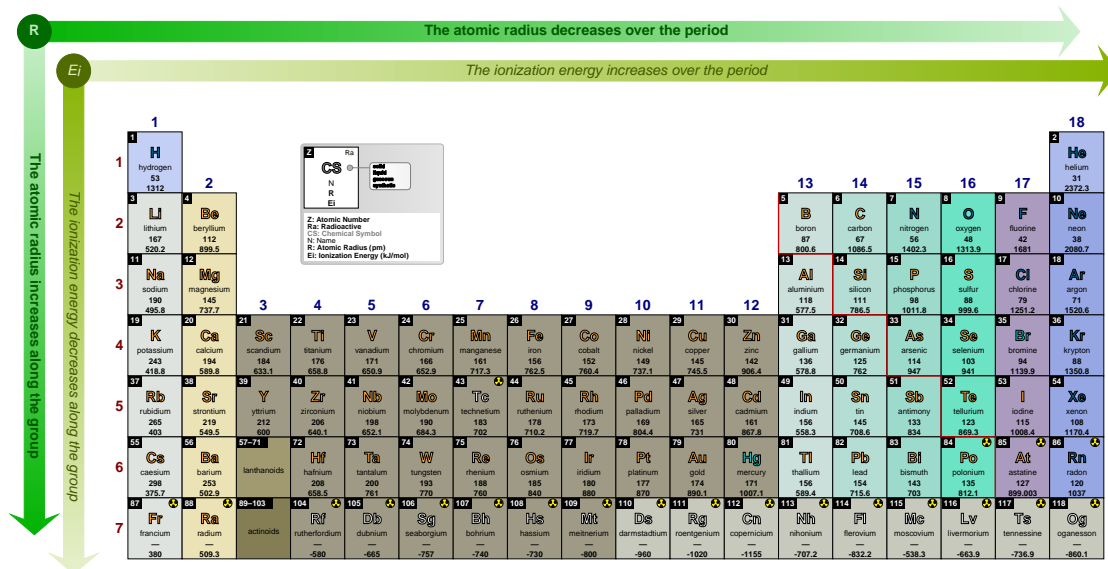
Pseudo style to set the keys: varEi color, varEi font and/or varEi font color. None of the keys – c, f and fc – are mandatory.

NOTE:

The color provided to varEi color could be any defined color via the command `\definecolor` or by *mixing* colors, using, for instance, the syntax `color1!value!color2`, as explained in the `xcolor` package documentation.

USAGE: `varEi={c=<color>,f=,fc=<color>}`

`\pgfPT[show periodic variations,cell style=pgfPTREi,`
`varR={c=green!70!black,f=\small\bfseries},`
`varEi={c=lime!70!black,f=\small\bfseries}]`

**vareaff**default: $\{c=colorvariations,f=\footnotesize\bfseries\}$

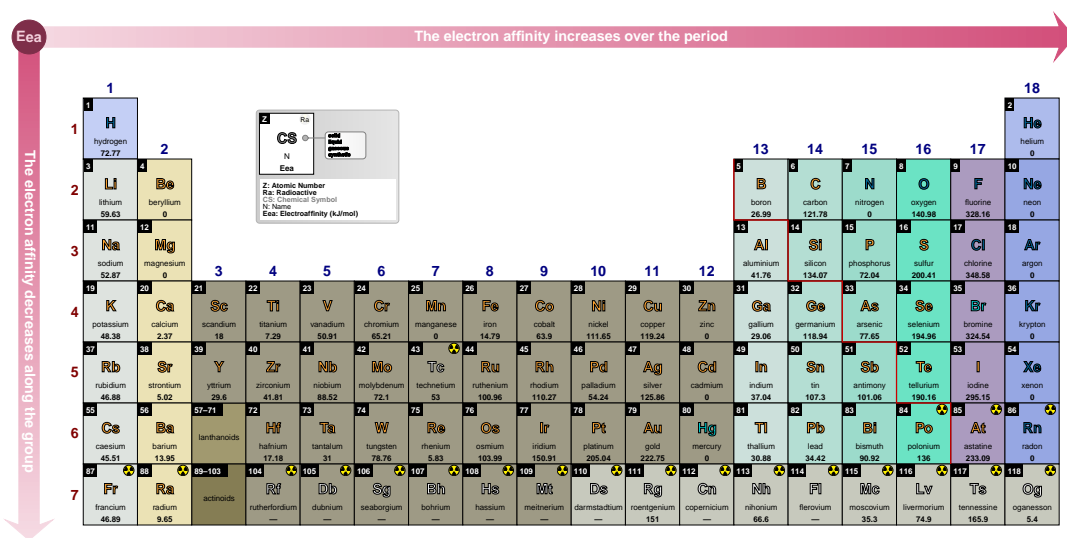
Pseudo style to set the keys: `vareaff color`, `vareaff font` and/or `vareaff font color`. None of the keys – `c`, `f` and `fc` – are mandatory.

NOTE:

The color provided to `vareaff color` could be any defined color via the command `\definecolor` or by *mixing* colors, using, for instance, the syntax `color1!value!color2`, as explained in the `xcolor` package documentation.

USAGE: `vareaff={c=<color>,f=,fc=<color>}`

`\pgfPT[show periodic variations,cell style=pgfPTeaff,
vareaff={c=purple!70!white,f=\small\bfseries,fc=white}]`

`\pgfPTresetstyle`

➡ Dark mode

dark mode

default: *no value*

Style to change the overall appearance of the Periodic Table to a dark mode suitable for on-screen viewing.

This style sets the following keys with the values:

```
back color scheme=solid, back color=black!80, cell line color=black!10, CS outline color=white, cell color=white,
Z backcolor=black!30, Z color=black, background={fill=black}, varR font color=black!20, varEi font color=black!20,
vareaff font color=black!20, per+gr={c=white}, title color=white, other languages color=black!40,
legend={bc=black!70,radio=white,CS=white,Z=white,pins style={draw=white,right color=black!75,
left color=black!60,line width=.05pt,rounded corners=2pt},extra style={draw=white,fill=black!70,line width=.05pt,
rounded corners=2pt},box={left color=black!70,right color=black!40,draw=white}}
```

\pgfPT[**dark mode**]

Periodic Table of Elements

➡ Exercise layout

The **keys** described in this section enable the *exercise layout* of the Periodic Table, *i.e.*, in this mode the *structure* of the Periodic Table is drawn, but there are only a few contents available in the cells.

only cells

default: *false*

When set to **true** the Periodic Table is drawn with only the cells without any contents.

NOTE:

The following keys are also set: back color scheme=solid, show title=false, show period numbers=false, show group numbers=false, show legend=false, show MNM line=false

`\pgfPT[only cells]`
`\pgfPT[Z list={1,...,54},only cells]`
only cells plus Zdefault: *false*

When set to **true** the Periodic Table is drawn with only the cells without any contents, except the atomic number (Z).

NOTE:

The following keys are also set: `back color scheme=solid`, `show title=false`, `show period numbers=false`, `show group numbers=false`, `show legend=false`, `show MNM line=false`

`\pgfPT[only cells plus Z]`

The diagram shows a periodic table where only the cells containing atomic numbers (Z) are filled. The main body of the table is a grid of 18 columns and 6 rows. The first two columns (groups 1 and 2) and the last six columns (groups 13-18) are filled with atomic numbers. The lanthanide and actinide series are shown as separate rows below the main body, also containing only atomic numbers. The atomic numbers range from 1 to 118.

`\pgfPT[only cells plus Z,IUPAC=false]`

The diagram shows a periodic table where only the cells containing period and group numbers are filled. The main body of the table is a grid of 18 columns and 6 rows. The first two columns (groups 1 and 2) and the last six columns (groups 13-18) are filled with period and group numbers. The lanthanide and actinide series are shown as separate rows below the main body, also containing only period and group numbers. The period and group numbers range from 1 to 118.

only cells with periods and group numbersdefault: *false*

When set to **true** the Periodic Table is drawn with only the cells without any contents. The period and group numbers are shown.

NOTE:

The following keys are also set: **back color scheme=solid**, **show title=false**, **show legend=false**, **show MNM line=false**

`\pgfPT[Z list={1,...,36},only cells with periods and group numbers]`

1																	18
2		2											13	14	15	16	17
3																	
4																	

only cells with periods and group numbers plus Z

default: *false*

When set to *true* the Periodic Table is drawn with only the cells without any contents, except the atomic number (Z). The period and group numbers are shown.

NOTE:

The following keys are also set: *back color scheme=solid*, *show title=false*, *show legend=false*, *show MNM line=false*

`\pgfPT[Z list={1,...,36},only cells with periods and group numbers plus Z]`

1																	18
2		2											13	14	15	16	17
3																	
4																	

Z exercise list

default: `{}`

Sets the list of atomic numbers to display as letters instead of their chemicals symbols.

NOTES:

- ✓ When values are provided to the *Z exercise list* and none of the above *exercise layout* is set, the *exercise layout only cells* is used.
- ✓ The line dots – ... – notation is not available in the *Z exercise list*, mainly to avoid *errors* on the desired list. For example `{1,...,4,8,...,16}` is expanded by the `\foreach` statement of `TikZ` to `{1,2,3,4,8,15}` instead of `{1,2,3,4,8,9,10,11,12,13,14,15,16}`. For achieving that purpose it must be typed `{1,...,4,8,9,...,16}`. Since the goal of *Z exercise list* is typing only a list of specific elements, it will often be easier to type element by element.

`\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87}, cell size=3em,Z list={1,...,36}]`

A																	B
C	D															E	
	F															G	H
I	J					K		L					M		N	O	

```
\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87},
cell size=3em,Z list={1,...,36},only cells with periods and group numbers]
```

	1																18
1	A																B
2	C	D															
3		F															
4	I	J															

exercise list in capitalsdefault: *true*When set to *true* the *letters* are typed in capitals, otherwise they are typed as lowercase letters.

```
\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87},
cell size=3em,Z list={1,...,36},exercise list in capitals=false]
```

	a																b
	c	d															
		f															
	i	j															

exercise list colordefault: *black*Sets the color of the displayed *letters* in the *exercise layout*.

```
\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87},
cell size=3em,Z list={1,...,36}, exercise list color=blue!50!black]
```

	A																B
	C	D															
		F															
	I	J															

exercise list fontdefault: `\bfseries\large`Sets the font of the displayed *letters* in the *exercise layout*.

```
\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87},
cell size=3em,Z list={1,...,36}, exercise list font=\fontfamily{fmm}\selectfont]
```

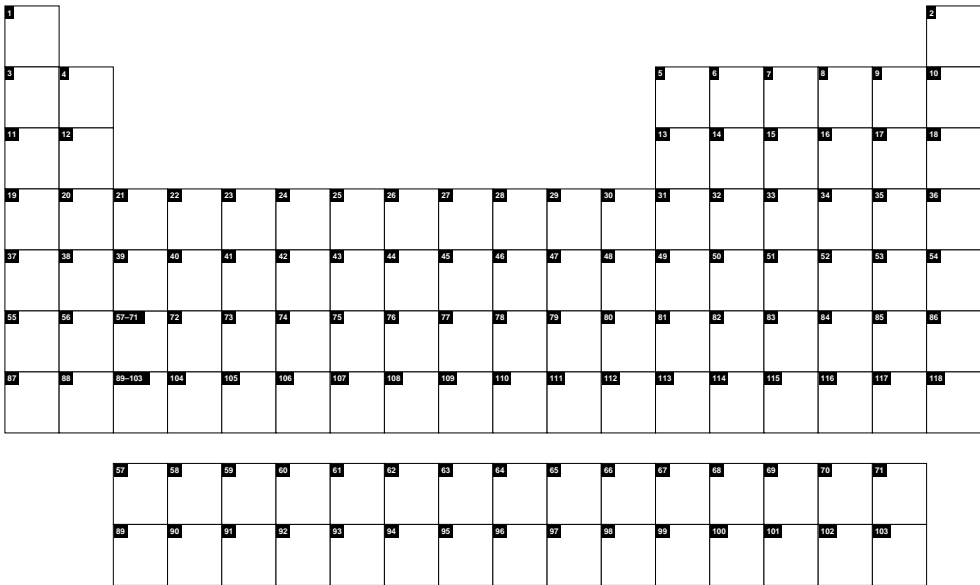
	\mathcal{A}																\mathcal{B}
	\mathcal{C}	\mathcal{D}															
		\mathcal{F}															
	\mathcal{I}	\mathcal{J}															

cells+Z

Style to set the key only cells plus Z to true.

no value

\pgfPT[cells+Z]

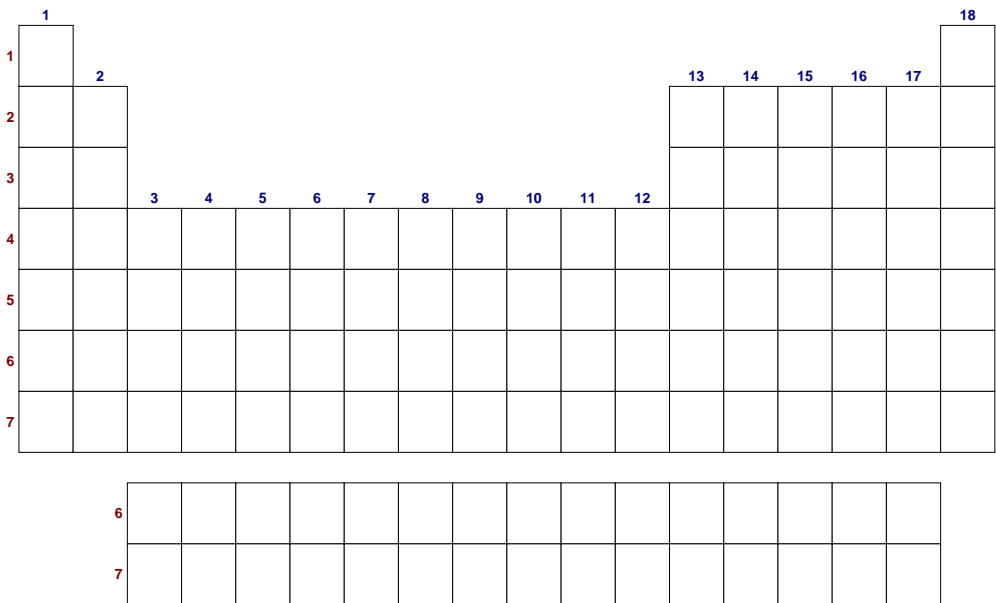


cells+p+g

Style to set the key only cells with periods and group numbers to true.

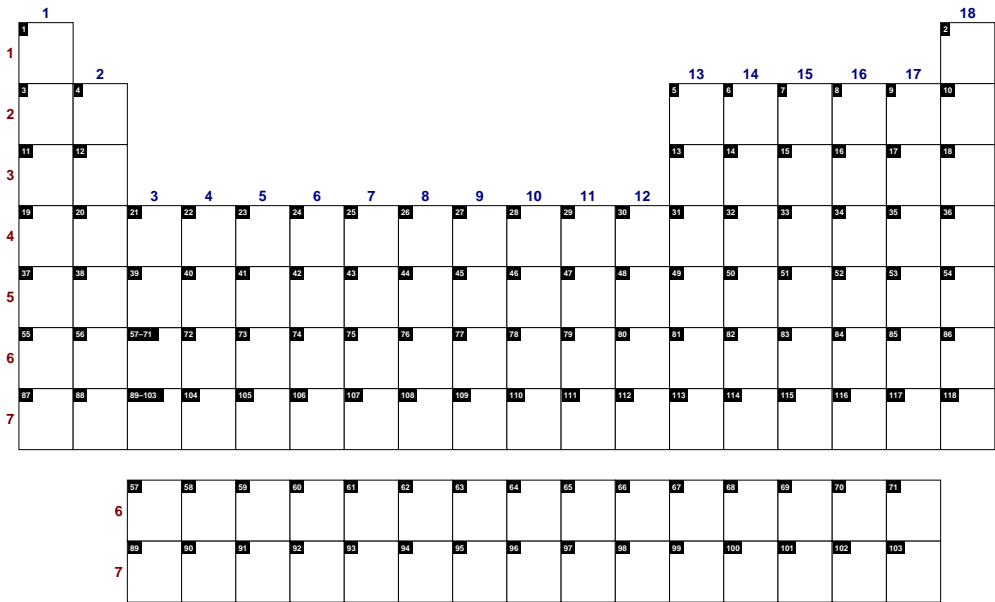
no value

\pgfPT[cells+p+g]



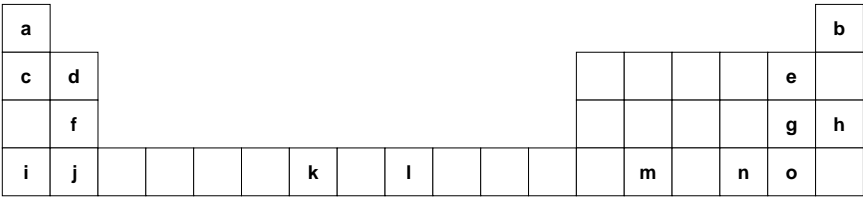
cells+p+g+Z no value
Style to set the key only cells with periods and group numbers plus Z to true.

```
\pgfPT[cells+p+g+Z]
```



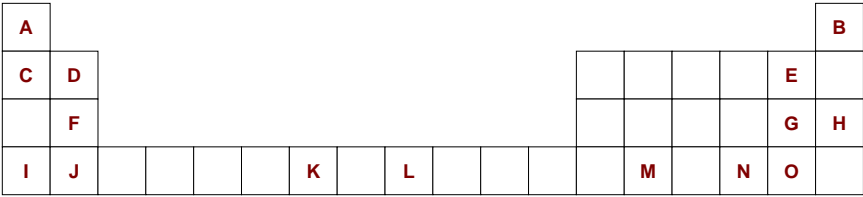
exnocaps no value
Style to set the key exercise list in capitals to false.

```
\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87},  
cell size=3em,Z list={1,...,36},exnocaps]
```



exColor default: black
Style to set the key exercise list color.

```
\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87},  
cell size=3em,Z list={1,...,36},exColor=red!50!black]
```



exFont

default: `\bfseries\large`

Style to set the key **exercise** list font.

`\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87},
cell size=3em,Z list={1,...,36},exFont=\Large]`

A													B				
C	D														E		
	F														G	H	
I	J					K		L					M		N	O	

ex

default: $\{caps=true, c=black, f=\texttt{\textbackslash bfseries\textbackslash large}\}$

Pseudo style to set the keys: exercise list in **capitals**, exercise list **color** and/or exercise list **font**. None of the keys – caps, c and f – are mandatory.

USAGE: `ex={caps=<true|false>,c=<color>,f=}`

`\pgfPT[Z exercise list={1,2,3,4,9,12,17,18,19,20,25,27,32,34,35,49,54,74,86,87},
cell size=3em,Z list={1,...,36},ex={c=blue,f=\Large\bfseries}]`

A														B			
C	D														E		
	F														G	H	
I	J					K		L					M		N	O	

✠ Cell contents options: keys, styles and *pseudo styles*

The following options and styles are used for customizing the contents available in each individual cell of the Periodic Table, like the *fonts* or the *colors* used in the shown contents.

➡ **Decimal separator in numbers**

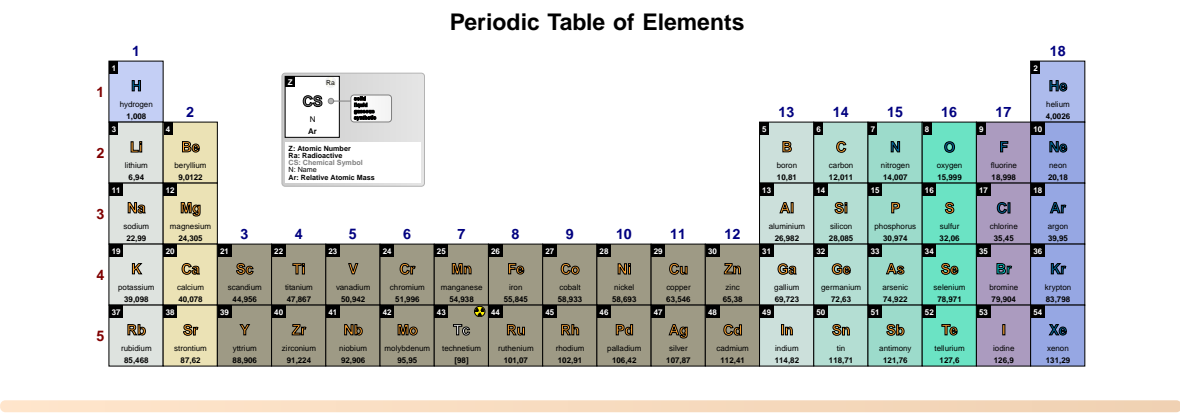
decimal separator

default: .

Sets the decimal separator in the numeric values of quantities. *If the separator character is a comma it must be provided between curly braces – {,}.*

Note that the decimal separator key is used to perform a direct replacement of the dot with the specified character. Therefore, there is no validation and any character can be used as a decimal separator (usually a dot or a comma). (new in v2.1.5)

\pgfPT[Z list={1,...,54},decimal separator={,}]



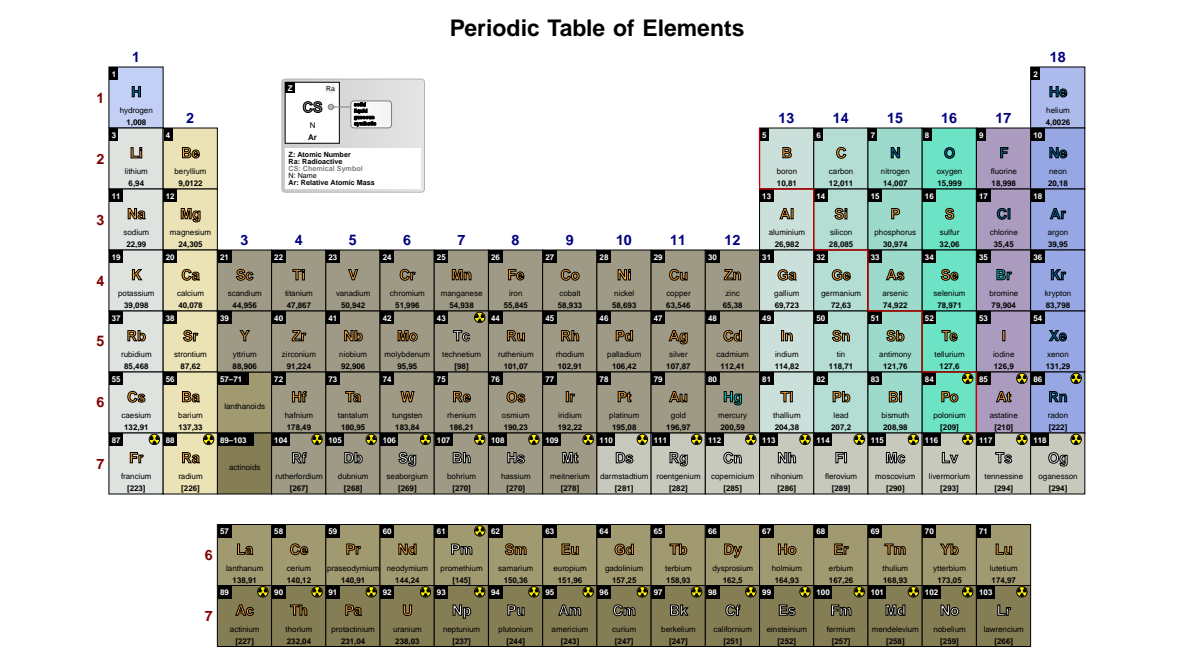
comma separator

default: no value

A style equivalent to decimal separator={,}

(new in v2.1.5)

\pgfPT[comma separator]



dot separator

default: no value

A style equivalent to decimal separator=.

(new in v2.1.5)

\pgfPT[dot separator]

Periodic Table of Elements

The periodic table displays elements with their atomic number (Z), chemical symbol (CS), name (N), and relative atomic mass (Ar). Elements are color-coded by groups. The lanthanide and actinide series are shown separately below the main table.

→ The atomic number

Z backcolor

default: *black*

Sets the background color of the box where the atomic number is displayed.

\pgfPT[Z list={1,...,36},Z backcolor=blue!70!black]

Periodic Table of Elements

This periodic table is similar to the first one, but the atomic numbers (Z) are highlighted in blue. The legend box and element details remain the same.

Z colordefault: *white*

Sets the color of the atomic number.

`\pgfPT[Z list={1,...,36},Z bgcolor=black!30,Z color=black]`

Periodic Table of Elements

1 H hydrogen 1.008																	18 He helium 4.0026																		
2 Li lithium 6.94	3 Be beryllium 9.0122																	19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

Z fontdefault: `\tiny\bfseries`

Sets the font of the atomic number.

`\pgfPT[Z list={1,...,36},Z font=\fontfamily{pag}\selectfont\tiny]`

Periodic Table of Elements

1 H hydrogen 1.008																	18 He helium 4.0026																		
2 Li lithium 6.94	3 Be beryllium 9.0122																	19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

Z use box widthdefault: *false*If true, the width specified in the constructed cell is used, otherwise, the *natural* width of the box containing Z value is used.`\pgfPT[Z list={1,...,36},Z use box width]`

Periodic Table of Elements

1 H hydrogen 1.008																	18 He helium 4.0026																		
2 Li lithium 6.94	3 Be beryllium 9.0122																	19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

Z aligndefault: *left*Sets the alignment of the atomic number value to *left*, *center* or *right* with respect to its containing box. It only takes effect when **Z use box width** is **true**.

```
\pgfPT[Z list={1,...,36},Z use box width,Z align=center]
```

Periodic Table of Elements

1	2											13	14	15	16	17	18	
1	H															2		
	hydrogen															helium		
	1.008															4.0026		
2	3	4											5	6	7	8	9	10
	Li	Be																
	lithium	beryllium																
	6.94	9.0122																
3	11	12											13	14	15	16	17	18
	Na	Mg																
	sodium	magnesium																
	22.99	24.305																
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798

Z padding

default: 0.25ex

Sets the padding between the atomic number value and the box that contains it. It only takes effect when **Z use box width** is true.

```
\pgfPT[Z list={1,...,36},Z use box width,Z align=right, Z padding=1em]
```

Periodic Table of Elements

1	2											13	14	15	16	17	18	
1	H															2		
	hydrogen															helium		
	1.008															4.0026		
2	3	4											5	6	7	8	9	10
	Li	Be																
	lithium	beryllium																
	6.94	9.0122																
3	11	12											13	14	15	16	17	18
	Na	Mg																
	sodium	magnesium																
	22.99	24.305																
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798

Z box

no value

Style equivalent to **Z use box width=true**.

```
\pgfPT[Z list={1,...,36},Z box]
```

Periodic Table of Elements

1	2											13	14	15	16	17	18	
1	H															2		
	hydrogen															helium		
	1.008															4.0026		
2	3	4											5	6	7	8	9	10
	Li	Be																
	lithium	beryllium																
	6.94	9.0122																
3	11	12											13	14	15	16	17	18
	Na	Mg																
	sodium	magnesium																
	22.99	24.305																
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798

Z

default: {bc=black,c=white,f=\tiny\bfseries,boxwd=false,align=left,pad=.25ex}

Pseudo style to set the keys: **Z backcolor**, **Z color**, **Z font**, **Z use box width**, **Z align** and/or **Z padding**. None of the keys – bc, c, f, boxwd, align and pad – are mandatory.

USAGE:

```
Z={bc=<color>,c=<color>,f=<font commands>,boxwd=<true|false>,align=<left|center|right>,pad=<length>}
```

```
\pgfPT[Z list={1,...,36},Z={bc=blue,f=\tiny\bfseries\itshape}]
```

Periodic Table of Elements

1

H

hydrogen

1.008

2

3

Li

lithium

6.94

4

Be

beryllium

9.0122

5

6

7

8

9

10

11

Na

sodium

22.99

12

Mg

magnesium

24.305

13

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He

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Radioactivity

radio symbol

default: *pgfPT_radio_symbol.pdf*

Sets the image or text to be displayed for radioactivity (in radioactive elements' cells as well as in the legend cell). The image can be in any format supported by graphicx. *(new in v2.1.6)*

```
\pgfPT[Z list={1,...,54},radio symbol=pgfPT_radio_symbol_BW.pdf]
```

Periodic Table of Elements

1	2											13	14	15	16	17	18	
1	H															He		
	hydrogen															helium		
	1.008															4.0026		
2	Li	Be											B	C	N	O	F	Ne
	lithium	beryllium											boron	carbon	nitrogen	oxygen	fluorine	neon
	6.94	9.0122											10.81	12.011	14.007	15.999	18.998	20.18
3	Na	Mg											Al	Si	P	S	Cl	Ar
	sodium	magnesium											aluminum	silicon	phosphorus	sulfur	chlorine	argon
	22.99	24.305											26.982	28.085	30.974	32.06	35.45	39.95
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
	rubidium	strontium	yttrium	zirconium	niobium	molybdenum	technetium	ruthenium	rhodium	palladium	silver	cadmium	indium	tin	antimony	tellurium	iodine	xenon
	85.468	87.62	88.906	91.224	92.906	95.95	[98]	101.07	102.91	106.42	107.87	112.41	114.82	118.71	121.76	127.6	126.9	131.29

```
\pgfPT[Z list={1,...,54},radio symbol=$\ast$]
```

Periodic Table of Elements

1																	18			
1	H																	2		
	hydrogen																	He		
	1.008																	4.0026		
2	Li	Be											3	4	5	6	7	8	9	10
	lithium	beryllium											B	C	N	O	F	Ne		
	6.94	9.0122											10.81	12.011	14.007	15.999	18.998	20.18		
3	Na	Mg											11	12	13	14	15	16	17	18
	sodium	magnesium											Al	Si	P	S	Cl	Ar		
	22.99	24.305											26.982	28.085	30.974	32.06	35.45	39.95		
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton		
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798		
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
	rubidium	strontium	yttrium	zirconium	niobium	molybdenum	technetium	ruthenium	rhodium	palladium	silver	cadmium	indium	tin	antimony	tellurium	iodine	xenon		
	85.468	87.62	88.906	91.224	92.906	95.95	[98]	101.07	102.91	106.42	107.87	112.41	114.82	118.71	121.76	127.6	126.9	131.29		

2

CS

N

Ar

Z: Atomic Number

R: Radioactive

CS: Chemical Symbol

N: Name

Ar: Relative Atomic Mass

radio fontdefault: `\small\bfseries`Sets the font for the **radio symbol**. It only has an effect on text.*(new in v2.1.6)*

```
\pgfPT[Z list={1,...,54},radio symbol=pgfPT_radio_symbol_BW.pdf,radio
font=\Large\bfseries]
```

Periodic Table of Elements

```
\pgfPT[Z list={1,...,54},radio symbol=$\ast$,radio font=\Large\bfseries]
```

Periodic Table of Elements

radio font colordefault: *black*Sets the font color for the **radio symbol**. It only has an effect on text.*(new in v2.1.6)*

```
\pgfPT[Z list={1,...,54},radio symbol=$\ast$,radio font=\Large\bfseries,radio font
color=red]
```

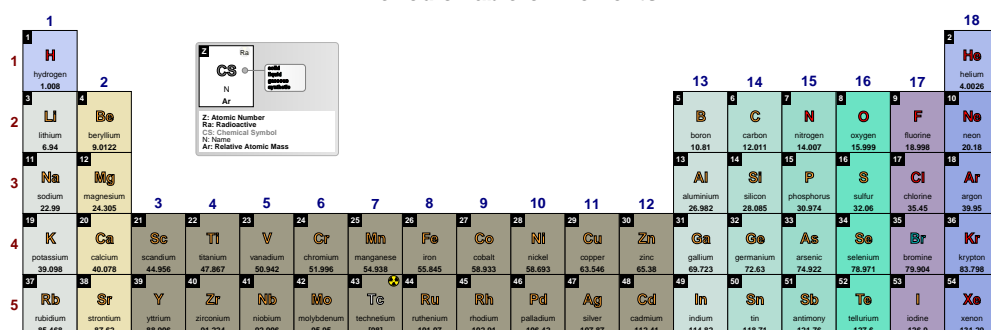
Periodic Table of Elements

CS gasdefault:  RGB: 0,102,153

Sets the color of the chemical symbol for elements that are in a gaseous state at normal temperature and pressure (NTP).

```
\pgfPT[Z list={1,...,54},CS gas=red]
```

Periodic Table of Elements



Legend box content:

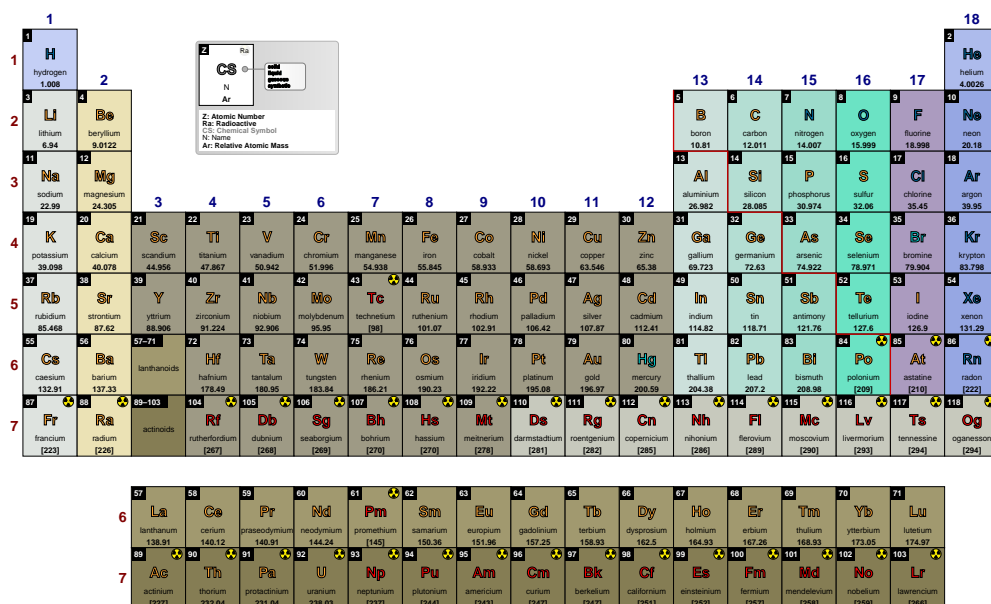
CS gas
Z: Atomic Number
Ra: Radioactive
CS: Chemical Symbol
N: Name
Ar: Relative Atomic Mass

CS syntdefault:  RGB: 236,236,236

Sets the color of the chemical symbol for elements that are synthetic.

```
\pgfPT[CS synt=red]
```

Periodic Table of Elements



Legend box content:

CS synt
Z: Atomic Number
Ra: Radioactive
CS: Chemical Symbol
N: Name
Ar: Relative Atomic Mass

CS alldefault: *black*

Style to set a common color to the chemical symbols, equivalent to CS solid=<color>, CS liquid=<color>, CS gas=<color>, CS synt=<color>.

`\pgfPT[CS all=red]`

Periodic Table of Elements

The periodic table is rendered with the CS font. Elements are colored in a standard periodic table color scheme. The Lanthanide and Actinide series are shown as separate rows below the main table. A legend box in the top left corner defines the font and color options: Z: Atomic Number, Ra: Radioactive, N: Chemical Symbol, Ar: Relative Atomic Mass.

CS font

Sets the font for the chemical symbol.

default: `\small\bfseries``\pgfPT[Z list={1,...,36},CS font=\small\fontfamily{fmm}\selectfont]`

Periodic Table of Elements

The periodic table is rendered with the CS font. Elements are colored in a standard periodic table color scheme. The Lanthanide and Actinide series are shown as separate rows below the main table. A legend box in the top left corner defines the font and color options: Z: Atomic Number, Ra: Radioactive, N: Chemical Symbol, Ar: Relative Atomic Mass.

CS render modeSets the chemical symbol render mode. Available modes are **fill**, **outline** or **fill and outline**.default: *fill and outline*`\pgfPT[Z list={1,...,36}]`

Periodic Table of Elements

The periodic table is rendered with the CS font. Elements are colored in a standard periodic table color scheme. The Lanthanide and Actinide series are shown as separate rows below the main table. A legend box in the top left corner defines the font and color options: Z: Atomic Number, Ra: Radioactive, N: Chemical Symbol, Ar: Relative Atomic Mass.

```
\pgfPT[Z list={1,...,36},CS render mode=fill]
```

Periodic Table of Elements

1	2																	18
1 H hydrogen 1.008																	2 He helium 4.0026	
3 Li lithium 6.94	4 Be beryllium 9.0122																	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305	13 B boron 10.81	14 C carbon 12.011	15 N nitrogen 14.007	16 O oxygen 15.999	17 F fluorine 18.998											18 Ar argon 39.95	
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798	

```
\pgfPT[Z list={1,...,36},CS render mode=outline]
```

Periodic Table of Elements

1

2

18

1 H hydrogen 1.008																	2 He helium 4.0026
3 Li lithium 6.94	4 Be beryllium 9.0122															10 Ne neon 20.18	
11 Na sodium 22.99	12 Mg magnesium 24.305	13 B boron 10.81	14 C carbon 12.011	15 N nitrogen 14.007	16 O oxygen 15.999	17 F fluorine 18.998							18 Ar argon 39.95				
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798

2

CS

N

Ar

Ra

Radioactive

CS: Chemical Symbol

N: Name

Ar: Relative Atomic Mass

CS outline colordefault: *black*

Sets the outline color for the chemical symbol.

```
\pgfPT[Z list={1,...,36},CS outline color=red]
```

Periodic Table of Elements

1	2																	18
1 H hydrogen 1.008																	2 He helium 4.0026	
3 Li lithium 6.94	4 Be beryllium 9.0122																	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305	13 B boron 10.81	14 C carbon 12.011	15 N nitrogen 14.007	16 O oxygen 15.999	17 F fluorine 18.998											18 Ar argon 39.95	
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798	

CS outline widthdefault: *0.05*Sets the outline width of the chemical symbol. It is any positive numerical value **without dimensions** (1.0 is roughly 1.0pt).

```
\pgfPT[Z list={1,...,36},CS outline width=.2]
```

Periodic Table of Elements

1	2																	18
1 H hydrogen 1.008																	2 He helium 4.0026	
3 Li lithium 6.94	4 Be beryllium 9.0122																	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305	13 B boron 10.81	14 C carbon 12.011	15 N nitrogen 14.007	16 O oxygen 15.999	17 F fluorine 18.998											18 Ar argon 39.95	
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798	

CS default: $\{r=fill\ and\ outline,c=black,w=.05,f=\small\bfseries,s=solido,l=liquido,g=gasoso,sy=sintetico\}$

Pseudo style to set the keys: CS **render mode**, CS **outline color**, CS **outline width**, CS **font**, CS **solid**, CS **liquid**, CS **gas** and/or CS **synt** and/or the style CS **all**. None of the keys – r, olc, olw, f, s, l, g, sy and all – are mandatory.

USAGE:

CS= $\{r=<fill\ or\ outline\ and\ outline>,olc=<color>,olw=<positive\ numerical\ value>f=<font\ commands>,s=<color>,l=<color>,g=<color>,sy=<color>,all=<color>\}$

$\backslash\pgfPT[Z\ list=\{1,...,36\},CS=\{r=outline,olc=red,olw=.4\},show\ legend\ pins=false]$

Periodic Table of Elements

The image shows a periodic table of elements with a legend box. The legend box contains the following information:

- Z:** Atomic Number
- Ra:** Radioactive
- CS:** Chemical Symbol
- N:** Name
- Ar:** Relative Atomic Mass

The periodic table itself is color-coded by groups. The legend box also shows the element symbols and names for the first few elements: H (hydrogen), He (helium), Li (lithium), Be (beryllium), Na (sodium), Mg (magnesium), Al (aluminum), Si (silicon), P (phosphorus), S (sulfur), Cl (chlorine), Ar (argon), K (potassium), Ca (calcium), Sc (scandium), Ti (titanium), V (vanadium), Cr (chromium), Mn (manganese), Fe (iron), Co (cobalt), Ni (nickel), Cu (copper), Zn (zinc), Ga (gallium), Ge (germanium), As (arsenic), Se (selenium), Br (bromine), Kr (krypton).

➡ The name

name colordefault: *black*

Sets the color of the element name.

$\backslash\pgfPTstyle[show\ title=false]$

$\backslash\pgfPT[Z\ list=\{1,...,36\},name\ color=red]$

The image shows a periodic table of elements with red element names. The legend box is also present, showing the same information as the first table.

name fontdefault: *\tiny*

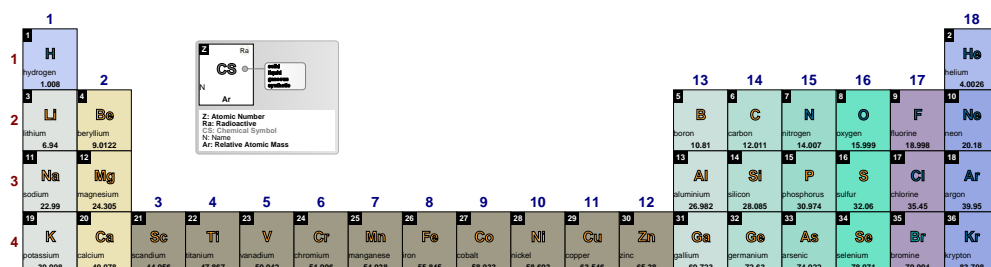
Sets the font of the element name.

$\backslash\pgfPT[Z\ list=\{1,...,36\},name\ font=\tiny]$

The image shows a periodic table of elements with tiny element names. The legend box is also present, showing the same information as the first table.

name aligndefault: *center*

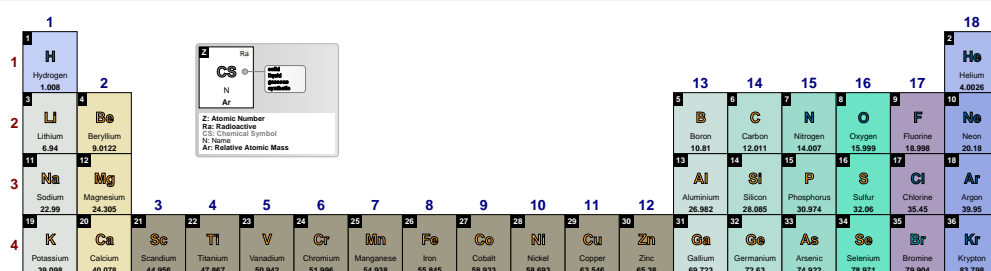
Sets the alignment of the element name to *left*, *center* or *right* with respect to its containing box.

(new in v1.0.1)`\pgfPT[Z list={1,...,36},name align=left]`


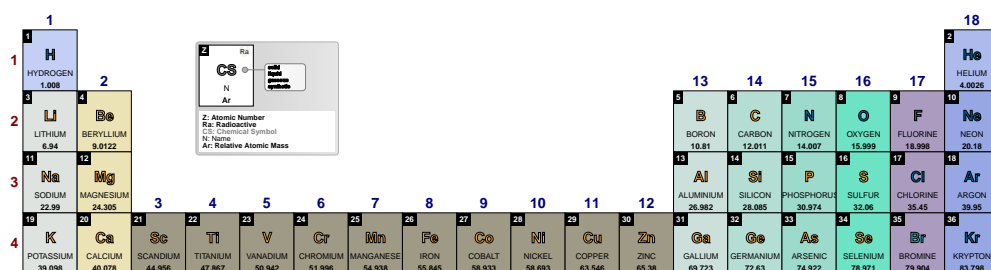
Periodic table showing element names aligned to the left. The table includes atomic number, symbol, name, and relative atomic mass for elements 1 through 36. A legend box shows the format for element 2 (Helium): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

capitalize element namesdefault: *false*

If set to **true** the first letter of the name of the elements is a capital letter (except in German where names start with a capital letter since version 2.0.1). If set to **TRUE** the whole name of the elements is in capital letters

(changed in v1.0.1)`\pgfPT[Z list={1,...,36},capitalize element names=true]`


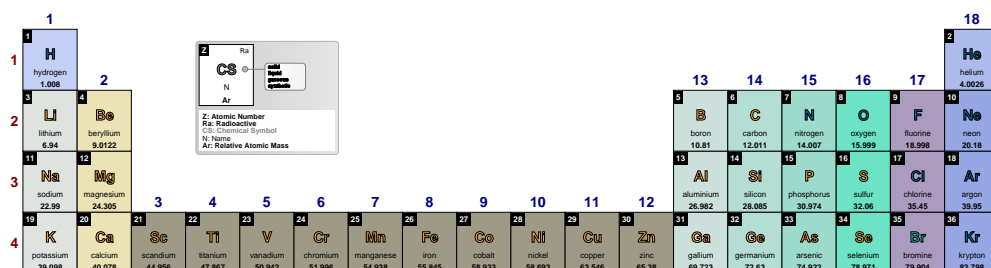
Periodic table showing element names with the first letter capitalized. The table includes atomic number, symbol, name, and relative atomic mass for elements 1 through 36. A legend box shows the format for element 2 (Helium): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

`\pgfPT[Z list={1,...,36},capitalize element names=TRUE]`


Periodic table showing element names in all capital letters. The table includes atomic number, symbol, name, and relative atomic mass for elements 1 through 36. A legend box shows the format for element 2 (Helium): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

name*no value*

A style equivalent to `capitalize element names=false`

`\pgfPT[Z list={1,...,36},name]`


Periodic table showing element names in lowercase. The table includes atomic number, symbol, name, and relative atomic mass for elements 1 through 36. A legend box shows the format for element 2 (Helium): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, Ar: Relative Atomic Mass.

Name*no value*A style equivalent to `capitalize element names=true``\pgfPT[Z list={1,...,36},Name]`

1

H

Hydrogen

1.008

2

3

Li

Lithium

6.94

4

Be

Beryllium

9.0122

5

6

7

8

9

10

11

Na

Sodium

22.99

12

Mg

Magnesium

24.305

13

14

15

16

17

18

19

20

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22

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998

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1000

2

CS

Caesium

Radioactive

Chemical Symbol

Name

Relative Atomic Mass

Z: Atomic Number

Ra: Radioactive

CS: Chemical Symbol

N: Name

Ar: Relative Atomic Mass

NAME*no value*A style equivalent to `capitalize element names=TRUE`*(new in v1.0.1)*`\pgfPT[Z list={1,...,36},NAME]`

1																	18	
1	H																	2
	HYDROGEN																HELIUM	
2	LI	BE																
	LITHIUM	BERYLLIUM																
3	NA	MG																
	SODIUM	MAGNESIUM																
4	K	CA	SC	TI	V	CR	MN	FE	CO	NI	CU	ZN	GA	GE	AS	SE	BR	KR
	POTASSIUM	CALCIUM	SCANDIUM	TITANIUM	VANADIUM	CHROMIUM	MANGANESE	IRON	COBALT	NICKEL	COPPER	ZINC	GALLIUM	GERMANIUM	ARSENIC	SELENIUM	BROMINE	KRYPTON

➡ The atomic weight

Ar colordefault: *black*

Sets the relative atomic mass color.

`\pgfPT[Z list={1,...,36},Ar color=red]`

1

H

hydrogen

1.008

2

3

Li

lithium

6.94

4

Be

beryllium

9.0122

5

6

7

8

9

10

11

Na

sodium

22.99

12

Mg

magnesium

24.305

13

14

15

16

17

18

He

helium

4.0026

2

CS

N

Ar

Z: Atomic Number

Ra: Radioactive

CS: Chemical Symbol

N: Name

Ar: Relative Atomic Mass

13

B

boron

10.81

14

C

carbon

12.011

15

N

nitrogen

14.007

16

O

oxygen

15.999

17

F

fluorine

18.998

18

Ne

neon

20.18

19

20

21

22

23

24

25

26

27

28

29

30

31

Al

aluminium

26.982

32

Si

silicon

28.085

33

P

phosphorus

30.974

34

S

sulfur

32.06

35

Cl

chlorine

35.45

36

Ar

argon

39.95

37

38

39

40

41

42

43

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98

99

100

Ar fontdefault: `\tiny\bfseries`

Sets the relative atomic mass font.

`\pgfPT[Z list={1,...,36},Ar font=\scriptsize\bfseries]`

1																	18					
1	H																	He				
	hydrogen																	helium				
	1.008																	4.0026				
2	Li	Be															B	C	N	O	F	Ne
	lithium	beryllium															boron	carbon	nitrogen	oxygen	fluorine	neon
	6.94	9.0122															10.81	12.011	14.007	15.999	18.998	20.18
3	Na	Mg															Al	Si	P	S	Cl	Ar
	sodium	magnesium															aluminum	silicon	phosphorus	sulfur	chlorine	argon
	22.99	24.305															26.982	28.085	30.974	32.06	35.45	39.95
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr				
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton				
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798				

Ar labeldefault: `m`

Sets the label to be used within the relative atomic mass description. When set to 'm' the term **mass** is used and when set to 'w' the term **weight** is used, resulting in *Relative Atomic Mass* and *Atomic Weight* labels respectively.

`\pgfPT[Z list={1,...,36}]`

1																	18					
1	H																	He				
	hydrogen																	helium				
	1.008																	4.0026				
2	Li	Be															B	C	N	O	F	Ne
	lithium	beryllium															boron	carbon	nitrogen	oxygen	fluorine	neon
	6.94	9.0122															10.81	12.011	14.007	15.999	18.998	20.18
3	Na	Mg															Al	Si	P	S	Cl	Ar
	sodium	magnesium															aluminum	silicon	phosphorus	sulfur	chlorine	argon
	22.99	24.305															26.982	28.085	30.974	32.06	35.45	39.95
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr				
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton				
	39.098	40.078	44.956	47.867	50.942	51.996	54.938	55.845	58.933	58.693	63.546	65.38	69.723	72.63	74.922	78.971	79.904	83.798				

`\pgfPT[Z list={1,...,36},Ar label=w]`

1

1

H

hydrogen

1.008

2

2

He

helium

4.0026

3

3

Li

lithium

6.94

4

4

Be

beryllium

9.0122

11

3

Na

sodium

22.99

12

4

Mg

magnesium

24.305

19

4

K

potassium

39.098

20

20

Ca

calcium

40.078

21

21

Sc

scandium

44.956

22

22

Ti

titanium

47.867

23

23

V

vanadium

50.942

24

24

Cr

chromium

51.996

25

25

Mn

manganese

54.938

26

26

Fe

iron

55.845

27

27

Co

cobalt

58.933

28

28

Ni

nickel

58.693

29

29

Cu

copper

63.546

30

30

Zn

zinc

65.38

31

31

Ga

gallium

69.723

32

32

Ge

germanium

72.63

33

33

As

arsenic

74.922

34

34

Se

selenium

78.971

35

35

Br

bromine

79.904

36

36

Kr

krypton

83.798

13

6

B

boron

10.81

14

6

C

carbon

12.011

15

7

N

nitrogen

14.007

16

8

O

oxygen

15.999

17

9

F

fluorine

18.998

18

10

Ne

neon

20.18

13

13

Al

aluminum

26.982

14

14

Si

silicon

28.085

15

15

P

phosphorus

30.974

16

16

S

sulfur

32.06

17

17

Cl

chlorine

35.45

18

18

Ar

argon

39.95

2

88

Ra

Z: Atomic Number

Ra: Radioactive

CS: Chemical Symbol

N: Name

Ar: Atomic Weight

88

88

CS

cesium

132.905

Ar precisiondefault: `-1`

Sets the relative atomic mass precision, *i.e.*, the decimal places displayed in the relative atomic mass value, performing the respective rounding, without zero padding the value.

NOTE:

Rounding is performed over the relative atomic mass data values which actually have a maximum of 4 decimal places. So giving this key a value of -1 (the value of relative atomic mass as-is) or 4 has the same effect.

Therefore the values provided to this key should be any integer between -1 and 3, *i.e.*, -1, 0, 1, 2 or 3. Any other integer provided will be processed as -1.

\pgfPT[Z list={1,...,36}]

1																	18																		
1	H hydrogen 1.008																	2	He helium 4.0026																
2	Li lithium 6.94	4	Be beryllium 9.0122													13	B boron 10.81	14	C carbon 12.011	15	N nitrogen 14.007	16	O oxygen 15.999	17	F fluorine 18.998	18	Ne neon 20.18								
3	Na sodium 22.99	12	Mg magnesium 24.305	3	4	5	6	7	8	9	10	11	12	13	Al aluminum 26.982	14	Si silicon 28.085	15	P phosphorus 30.974	16	S sulfur 32.06	17	Cl chlorine 35.45	18	Ar argon 39.95										
4	K potassium 39.098	20	Ca calcium 40.078	21	Sc scandium 44.956	22	Ti titanium 47.867	23	V vanadium 50.942	24	Cr chromium 51.996	25	Mn manganese 54.938	26	Fe iron 55.845	27	Co cobalt 58.933	28	Ni nickel 58.693	29	Cu copper 63.546	30	Zn zinc 65.38	31	Ga gallium 69.723	32	Ge germanium 72.63	33	As arsenic 74.922	34	Se selenium 78.971	35	Br bromine 79.904	36	Kr krypton 83.798

Z: Atomic Number
Ra: Radioactive
CS: Chemical Symbol
N: Name
Ar: Relative Atomic Mass

CS

N

Ar

\pgfPT[Z list={1,...,36},Ar precision=2]

1																	18																		
1	H hydrogen 1.01																	2	He helium 4.00																
3	Li lithium 6.94	4	Be beryllium 9.01													13	B boron 10.81	14	C carbon 12.01	15	N nitrogen 14.01	16	O oxygen 16.00	17	F fluorine 19.00	18	Ne neon 20.18								
11	Na sodium 22.99	12	Mg magnesium 24.31													15	Al aluminum 26.98	16	Si silicon 28.09	17	P phosphorus 30.97	18	S sulfur 32.06	19	Cl chlorine 35.45	20	Ar argon 39.95								
19	K potassium 39.10	20	Ca calcium 40.08	21	Sc scandium 44.96	22	Ti titanium 47.88	23	V vanadium 50.94	24	Cr chromium 52.00	25	Mn manganese 54.94	26	Fe iron 55.85	27	Co cobalt 58.93	28	Ni nickel 58.69	29	Cu copper 63.55	30	Zn zinc 65.38	31	Ga gallium 69.72	32	Ge germanium 72.64	33	As arsenic 74.92	34	Se selenium 78.96	35	Br bromine 79.90	36	Kr krypton 83.80

2

CS

</

\pgfPT[Z list={1,...,36},Ar precision=1]

1																	18																		
1	<div>H</div> hydrogen 1.0																	2	<div>He</div> helium 4.0																
3	<div>Li</div> lithium 6.9	4	<div>Be</div> beryllium 9.0													5	<div>B</div> boron 10.8	6	<div>C</div> carbon 12.0	7	<div>N</div> nitrogen 14.0	8	<div>O</div> oxygen 16.0	9	<div>F</div> fluorine 19.0	10	<div>Ne</div> neon 20.2								
11	<div>Na</div> sodium 23.0	12	<div>Mg</div> magnesium 24.3													13	<div>Al</div> aluminum 27.0	14	<div>Si</div> silicon 28.1	15	<div>P</div> phosphorus 31.0	16	<div>S</div> sulfur 32.1	17	<div>Cl</div> chlorine 35.5	18	<div>Ar</div> argon 40.0								
19	<div>K</div> potassium 39.1	20	<div>Ca</div> calcium 40.1	21	<div>Sc</div> scandium 44.9	22	<div>Ti</div> titanium 47.9	23	<div>V</div> vanadium 50.9	24	<div>Cr</div> chromium 52.0	25	<div>Mn</div> manganese 54.9	26	<div>Fe</div> iron 55.8	27	<div>Co</div> cobalt 58.9	28	<div>Ni</div> nickel 58.7	29	<div>Cu</div> copper 63.5	30	<div>Zn</div> zinc 65.4	31	<div>Ga</div> gallium 69.7	32	<div>Ge</div> germanium 72.6	33	<div>As</div> arsenic 74.9	34	<div>Se</div> seelenium 79.0	35	<div>Br</div> bromine 79.9	36	<div>Kr</div> krypton 83.8

2

CS

N

Ar

Z: Atomic Number

Ra: Radioactive

CS: Chemical Symbol

N: Name

Ar: Relative Atomic Mass

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

Ar

default: {c=black,f=\tiny\bfseries,l=m,p=-1}

Pseudo style to set the keys: Ar color, Ar font, Ar label and/or Ar precision. None of the keys – c, f, l and p – are mandatory.

USAGE: Ar={c=<color>,f=,l=<m|w>p=<integer value>}

\pgfPT[Z list={1,...,36},Ar={c=red!50!black,p=2}]

1	2											13	14	15	16	17	18																		
1	H												5	B	6	C	7	N	8	O	9	F	10	Ne											
2	Li	4	Be									13	Al	14	Si	15	P	16	S	17	Cl	18	Ar												
3	Na	12	Mg									13	Al	14	Si	15	P	16	S	17	Cl	18	Ar												
4	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr

```
\pgfPT[Z list={1,...,36},Ar={c=red!50!black,p=1,l=w}]
```

1																	18																		
1	H hydrogen 1.0																	2	He helium 4.0																
2	Li lithium 6.9	4	Be beryllium 9.0													13	B boron 10.8	14	C carbon 12.0	15	N nitrogen 14.0	16	O oxygen 16.0	17	F fluorine 19.0	18	Ne neon 20.2								
3	Na sodium 23.0	12	Mg magnesium 24.3	3	3	4	5	6	7	8	9	10	11	12	13	Al aluminum 27.0	14	Si silicon 28.1	15	P phosphorus 31.0	16	S sulfur 32.1	17	Cl chlorine 35.5	18	Ar argon 40.0									
4	K potassium 39.1	20	Ca calcium 40.1	21	Sc scandium 45.0	22	Ti titanium 47.9	23	V vanadium 50.9	24	Cr chromium 52.0	25	Mn manganese 54.9	26	Fe iron 55.9	27	Co cobalt 58.9	28	Ni nickel 58.7	29	Cu copper 63.6	30	Zn zinc 65.4	31	Ga gallium 69.7	32	Ge germanium 72.6	33	As arsenic 74.9	34	Se selenium 79.0	35	Br bromine 79.9	36	Kr krypton 83.8

→ The oxidation states

O color

default: *black*

Sets the color of the oxidation states.

```
\pgfPTbuildcell(5,3)% 5 rows by 3 columns
```

```
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;O)]
```

```
\pgfPTstyle[show title=false]
```

```
\pgfPT[Z list={1,...,36},O color=red]
```

1

H

hydrogen

+1

2

He

helium

—

3

Li

lithium

+1

4

Be

beryllium

+2

13

B

boron

+3

14

C

carbon

+2, +4, +5

15

N

nitrogen

-3, +4, +5

16

O

oxygen

-2

17

F

fluorine

-1

18

Ne

neon

—

5

Na

sodium

+1

12

Mg

magnesium

+2

3

Al

aluminum

+3

14

Si

silicon

+4

15

P

phosphorus

+3, +5

16

S

sulfur

+2, +4, +6

17

Cl

chlorine

+1, +3, +5, +7

18

Ar

argon

0

19

K

potassium

+1

20

Ca

calcium

+2

21

Sc

scandium

+3

22

Ti

titanium

+2, +3, +4

23

V

vanadium

+2, +3, +4, +5

24

Cr

chromium

+2, +3, +6

25

Mn

manganese

+2, +3, +4, +6, +7

26

Fe

iron

+2, +3

27

Co

cobalt

+2, +3

28

Ni

nickel

+2

29

Cu

copper

+1, +2

30

Zn

zinc

+2

31

Ga

gallium

+3

32

Ge

germanium

+2, +4

33

As

arsenic

+3, +5

34

Se

selenium

+2, +4, +6

35

Br

bromine

+1, +3, +5

36

Kr

krypton

0

2

CS

N

O

Z: Atomic Number

Ra: Radioactive

CS: Chemical Symbol

N: Name

O: Oxidation States

+

−

0

1

2

3

4

5

6

7

8

9

10

11

12

1

2

3

4

5

6

7

8

9

10

11

12

1

2

3

4

5

6

7

8

9

10

11

12

O font

default: *\tiny\bfseries*

Sets the font of the oxidation states.

```
\pgfPT[Z list={1,...,36},O font=\itshape\tiny]
```

1																	18																		
1	H hydrogen <i>+1</i>																	2	He helium —																
2	Li lithium <i>+1</i>	4	Be beryllium <i>+2</i>													13	B boron <i>+3, +1, +2, +3, +4</i>	14	C carbon <i>+2, +4, +5</i>	15	N nitrogen <i>-3, +4, +5</i>	16	O oxygen <i>-2</i>	17	F fluorine <i>-1</i>	18	Ne neon —								
3	Na sodium <i>+1</i>	12	Mg magnesium <i>+2</i>	3	3	4	5	6	7	8	9	10	11	12	13	Al aluminum <i>+3</i>	14	Si silicon <i>+4</i>	15	P phosphorus <i>+3, +5</i>	16	S sulfur <i>+2, +4, +6</i>	17	Cl chlorine <i>+1, +3, +5, +7</i>	18	Ar argon <i>0</i>									
4	K potassium <i>+1</i>	20	Ca calcium <i>+2</i>	21	Sc scandium <i>+3</i>	22	Ti titanium <i>+2, +3, +4</i>	23	V vanadium <i>+2, +3, +4, +5</i>	24	Cr chromium <i>+2, +3, +6</i>	25	Mn manganese <i>+2, +3, +4, +6, +7</i>	26	Fe iron <i>+2, +3</i>	27	Co cobalt <i>+2, +3</i>	28	Ni nickel <i>+2</i>	29	Cu copper <i>+1, +2</i>	30	Zn zinc <i>+2</i>	31	Ga gallium <i>+3</i>	32	Ge germanium <i>+2, +4</i>	33	As arsenic <i>+3, +5</i>	34	Se selenium <i>+2, +4, +6</i>	35	Br bromine <i>+1, +3, +5</i>	36	Kr krypton <i>0</i>

O Romandefault: *false*

When set to **true** the oxidation states are displayed in Roman numerals, otherwise they are displayed in arabic numerals.

(new in v2.1.1)

```
\pgfPT[Z list=spd,O Roman,group numbers=CAS]
```

► The density**d color**default: *black*

Sets the density value text color.

```
\pgfPTbuildcellstyle{myd}{5,3}% 5 rows by 3 columns
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;d)]
\pgfPT[Z list={1,...,36},cell style=myd,show title=false]
```


```
\pgfPT[Z list={1,...,36},cell style=myd,show title=false,d color=red]
```

default: *\tiny\bfseries*

`\pgfPT[Z list={1,...,36},cell style=myd,show title=false,d font=\tiny\itshape]`

1	H hydrogen 0.0045	2		3	Li lithium 0.534	4	Be beryllium 1.850
5	B	6	C	7	N	8	O
9	F	10	Ne	11	Na sodium 0.968	12	Mg magnesium 1.738

2
CS
N
d

Ra


Z: Atomic Number

Ra: Radioactive

CS: Chemical Symbol

N: Name

d: Density (g/cm³; g/dm³ for the gases)

13	14	15	16	17	18
B boron 2.340	C carbon 2.267	N nitrogen 1.251	O oxygen 1.429	F fluorine 1.7	Ne neon 0.9002
19	20	21	22	23	24
K potassium 0.86	Ca calcium 1.55	Sc scandium	Ti titanium	V vanadium	Cr chromium
25	26	27	28	29	30
Mn manganese	Fe iron	Co cobalt	Ni nickel	Cu copper	Zn zinc
31	32	33	34	35	36
Ga gallium	Ge germanium	As arsenic	Se selenium	Br bromine	Kr krypton

default: *both*

(new in v1.0.1)

`\pqfPT[Z list={1,...,36},cell style=myd,show title=false]`

1 **H**
hydrogen
0.0098

2 **He**
helium
0.1786

3 **Li**
lithium
0.534

4 **Be**
beryllium
1.850

5 **B**
boron
2.340

6 **C**
carbon
2.267

7 **N**
nitrogen
1.251

8 **O**
oxygen
1.429

9 **F**
fluorine
1.7

10 **Ne**
neon
0.9002

11 **Na**
sodium
0.968

12 **Mg**
magnesium
1.738

13 **Al**
aluminum
2.700

14 **Si**
silicon
2.330

15 **P**
phosphorus
1.823

16 **S**
sulfur
1.960

17 **Cl**
chlorine
3.2

18 **Ar**
argon
1.784

19 **K**
potassium
0.890

20 **Ca**
calcium
1.550

21 **Sc**
scandium
2.985

22 **Ti**
titanium
4.506

23 **V**
vanadium
6.010

24 **Cr**
chromium
7.190

25 **Mn**
manganese
7.210

26 **Fe**
iron
7.860

27 **Co**
cobalt
8.860

28 **Ni**
nickel
8.908

29 **Cu**
copper
8.960

30 **Zn**
zinc
7.140

31 **Ga**
gallium
7.410

32 **Ge**
germanium
5.320

33 **As**
arsenic
5.727

34 **Se**
selenium
4.810

35 **Br**
bromine
3.102

36 **Kr**
krypton
3.698

Callout Box for Radium (Ra):
 Z: Atomic Number
 Ra: Radioactive
 CS: Chemical Symbol
 N: Name
 d: Density (g/cm³) for the gas

`\pgfPT[Z list={1,...,36},cell style=myd,show title=false,d unit=g/cm3]`

1
H
hydrogen
0.00008989

2
He
helium
0.000178

3
Li
lithium
0.534

4
Be
beryllium
1.850

5
B
boron
2.340

6
C
carbon
2.267

7
N
nitrogen
0.001251

8
O
oxygen
0.001429

9
F
fluorine
0.0017

10
Ne
neon
0.0009002

11
Na
sodium
0.968

12
Mg
magnesium
1.738

13
Al
aluminum
2.700

14
Si
silicon
2.330

15
P
phosphorus
1.823

16
S
sulfur
1.960

17
Cl
chlorine
0.0032

18
Ar
argon
0.001784

19
K
potassium
0.86

20
Ca
calcium
1.55

21
Sc
scandium
2.98

22
Ti
titanium
4.54

23
V
vanadium
6.0

24
Cr
chromium
7.19

25
Mn
manganese
7.43

26
Fe
iron
7.87

27
Co
cobalt
8.90

28
Ni
nickel
8.90

29
Cu
copper
8.96

30
Zn
zinc
7.14

31
Ga
gallium
5.91

32
Ge
germanium
5.32

33
As
arsenic
5.72

34
Se
selenium
4.81

35
Br
bromine
3.12

36
Kr
krypton
3.71

37
Rb
rubidium
1.47

38
Sr
strontium
2.54

39
Y
yttrium
4.47

40
Zr
zirconium
6.52

41
Nb
niobium
8.47

42
Mo
molybdenum
10.22

43
Tc
technetium
11.49

44
Ru
ruthenium
12.38

45
Rh
rhodium
12.41

46
Pd
palladium
12.02

47
Ag
silver
10.49

48
Cd
cadmium
8.65

49
In
indium
7.31

50
Sn
tin
7.27

51
Sb
antimony
6.0

52
Te
tellurium
5.24

53
I
iodine
4.93

54
Xe
xenon
5.84

55
Cs
cesium
1.93

56
Ba
barium
3.51

57
La
lanthanum
6.91

58
Ce
cerium
6.99

59
Pr
praseodymium
7.26

60
Nd
neodymium
7.20

61
Pm
promethium
7.26

62
Sm
samarium
7.53

63
Eu
europium
7.53

64
Gd
gadolinium
7.84

65
Tb
terbium
8.23

66
Dy
dysprosium
8.54

67
Ho
holmium
8.78

68
Er
erbium
9.0

69
Tm
thulium
9.32

70
Yb
ytterbium
9.45

71
Lu
lutetium
9.48

72
Hf
hafnium
13.31

73
Ta
tantalum
16.69

74
W
tungsten
19.3

75
Re
rhenium
21.02

76
Os
osmium
22.61

77
Ir
iridium
22.42

78
Pt
platinum
21.46

79
Au
gold
19.3

80
Hg
mercury
13.55

81
Tl
thallium
11.85

82
Pb
lead
11.34

83
Bi
bismuth
9.80

84
Po
polonium
9.19

85
At
astatine
9.4

86
Rn
radon
9.73

87
Fr
francium
10.1

88
Ra
radium
10.2

89
Ac
actinium
10.2

90
Th
thorium
11.7

91
Pa
protactinium
11.96

92
U
uranium
19.1

93
Np
neptunium
20.25

94
Pu
plutonium
19.84

95
Am
americium
19.8

96
Cm
curium
19.1

97
Bk
berkelium
18.9

98
Cf
californium
18.1

99
Es
einsteinium
18.6

100
Fm
fermium
18.2

101
Md
mendelevium
18.1

102
No
nobelium
18.2

103
Lr
lawrencium
18.9

104
Rf
rutherfordium
21.0

105
Db
dubnium
22.6

106
Sg
seaborgium
23.6

107
Bh
bohrium
24.7

108
Hs
hassium
26.1

109
Mt
meitnerium
27.1

110
Ds
darmstadtium
28.1

111
Rg
roentgenium
28.1

112
Cn
copernicium
28.1

113
Nh
nihonium
28.1

114
Fl
flerovium
28.1

115
Mc
moscovium
28.1

116
Lv
livermorium
28.1

117
Ts
tennessine
28.1

118
Og
oganesson
28.1

```
\pgfPT[Z list={1,...,36},cell style=myd,show title=false,d unit=g/dm3]
```

Periodic Table of Elements

Callout Box for Carbon (C):

- Z:** Atomic Number (6)
- Ra:** Radioactive
- CS:** Chemical Symbol
- N:** Name
- D:** Density (2.267 g/cm³)

d precision

default: -1

Sets the density precision, *i.e.*, the decimal places displayed in their value, performing the respective rounding, without zero padding the value.

NOTE:

Rounding is performed over density values which actually have a maximum 5 or 8 decimal places, when the values are in g/dm³ or in g/cm³, respectively.. So giving this key a value of -1 (the value of the density as-is) or 5 or 8 has the same effect.

Therefore the values provided to this key should be any integer between -1 and 4 (g/dm³) or 7 (g/cm³). Any other integer provided will be processed as -1.

\pgfPTstyle[Z list={1,...,54},cell style=myd,show title=false]

\pgfPT

1																	18	
1	H																	He
	hydrogen																	helium
	0.08989																	0.1786
2	Li	Be															Ne	
	lithium	beryllium															neon	
	0.534	1.850															0.9002	
3	Na	Mg															Ar	
	sodium	magnesium															argon	
	0.968	1.738															1.784	
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
	0.890	1.550	2.985	4.506	6.110	7.150	7.21	7.860	8.900	8.908	8.960	7.140	5.910	5.323	5.727	4.810	3.1028	3.749
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
	rubidium	strontium	yttrium	zirconium	niobium	molybdenum	technetium	ruthenium	rhodium	palladium	silver	cadmium	indium	tin	antimony	tellurium	iodine	xenon
	1.532	2.640	4.472	6.520	8.570	10.280	11.000	12.450	12.410	12.023	10.480	8.650	7.310	7.265	6.087	6.240	4.933	5.854

2

He

Atomic Number

Radioactive

CS

Chemical Symbol

N

Name

Density (g/cm³: g/dm³ for the gases)

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\pgfPT[d precision=1]

1																	18	
1	H																	He
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	0.5	1.9															0.9	
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4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
	0.9	1.6	3.0	4.5	6.1	7.2	7.2	7.9	8.9	8.9	9.0	7.1	5.9	5.3	5.7	4.8	3.1	3.8
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
	rubidium	strontium	yttrium	zirconium	niobium	molybdenum	technetium	ruthenium	rhodium	palladium	silver	cadmium	indium	tin	antimony	tellurium	iodine	xenon
	1.5	2.6	4.5	6.5	8.6	10.3	11.0	12.5	12.4	12.0	10.5	8.7	7.3	7.3	6.7	6.2	4.9	5.9

\pgfPT[d precision=2]

Periodic table showing element properties with density values rounded to 2 decimal places. The table includes atomic number (Z), atomic symbol, name, and density (g/cm³) for the gas phase. A legend box shows the format for the density value: $\frac{Z}{\text{CS}} \frac{N}{d}$ where Z is Atomic Number, CS is Chemical Symbol, N is Name, and d is Density (g/cm³) for the gas phase.

\pgfPT[d precision=3]

Periodic table showing element properties with density values rounded to 3 decimal places. The table includes atomic number (Z), atomic symbol, name, and density (g/cm³) for the gas phase. A legend box shows the format for the density value: $\frac{Z}{\text{CS}} \frac{N}{d}$ where Z is Atomic Number, CS is Chemical Symbol, N is Name, and d is Density (g/cm³) for the gas phase.

\pgfPT[d precision=4]

Periodic table showing element properties with density values rounded to 4 decimal places. The table includes atomic number (Z), atomic symbol, name, and density (g/cm³) for the gas phase. A legend box shows the format for the density value: $\frac{Z}{\text{CS}} \frac{N}{d}$ where Z is Atomic Number, CS is Chemical Symbol, N is Name, and d is Density (g/cm³) for the gas phase.

\pgfPT[d precision=5]

Periodic table showing element properties with density values rounded to 5 decimal places. The table includes atomic number (Z), atomic symbol, name, and density (g/cm³) for the gas phase. A legend box shows the format for the density value: $\frac{Z}{\text{CS}} \frac{N}{d}$ where Z is Atomic Number, CS is Chemical Symbol, N is Name, and d is Density (g/cm³) for the gas phase.

default: $\{c=black, f=\texttt{\tiny\bfseries}, p=-1, u=both\}$

(new in v1.0.1)

USAGE: d={c=<color>,f=,p=<integer value>,u=<pm|A>}

`\pgfPT[Z list={1,...,36},cell style=myd,show title=false,d={c=blue,p=2}]`

Callout Box for Carbon (C):

- Z:** Atomic Number
- Ra:** Radioactive
- CS:** Chemical Symbol
- N:** Name
- d:** Density (g/cm³, g/dm³ for the gases)

Periodic Table Data:

Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	H hydrogen 1.01	He helium 4.00																
2	Li lithium 6.94	Be beryllium 9.01																
3	Na sodium 22.99	Mg magnesium 24.31																
4	K potassium 39.10	Ca calcium 40.08	Sc scandium	Ti titanium	V vanadium	Cr chromium	Mn manganese	Fe iron	Co cobalt	Ni nickel	Cu copper	Zn zinc	Ga gallium	Ge germanium	As arsenic	Se selenium	Br bromine	Kr krypton
5	Rb rubidium 85.47	Sr strontium 87.62	Y yttrium	Zr zirconium	Nb niobium	Mo molybdenum	Tc technetium	Ru ruthenium	Rh rhodium	Pd palladium	Ag silver	Cd cadmium	In indium	Sn tin	Sb antimony	Te tellurium	I iodine	Xe xenon
6	Cs cesium 132.91	Ba barium 137.33	La lanthanum	Ce cerium	Pr praseodymium	Nd neodymium	Pm promethium	Sm samarium	Eu europium	Gd gadolinium	Tb terbium	Dy dysprosium	Ho holmium	Er erbium	Tm thulium	Yb ytterbium	Lu lutetium	
7	Fr francium	Ra radium																

➡ The lattice structure

default: *fig*

(changed in v2.1.6)

```
\pgfPT[Z list={1,...,36},cell style=pgfPTIs]
```

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen 1.008	2 He helium 4.0026	3 Li lithium 6.94	4 Be beryllium 9.0122	5 B boron 10.81	6 C carbon 12.011	7 N nitrogen 14.007	8 O oxygen 15.999	9 F fluorine 18.998	10 Ne neon 20.18	11 Na sodium 22.99	12 Mg magnesium 24.305	13 Al aluminum 26.982	14 Si silicon 28.085	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.88	23 V vanadium 50.942	24 Cr chromium 52.00	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.69	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.96	35 Br bromine 79.904	36 Kr krypton 83.8

`\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=fig*]`

[illegible]

\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=txt]

\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=txt*]

\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=fig+txt]

\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=fig+txt*]

`\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=txt+fig]`

`\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=txt+fig*]`

Is color

Sets the lattice structure text color.

default: *black*

`\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=txt+fig,ls color=red]`

Is font

Sets the lattice structure text font.

default: *\tiny*

`\pgfPT[Z list={1,...,36},cell style=pgfPTIs,ls=txt+fig,ls font=\tiny\bfseries]`

Is aligndefault: *right*Sets the alignment of the lattice structure to *left* or *center* or *right*.`\pgfPT[Z list={1,...,36},cell style=pgfPTIs,Is align=center]`

Periodic table showing elements 1 to 36. The cell style box displays the following information:

- Z: Atomic Number
- Is: Lattice Structure
- CS: Chemical Symbol
- N: Name
- Ar: Relative Atomic Mass

The lattice structure constants are centered in the cell style box.

Is unitdefault: *pm*Sets the unit for the lattice structure constants: a, b and c. The two possible values to this key are *pm* (picometers) and *A* (Å – angstroms).

```
\pgfPTbuildcellstyle{myls}{6,3}% 6 rows by 3 columns
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-2.5;Is),(5;2.5-3;Isa),
(6;1-2.5;Isb),(6;2.5-3;Isca)]
\pgfPTstyle[Z list={1,...,36},cell style=myls,show title=false,Is align=center]
\pgfPT
```

Periodic table showing elements 1 to 36. The cell style box displays the following information:

- Z: Atomic Number
- Is: Lattice Structure
- CS: Chemical Symbol
- N: Name
- Ar: Relative Atomic Mass

The lattice structure constants are in Angstroms (A) and are centered in the cell style box.

`\pgfPT[Is unit=A]`

Periodic table showing elements 1 to 36. The cell style box displays the following information:

- Z: Atomic Number
- Is: Lattice Structure
- CS: Chemical Symbol
- N: Name
- Ar: Relative Atomic Mass

The lattice structure constants are in Angstroms (A) and are centered in the cell style box.

Is precisiondefault: *-1*Sets the lattice structure constants - a, b, and c - precision, as also the lattice c/a ratio, *i.e.*, the decimal places displayed in their value, performing the respective rounding, without zero padding the value.**NOTE:**

Rounding is performed over the constants data or c/a ratio values which actually have a maximum of 2 or 4 decimal places, when the values are in picometers or in angstroms, respectively. So giving this key a value of -1 (the value of the constants or c/a ratio as-is) or 2 or 4 has the same effect.

Therefore the values provided to this key should be any integer between -1 and 1 (pm) or 3 (Å). Any other integer provided will be processed as -1.

```
\pgfPTbuildcellstyle{mysls}(6,3)% 6 rows by 3 columns
[(1;1-2;Z),(1;2-3;ls),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-2.5;lsa),
(5;2.5-3;lsb),(6;1-2.5;lsc),(6;2.5-3;lsa)]
\pgfPTstyle[Z list={1,...,36},cell={w=36pt,h=42pt,style=mysls}]
\pgfPT
```

Periodic Table of Elements

\pgfPT[ls precision=0]

Periodic Table of Elements

\pgfPT[ls precision=1]

Periodic Table of Elements

\pgfPT[ls precision=2]

Periodic Table of Elements

\pgfPT[*Is precision=2,Is unit=A*]

Periodic Table of Elements

The periodic table displays elements from Hydrogen (H) to Krypton (Kr). Each element cell contains its atomic number, symbol, name, and atomic weight. A legend on the right lists crystal structures: body centered cubic, face centered orthorhombic, body centered tetragonal, diamond, face centered cubic, face centered orthorhombic, hexagonal close packed, hexagonal, monoclinic, rhombohedral, simple cubic, simple tetragonal, and tetragonal. A key on the left defines fields: Z (Atomic Number), Ra (Lattice Structure), CS (Chemical Symbol), N (Name), Is a (Lattice constant: a (Å)), Is b (Lattice constant: b (Å)), Is c (Lattice constant: c (pm)), and Is ca (Lattice c/a ratio).

lat

default: $\{Is=fig,c=black,f=\tiny,align=right,p=-1,u=pm\}$

Pseudo style to set the keys: **Is**, **Is color**, **Is font**, **Is align**, **Is precision** and/or **Is unit**. None of the keys – **Is**, **c**, **f**, **align**, **p** and **u** – are mandatory. (new in v1.0.1)

USAGE:

$lat=\{Is=<fig>|txt|fig+txt|txt+fig>,c=<color>,f=<font\commands>,align=<left|center|right>,p=<integer\value>,u=<pm|A>\}$

\pgfPT[Z list={1,...,36},lat={c=blue,f=\tiny\bfseries,u=A,p=2}]

Periodic Table of Elements

This version of the periodic table uses the 'lat' key settings. The legend on the right lists crystal structures: body centered cubic, face centered orthorhombic, body centered tetragonal, diamond, face centered cubic, face centered orthorhombic, hexagonal close packed, hexagonal, monoclinic, rhombohedral, simple cubic, simple tetragonal, and tetragonal. The key on the left defines fields: Z (Atomic Number), Ra (Lattice Structure), CS (Chemical Symbol), N (Name), Is a (Lattice constant: a (Å)), Is b (Lattice constant: b (Å)), Is c (Lattice constant: c (pm)), and Is ca (Lattice c/a ratio).

► The year of discovery

DiscY color

default: *black*

Sets the color of the discovery year.

\pgfPT[Z list={1,...,36},cell style=pgfPTdisc,DiscY color=red]

Periodic Table of Elements

This version of the periodic table uses the 'DiscY color' key setting. The legend on the right lists crystal structures: body centered cubic, face centered orthorhombic, body centered tetragonal, diamond, face centered cubic, face centered orthorhombic, hexagonal close packed, hexagonal, monoclinic, rhombohedral, simple cubic, simple tetragonal, and tetragonal. The key on the left defines fields: Z (Atomic Number), Ra (Lattice Structure), CS (Chemical Symbol), N (Name), Is a (Lattice constant: a (Å)), Is b (Lattice constant: b (Å)), Is c (Lattice constant: c (pm)), and Is ca (Lattice c/a ratio).

DiscY fontdefault: `\tiny\bfseries`

Sets the font of the discovery year.

```
\pgfPT[Z list={1,...,36},cell style=pgfPTdisc,DiscY
font=\fontfamily{pbk}\selectfont\tiny\bfseries]
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (H) to Krypton (Kr). Each element cell contains its symbol, name, atomic number, and discovery year. A legend identifies element categories: Asia Minor, Asstia, Denmark, Egypt, France, Germany, Italy, Middle East, Persia, Russia, Spain, Sweden, Switzerland, The United Kingdom, The United States, and Mexico. A detailed view of Cesium (Cs) shows its properties: Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, cd: Country of Discovery, and yd: Year of Discovery.

DiscY BC scaledefault: `1`

Sets the font factor scaling for the Before Christ (BC) acronym in the year of discovery.

```
\pgfPT[Z list={1,...,36},cell style=pgfPTdisc,DiscY BC scale=.8]
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (H) to Krypton (Kr). Each element cell contains its symbol, name, atomic number, and discovery year. A legend identifies element categories: Asia Minor, Asstia, Denmark, Egypt, France, Germany, Italy, Middle East, Persia, Russia, Spain, Sweden, Switzerland, The United Kingdom, The United States, and Mexico. A detailed view of Cesium (Cs) shows its properties: Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, cd: Country of Discovery, and yd: Year of Discovery.

► The electron distribution

```
\pgfPTbuildcellstyle{electron}(6,3)% 6 rows by 3 columns
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),
(5;1-3;eDist),(6;1-3;eConfignl)]
```

eDist colordefault: `black`

Sets the electron distribution color.

```
\pgfPT[Z list={1,...,54},cell style=electron,eDist color=red]
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (1) to Xenon (54). Each element cell contains its symbol, atomic number, name, and electron configuration. The electron distribution is shown in red using the `\tiny\bfseries` font. A legend box for Cesium (Cs) shows the configuration: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^6 5s^2 5p^6 6s^2 6p^6 7s^2$.

eDist fontdefault: `\tiny\bfseries`

Sets the electron distribution font.

```
\pgfPT[Z list={1,...,54},cell style=electron,eDist  
font=\fontfamily{pbk}\selectfont\tiny\bfseries]
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (1) to Xenon (54). The electron distribution is shown using the `\fontfamily{pbk}\selectfont` font family, along with `\tiny\bfseries`. The legend box for Cesium (Cs) shows the configuration: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^6 5s^2 5p^6 6s^2 6p^6 7s^2$.

eDist sepdefault: `:`Sets the separator character between energy levels in electron distribution. *If the separator character is a comma it must be provided between curly braces – {,}.*

```
\pgfPT[Z list={1,...,54},cell style=electron,eDist sep=-]
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (1) to Xenon (54). The electron distribution uses a hyphen (`-`) as the separator between energy levels. The legend box for Cesium (Cs) shows the configuration: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^6 5s^2 5p^6 6s^2 6p^6 7s^2$.

```
\pgfPT[Z list={1,...,54},cell style=electron,eDist sep={,}]
```

Periodic Table of Elements

Periodic Table of Elements showing electron configurations for each element. The table includes elements from Hydrogen (1) to Xenon (54). A callout box for Cesium (Cs) shows its properties: Z: Atomic Number, R: Radioactive, N: Chemical Symbol, M: Name, ed: Electron Distribution, ec: Electronic Configuration.

► The other contents

For all the *other contents* available for the cells of the periodic table, two keys can be set: **<content name> color** and **<content name> font**.

The <content name>'s list:

- ✓ **R**: atomic radius
- ✓ **Rcov**: covalent radius
- ✓ **Rion**: ionic radius
- ✓ **Ei**: first ionization energy
- ✓ **eneg**: electronegativity (Pauling)
- ✓ **eaaff**: electroaffinity
- ✓ **Tmelt**: melting point (Kelvin)
- ✓ **TmeltC**: melting point (Celsius degrees)
- ✓ **Tboil**: boiling point (Kelvin)
- ✓ **TboilC**: boiling point (Celsius degrees)
- ✓ **eConfig**: electronic configuration (increasing n)
- ✓ **eConfignl**: electronic configuration (increasing n+l)
- ✓ **Cp**: specific heat capacity
- ✓ **kT**: thermal conductivity
- ✓ **lsa**: lattice constant – a
- ✓ **lsb**: lattice constant – b
- ✓ **lsc**: lattice constant – c
- ✓ **lsca**: lattice c/a ratio
- ✓ **DiscC**: country of discovery
- ✓ **spectra**: visible range spectral lines

<content name> color

Sets the <content name> color.

default: *black*

```
\pgfPT[Z list={1,...,36},name color=blue]
```

Periodic Table of Elements

Periodic Table of Elements showing oxidation states for each element. The table includes elements from Hydrogen (1) to Krypton (36). A callout box for Cesium (Cs) shows its properties: Z: Atomic Number, R: Radioactive, N: Chemical Symbol, M: Name, O: Oxidation States.

<content name> fontdefault: `\tiny\bfseries`Sets the `<content name>` font.`\pgfPT[Z list={1,...,36},name font=\tiny\itshape]`

Periodic Table of Elements

Periodic Table of Elements showing elements 1 to 36. The table is color-coded by groups. A legend box in the center shows the font settings for Z, Ra, CS, N, and O.

cell fontdefault: `\bfseries\tiny`

Style to set the font for all cell contents, except for the Z and Chemical Symbol fonts.

`\pgfPT[Z list={1,...,36},cell font=\tiny\itshape]`

Periodic Table of Elements

Periodic Table of Elements showing elements 1 to 36. The table is color-coded by groups. A legend box in the center shows the font settings for Z, Ra, CS, N, and O.

cell colordefault: *black*

Style to set the color for all cell contents, except for the Z and Chemical Symbol colors.

`\pgfPT[Z list={1,...,36},cell color=blue]`

Periodic Table of Elements

Periodic Table of Elements showing elements 1 to 36. The table is color-coded by groups. A legend box in the center shows the font settings for Z, Ra, CS, N, and O.

The precision of the *other contents*, which have numerical values, can also be set by a key. Atomic radius, covalent radius, and ionic radius all have integer values, so precision does not apply to them.

E precision

default: -1

Sets the first ionization energy and the electroaffinity precision, *i.e.*, the decimal places displayed in their value, performing the respective rounding, without zero padding the value.

NOTE:

Rounding is performed over energy values witch actually have a maximum of 3 decimal places. So giving this key a value of -1 (the value of the energy as-is) or 3 has the same effect. *Therefore the values provided to this key should be any integer between -1 and 2, i.e., -1, 0, 1 or 2. Any other integer provided will be processed as -1.*

```
\pgfPTbuildcellstyle{myE}{5,3}% 5 rows by 3 columns
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-2.5;Ei),(5;2.5-3;eaff)]
\pgfPTstyle[Z list={1,...,54},cell style=myE,show title=false]
\pgfPT
```

1	2																	18																	
1	H																	2	He																
3	Li	4	Be															10	Ne																
11	Na	12	Mg	13	B	14	C	15	N	16	O	17	F	18	Ar																				
19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe

\pgfPT[E precision=0]

1	2																	18																	
1	H																	2	He																
3	Li	4	Be															10	Ne																
11	Na	12	Mg	13	B	14	C	15	N	16	O	17	F	18	Ar																				
19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe

\pgfPT[E precision=1]

1

H

hydrogen

1312 72.8

2

3

Li

lithium

520.2 59.6

4

Be

beryllium

999.5 0

5

6

7

8

9

10

Ne

neon

2372.3 0

2

CS

Carbon

12

12.011

78.9

15.1

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`\pgfPT[E precision=2]`

Periodic table generated with `\pgfPT[E precision=2]`. The table displays elements with their symbols, atomic numbers, and names. A callout box for Cesium (Cs) shows: Z: Atomic Number, R: Radioactive, CS: Chemical Symbol, N: Name, Ei: Ionization Energy (kJ/mol), Eea: Electronegativity (kJ/mol).

`\pgfPT[E precision=3]`

Periodic table generated with `\pgfPT[E precision=3]`. The table displays elements with their symbols, atomic numbers, and names. A callout box for Cesium (Cs) shows: Z: Atomic Number, R: Radioactive, CS: Chemical Symbol, N: Name, Ei: Ionization Energy (kJ/mol), Eea: Electronegativity (kJ/mol).

T precision

default: -1

Sets the melting point an boiling point precision, *i.e.*, the decimal places displayed in their value, performing the respective rounding, without zero padding the value.

NOTE:

Rounding is performed over melting or boiling point values witch actually have a maximum, respectively, of 4 or 2 decimal places. So giving this key a value of -1 (the value of the melting or boiling point as-is) or, respectively, 4 or 2 has the same effect.

Therefore the values provided to this key should be any integer between -1 and 3 or 2. Any other integer provided will be processed as -1.

```
\pgfPTbuildcellstyle{myT}{6,3}% 6 rows by 3 columns
```

```
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-2.5;Tmelt),
```

```
(5;2.5-3;Tboil),(6;1-2.5;TmeltC),(6;2.5-3;TboilC)]
```

```
\pgfPTstyle[Z list={1,...,36},cell style=myT,Tmelt color=blue!50!black,TmeltC
```

```
color=blue,Tboil color=red!50!black,TboilC color=red,show title=false]
```

`\pgfPT`

Periodic table generated with `\pgfPT` using the T precision option. The table displays elements with their symbols, atomic numbers, and names. A callout box for Cesium (Cs) shows: Z: Atomic Number, R: Radioactive, CS: Chemical Symbol, N: Name, Ei: Ionization Energy (kJ/mol), Eea: Electronegativity (kJ/mol).

\pgfPT[T precision=0]

Periodic table showing elements with T precision=0. The table includes element symbols, names, atomic numbers, and physical properties (melting and boiling points) for many elements. The legend box shows the format for element 2 (He): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, MPK: Melting Point (K), BPK: Boiling Point (K), BPC: Boiling Point (°C).

\pgfPT[T precision=1]

Periodic table showing elements with T precision=1. The table includes element symbols, names, atomic numbers, and physical properties (melting and boiling points) for many elements. The legend box shows the format for element 2 (He): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, MPK: Melting Point (K), BPK: Boiling Point (K), BPC: Boiling Point (°C).

\pgfPT[T precision=2]

Periodic table showing elements with T precision=2. The table includes element symbols, names, atomic numbers, and physical properties (melting and boiling points) for many elements. The legend box shows the format for element 2 (He): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, MPK: Melting Point (K), BPK: Boiling Point (K), BPC: Boiling Point (°C).

\pgfPT[T precision=3]

Periodic table showing elements with T precision=3. The table includes element symbols, names, atomic numbers, and physical properties (melting and boiling points) for many elements. The legend box shows the format for element 2 (He): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, MPK: Melting Point (K), BPK: Boiling Point (K), BPC: Boiling Point (°C).

\pgfPT[T precision=4]

Periodic table showing elements with T precision=4. The table includes element symbols, names, atomic numbers, and physical properties (melting and boiling points) for many elements. The legend box shows the format for element 2 (He): Z: Atomic Number, Ra: Radioactive, CS: Chemical Symbol, N: Name, MPK: Melting Point (K), BPK: Boiling Point (K), BPC: Boiling Point (°C).

default: -1

NOTE:

Therefore the values provided to this key should be any integer between -1 and 2. Any other integer provided will be processed as -1.

```
\pgfPTbuildcellstyle{myCp}(5,3)% 5 rows by 3 columns
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;Cp)]
\pgfPTstyle[Z list={1,...,36},cell style=myCp]
\pgfPT
```

1																	18																	
1	1 H hydrogen 20.836																	2 He helium 20.786																
2	3 Li lithium 24.86	4 Be beryllium 16.443															13 B boron 11.087	14 C carbon 8.517	15 N nitrogen 29.124	16 O oxygen 29.378	17 F fluorine 31.304	18 Ne neon 20.786												
3	11 Na sodium 28.23	12 Mg magnesium 24.869															19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.88	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.64	33 As arsenic 74.922	34 Se selenium 78.96	35 Br bromine 79.904	36 Kr krypton 83.80
	3	4	5	6	7	8	9	10	11	12																								

`\pgfPT[Cp precision=0]`

1																	18	
1	H hydrogen 1																2	He helium 2
3	Li lithium 3	Be beryllium 4															10	Ne neon 10
5	Na sodium 11	Mg magnesium 12															18	Ar argon 18
7	K potassium 19	Ca calcium 20	Sc scandium 21	Ti titanium 22	V vanadium 23	Cr chromium 24	Mn manganese 25	Fe iron 26	Co cobalt 27	Ni nickel 28	Cu copper 29	Zn zinc 30	Ga gallium 31	Ge germanium 32	As arsenic 33	Se selenium 34	Br bromine 35	Kr krypton 36

`\pgfPT[Cp precision=1]`

2 He
helium
20.8

1 H
hydrogen
20.8

3 Li
lithium
24.9

4 Be
beryllium
16.4

11 Na
sodium
28.2

12 Mg
magnesium
24.9

13 B
boron
11.1

14 C
carbon
8.5

15 N
nitrogen
29.1

16 O
oxygen
29.4

17 F
fluorine
31.3

18 Ne
neon
20.8

19 K
potassium
35.4

20 Ca
calcium
34.4

21 Sc
scandium
34.4

22 Ti
titanium
34.4

23 V
vanadium
34.4

24 Cr
chromium
34.4

25 Mn
manganese
34.4

26 Fe
iron
34.4

27 Co
cobalt
34.4

28 Ni
nickel
34.4

29 Cu
copper
34.4

30 Zn
zinc
34.4

31 Ga
gallium
34.4

32 Ge
germanium
34.4

33 As
arsenic
34.4

34 Se
selenium
34.4

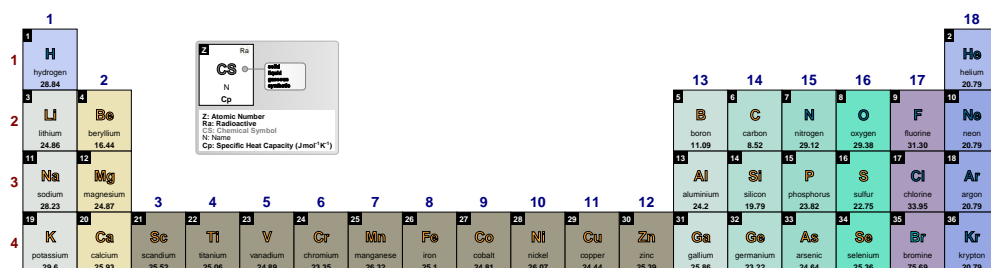
35 Br
bromine
34.4

36 Kr
krypton
34.4

Callout for Element 2 (He):
 Z: Atomic Number
 Ra: Radioactive
 CS: Chemical Symbol
 N: Name
 C_p: Specific Heat Capacity (J/mol K)

`\pgfPT[Cp precision=2]`

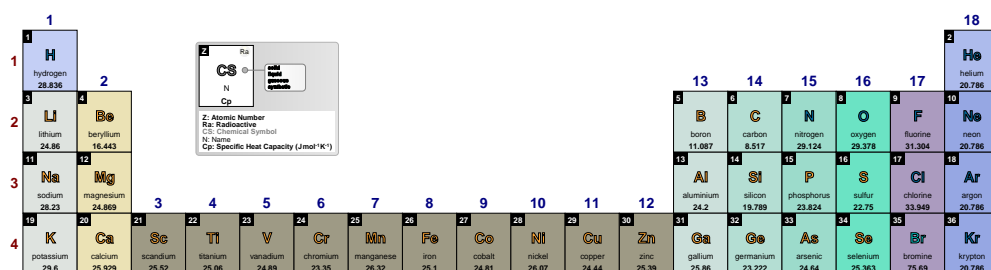
Periodic Table of Elements



1	2											13	14	15	16	17	18																		
1	H															2	He																		
	hydrogen																helium																		
	28.84																20.79																		
3	Li	4	Be									5	B	6	C	7	N	8	O	9	F	10	Ne												
	lithium		beryllium										boron		carbon		nitrogen		oxygen		fluorine		neon												
	24.86		16.44										11.09		8.52		28.12		29.38		31.36		20.79												
11	Na	12	Mg									13	Al	14	Si	15	P	16	S	17	Cl	18	Ar												
	sodium		magnesium										aluminum		silicon		phosphorus		sulfur		chlorine		argon												
	28.23		24.87										24.2		19.79		23.82		22.75		33.95		20.79												
19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
	potassium		calcium		scandium		titanium		vanadium		chromium		manganese		iron		cobalt		nickel		copper		zinc		gallium		germanium		arsenic		selenium		bromine		krypton
	29.6		25.93		25.52		25.06		24.89		23.35		26.32		25.1		24.81		26.07		24.44		25.39		25.86		23.22		24.64		25.36		75.69		20.79

`\pgfPT[Cp precision=3]`

Periodic Table of Elements



1	2											13	14	15	16	17	18																		
1	H															2	He																		
	hydrogen																helium																		
	28.836																20.786																		
3	Li	4	Be									5	B	6	C	7	N	8	O	9	F	10	Ne												
	lithium		beryllium										boron		carbon		nitrogen		oxygen		fluorine		neon												
	24.86		16.443										11.087		8.517		29.124		29.378		31.304		20.786												
11	Na	12	Mg									13	Al	14	Si	15	P	16	S	17	Cl	18	Ar												
	sodium		magnesium										aluminum		silicon		phosphorus		sulfur		chlorine		argon												
	28.23		24.869										24.2		19.789		23.824		22.75		33.949		20.786												
19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
	potassium		calcium		scandium		titanium		vanadium		chromium		manganese		iron		cobalt		nickel		copper		zinc		gallium		germanium		arsenic		selenium		bromine		krypton
	29.6		25.929		25.52		25.06		24.89		23.35		26.32		25.1		24.81		26.07		24.44		25.39		25.86		23.222		24.64		25.363		75.69		20.786

KT precision

default: -1

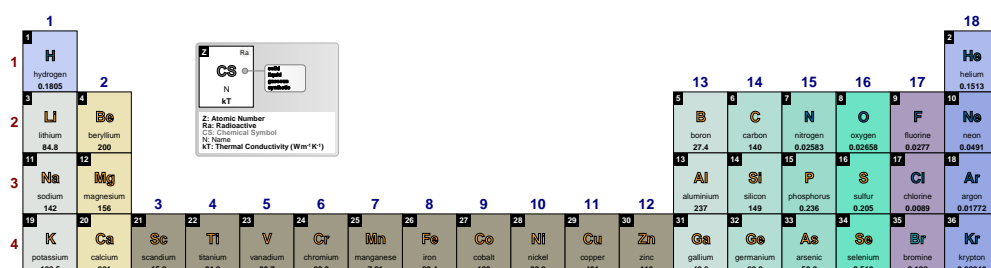
Sets the thermal conductivity precision, *i.e.*, the decimal places displayed in their value, performing the respective rounding, without zero padding the value.

NOTE:

Rounding is performed over density values which actually have a maximum 5 decimal places. So giving this key a value of -1 (the value of the melting or boiling point as-is) or 5 has the same effect.

Therefore the values provided to this key should be any integer between -1 and 4. Any other integer provided will be processed as -1.

```
\pgfPTbuildcellstyle{mykT}(5,3)% 5 rows by 3 columns
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;kT)]
\pgfPTstyle[Z list={1,...,36},cell style=mykT,show title=false]
\pgfPT
```



1	2											13	14	15	16	17	18																		
1	H															2	He																		
	hydrogen																helium																		
	0.1895																0.1513																		
3	Li	4	Be									5	B	6	C	7	N	8	O	9	F	10	Ne												
	lithium		beryllium										boron		carbon		nitrogen		oxygen		fluorine		neon												
	84.8		200										27.4		140		0.02583		0.02658		0.0277		0.0491												
11	Na	12	Mg									13	Al	14	Si	15	P	16	S	17	Cl	18	Ar												
	sodium		magnesium										aluminum		silicon		phosphorus		sulfur		chlorine		argon												
	142		156										237		149		0.236		0.205		0.0089		0.01772												
19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
	potassium		calcium		scandium		titanium		vanadium		chromium		manganese		iron		cobalt		nickel		copper		zinc		gallium		germanium		arsenic		selenium		bromine		krypton
	102.5		201		15.8		21.9		30.7		93.9		7.81		80.4		100		90.9		401		116		40.6		60.2		50.2		0.519		0.122		0.00943

\pgfPT[kT precision=0]

Periodic table showing elements with their symbols, atomic numbers, and names. The thermal conductivity (kT) values are not displayed for any element.

\pgfPT[kT precision=1]

Periodic table showing elements with their symbols, atomic numbers, and names. The thermal conductivity (kT) values are displayed with one decimal place.

\pgfPT[kT precision=2]

Periodic table showing elements with their symbols, atomic numbers, and names. The thermal conductivity (kT) values are displayed with two decimal places.

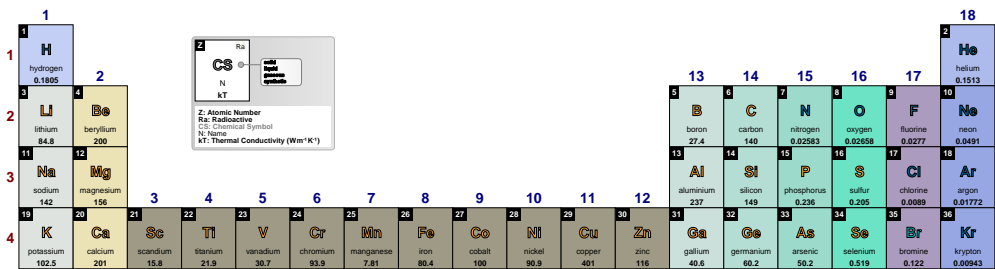
\pgfPT[kT precision=3]

Periodic table showing elements with their symbols, atomic numbers, and names. The thermal conductivity (kT) values are displayed with three decimal places.

\pgfPT[kT precision=4]

Periodic table showing elements with their symbols, atomic numbers, and names. The thermal conductivity (kT) values are displayed with four decimal places.

\pgfPT[kT precision=5]

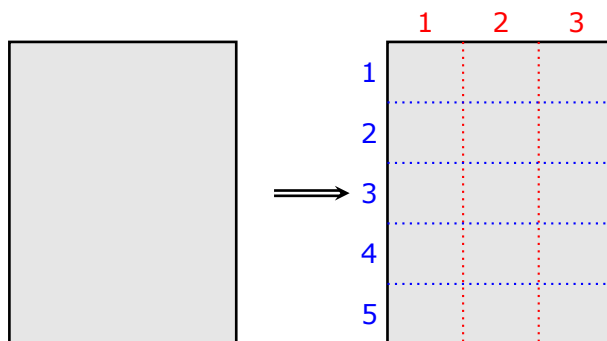


\pgfPTresetstyle

Designing cells with \pgfPTbuildcell

To start designing the *base cell* of the Periodic Table it is necessary to keep in mind that each cell will be split into **n** rows and **k** columns.

As a running example, 5 rows and 3 columns will be used:

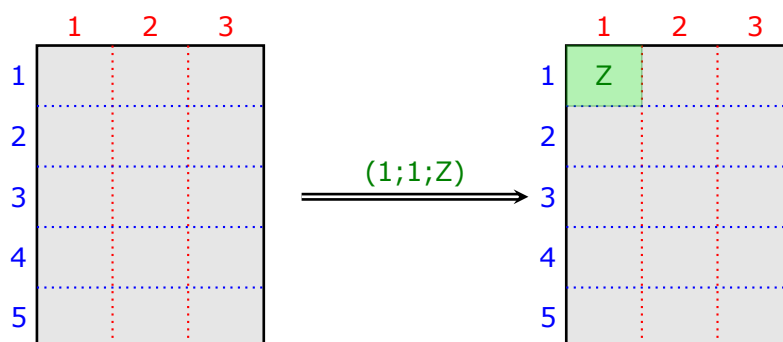


The next task is to assign contents to the cell by typing *trios* with the structure

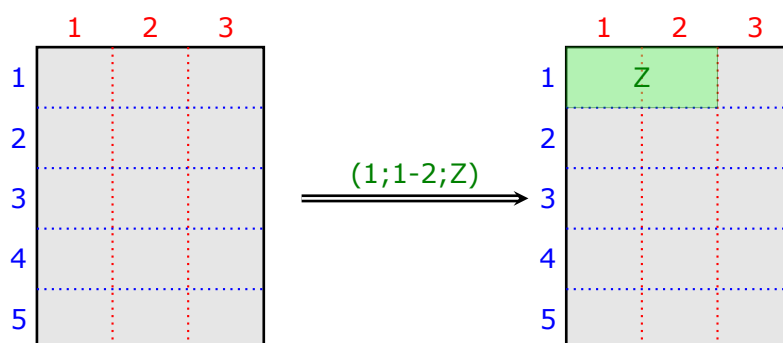
- **(row;column;content)**
- or **(start row-end row;start column-end column;content)**
- or a combination of both.

The available **contents** are: Z, name, CS, Ar, Ar*, radio, R, Rcov, Rion, Ei, eneg, eaff, O, Tmelt, TmeltC, Tboil, TboilC, eDist, eConfig, eConfigl, d, Cp, kT, ls, lsa, lsb, lsc, lsca, DiscY, DiscC and spectra.

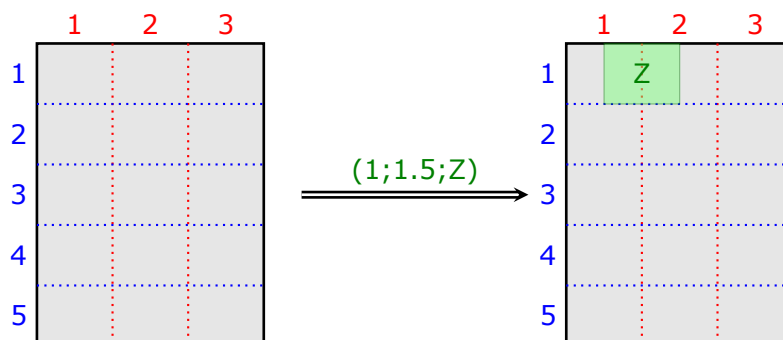
Assigning, for instance, (1;1;Z) will show the atomic number in the first row and in the first column,



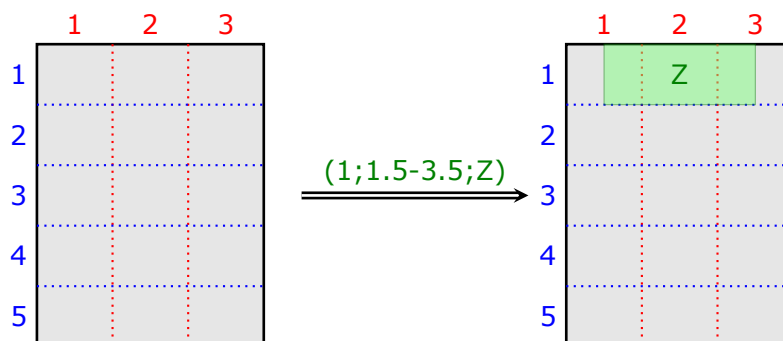
while the assignment (1;1-2;Z) will show the atomic number in the first row and filling the first and second columns,



It is also possible to start at a *fraction* of a line or column. If it is intended to start a line at the middle of the first column the value used should be **1.5**, which means that the start value is at the half (0.5) of the first column (1), observing that 1.5 is 0.5 plus 1:



As in the second example above it is possible to end up in a specified *fraction* of a line or column:



The row, column syntax

Both lines and columns share the same syntax, where **n** is any integer between 1 and the number of rows and **f** is the fractional part of any number between 0 and 1:

- (1) If only the row number **n** is provided the *content* is placed at the row **n**.
- (2) If the row number **n** is provided followed by a **dot** and a number **f**, the *content* is placed at the fraction **f** of the row **n**.
- (3) If the start row **n_s** and the end row **n_e** are provided separated by a **dash**, i.e., **n_s-n_e**, the *content* is placed filling all the rows from **n_s** to **n_e**.
The **dot** notation described in (2) can be used both on **n_s** and **n_e**.
- (4) All of the items above apply to columns in the same way.

✂ The cell contents

- ✓ **Z** – the atomic number of the elements.
- ✓ **name** – the name of the elements.
- ✓ **CS** – the chemical symbol of the elements.
- ✓ **Ar** – the relative atomic mass (atomic weight) of the elements.
- ✓ **Ar*** – the standard relative atomic mass (standard atomic weight) of the elements.

- ✓ **radio** – radioactivity of the elements. If the element is radioactive the figure ☼ is placed in the cell, otherwise nothing is shown.
- ✓ **R** – the atomic radius of the elements. The atomic radius shown is the calculated radius and is expressed in picometers.
- ✓ **Rcov** – the covalent radius of the elements. The covalent radius shown is for single bonds and is expressed in picometers.
- ✓ **Rion** – the ionic radius of the elements. The radius shown is the effective ionic radius in picometers.
- ✓ **Ei** – the first ionization energy of the elements, measured in $\text{kJ} \cdot \text{mol}^{-1}$. All data from rutherfordium onwards is predicted.
- ✓ **eneg** – the Pauling electronegativity of the elements.
- ✓ **eaff** – the electroaffinity (electron affinity) of the elements, measured in $\text{kJ} \cdot \text{mol}^{-1}$. Estimated negative values have been replaced by zero, since the negative ions formed in these cases are always unstable (they may have lifetimes of the order of microseconds to milliseconds, and invariably autodetach after some time).
- ✓ **O** – the common oxidation states of the elements.
- ✓ **Tmelt** – the melting point, in Kelvin, of the elements.
- ✓ **TmeltC** – the melting point, in degrees Celsius, of the elements.
- ✓ **Tboil** – the boiling point, in Kelvin, of the elements.
- ✓ **TboilC** – the boiling point, in degrees Celsius, of the elements.
- ✓ **eDist** – the electron distribution of the elements.
- ✓ **eConfig** – the electronic configuration, in increasing n (principal quantum number), of the element, corresponding to the *spectroscopic* order of orbital energies, that is, the reverse of the order in which electrons are removed from a given atom to form positive ions.
Note: the short version of the electronic configuration is used, i.e., [previous noble gas]remaining electrons. For example, for scandium it is: [Ar]3d¹4s²
- ✓ **eConfigl** – the electronic configuration, in increasing sum of n and ℓ (azimuthal quantum number), of the element, following the order based on the Madelung rule.
Note: the short version of the electronic configuration is used, i.e., [previous noble gas]remaining electrons. For example, for scandium it is: [Ar]4s²3d¹
- ✓ **d** – the density of the elements, in the corresponding physical state, at 25°C and 1 atm.
- ✓ **Cp** – the specific heat capacity of the elements in $\text{J} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}$ at 25°C and 100 kPa.
- ✓ **kT** – the thermal conductivity of the elements in $\text{J} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$ at 25°C.
- ✓ **ls** – the lattice structure of the elements at 1 bar and mostly at 25°C.
- ✓ **lsa** – the lattice constant a of the elements in picometers at 1 bar and mostly at 25°C.
- ✓ **lsb** – the lattice constant b of the eligible elements in picometers at 1 bar and mostly at 25°C.
- ✓ **lsc** – the lattice constant c of the eligible elements in picometers at 1 bar and mostly at 25°C.
- ✓ **lsca** – the lattice c/a ratio of the eligible elements at 1 bar and mostly at 25°C.
- ✓ **DiscY** – the discovery year of the elements.
- ✓ **DiscC** – the discovery country or in, a few cases, region (Middle East or Asia Minor) of the elements.
- ✓ **spectra** – the emission spectrum of the elements. The spectrum is only shown if available. The spectra are pre-built using the package `pgf-spectra` via the commands:

```
\pgfspectraStyle[back=visible40,line width=1pt,width=180pt,height=45pt,%
    relative intensity,relative intensity threshold=.375,%
    brightness=.5,charge=all,Imin=.125,gamma=1]
\foreach \SQ in {H,He,...,Bi,Po,Rn,Fr,...,Es}% Z=1,2,...,83,84,86,87,...,99
{
    \pgfspectra[element=\SQ]%
}
```

✧ Built-in cell styles

There is a set of *built-in* cell styles that could be used for the described purposes:

- ✓ **pgfPT2lang** – a cell layout to use with the name in two languages.

Built-in style pgfPT2lang

The build command:

```
\pgfPTbuildcell(6,3)%
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4-5;1-3;name),(6;1-3;Ar)]
```

	1	2	3
1	Z		radio
2			
3		CS	
4			
5		name	
6		Ar	

scale 1.6:1

- ✓ **pgfPT3lang** – a cell layout to use with the name in three languages.

Built-in style pgfPT3lang

The build command:

```
\pgfPTbuildcell(7,3)%
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4-6;1-3;name),(7;1-3;Ar)]
```

	1	2	3
1	Z		radio
2			
3		CS	
4			
5		name	
6			
7		Ar	

scale 1.6:1

- ✓ **pgfPTR** – a cell layout to display the atomic radius and its periodic variations (if of course the **show periodic variations** key is set to true).

Built-in style pgfPTR

The build command:

```
\pgfPTbuildcell(5,3)%
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;R)]
```

	1	2	3
1	Z		radio
2			
3		CS	
4		name	
5		R	

scale 1.6:1

- Built-in style* **pgfPTEi**

\pgfPTbuildcell(5,3)%

$$[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;Ei)]$$

	1	2	3
1	Z		radio
2		CS	
3			
4	name		
5	Ei		

scale 1.6:1

- Built-in style* **pgfPTeaff**

\pgfPTbuildcell(5,3)%

```
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;eaff)]
```

	1	2	3
1	Z		radio
2		CS	
3			
4	name		
5	eaff		

scale 1.6:1

- Built-in style* **pgfPTREi**

```
\pgfPTbuildcell(6,3)%
```

$$[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;R),(6;1-3;Ei)]$$

	1	2	3
1	Z		radio
2			
3	CS		
4	name		
5	R		
6	Ei		

scale 1.6:1

- ### Built-in style pgfPTIs

```
\pgfPTbuildcell(5,3)%
```

$$[(1;1-2.5;Z),(1;2.5-3;ls),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;Ar)]$$

	1	2	3
1	Z		Is
2		CS	
3			
4	name		
5	Ar		

scale 1.6:1

✓ **pgfPTdisc** – a cell layout to display the discovery country and discovery year.

Built-in style **pgfPTdisc**

The build command:

```
\pgfPTbuildcell(6,3)%  
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-3;DiscC),(6;1-3;DiscY)]
```

	1	2	3
1	Z		radio
2			
3		CS	
4	name		
5	DiscC		
6	DiscY		

scale 1.6:1

Designing color schemes

There are three ways to make a new color scheme:

- with the command `\pgfPTnewColorScheme`
- using the *script* in the file [pgfPTcolorSchemes.html](#)
- with the commands provided by the [colorschemes library](#) (see the [libraries section](#)).

✦ Designing a color scheme with `\pgfPTnewColorScheme`

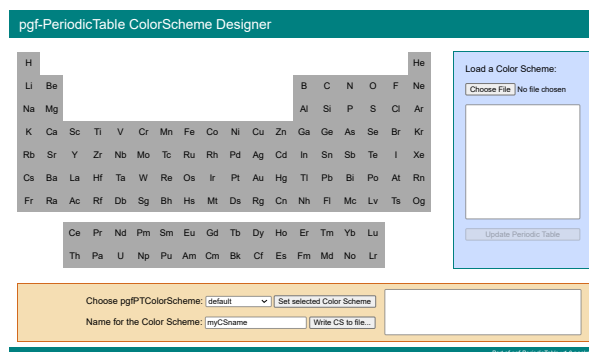
This command provides a way to set the cell background color of each of the 118 elements of the Periodic Table. *If the intention is to set the background color for all of them, it is highly recommended to use the file `pgfPTcolorSchemes.html`, unless the trailing color begin at a small atomic number.*

Despite that, this command can always be used taking into account:

1. It has the form `\pgfPTnewColorScheme[trailing color]{name}{color list}` where:
 - the first argument (enclosed by square brackets) is optional. If provided, the specified trailing color will be used, otherwise the default color (white) will be used as trailing color.
 - the second and third arguments are mandatory and specify, respectively, the color scheme name and the color list.
2. The **name** is any name made up of letters (only the characters a,...,z and A,...,Z).
3. The **color list** is a comma-separated list where each entry has the format `r/g/b`, representing the red, blue and green values, between 0 and 1, of the color: the first entry of the list will be the background color used in the cell of the element with atomic number 1, the second entry, the background color of the cell of the element with atomic number 2, and so on.

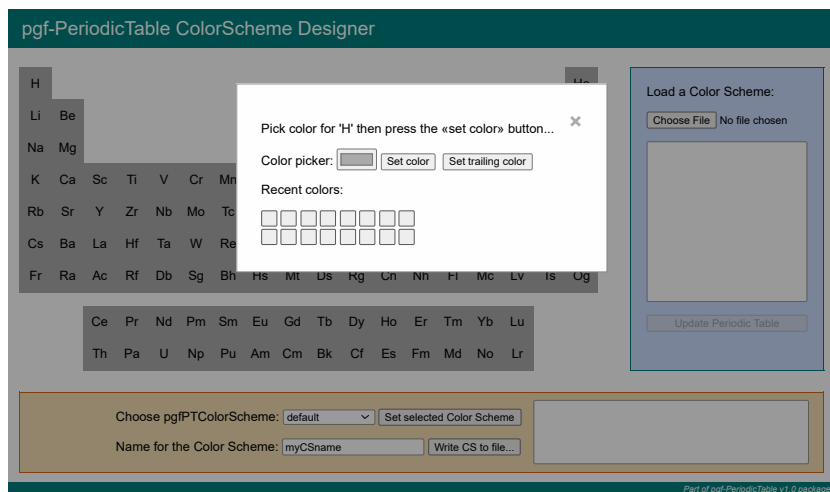
*If the color list has ten entries, these entries will set the background colors of the elements with atomic numbers from 1 to 10. For the following atomic numbers, greater than or equal to 11, the **trailing color** will be used in the color background.*


✦ Designing a color scheme with [pgfPTcolorSchemes.html](#)

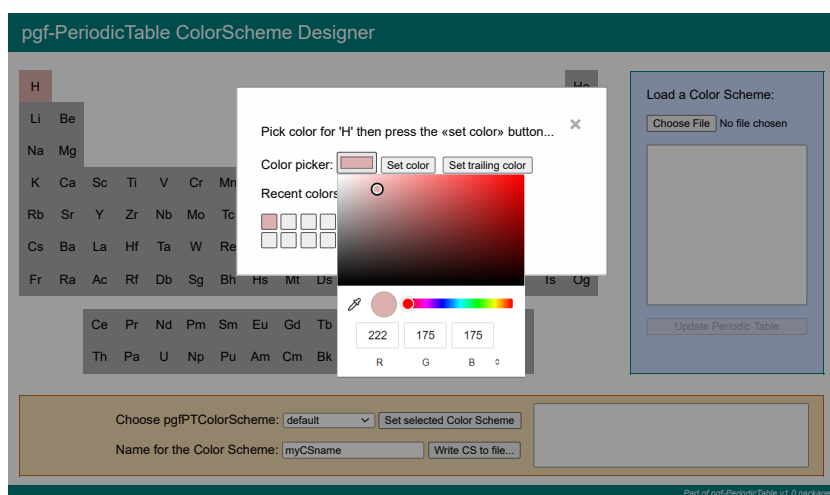


The [pgfPTcolorSchemes.html](#) *designer* is an *html* file with a little *javascript* code to perform the task of building a color scheme to use with the **back color scheme** key associated with the `\pgfPT` command.

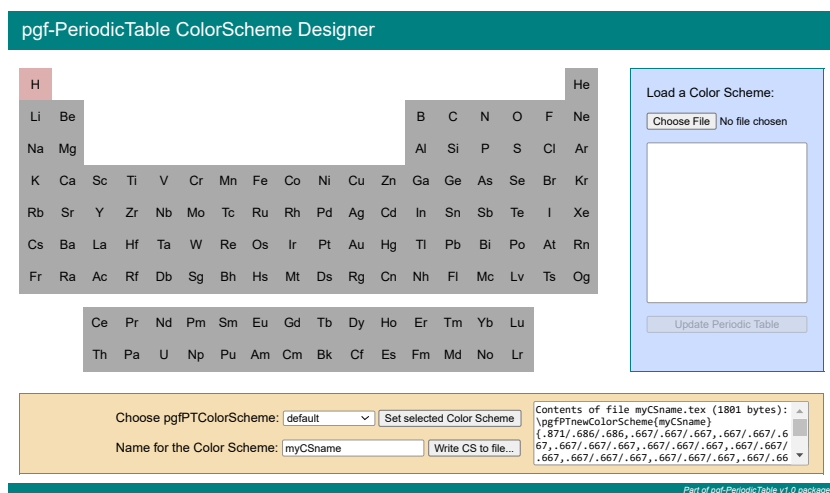
The Periodic Table of the Elements is displayed on the page and clicking on an element opens a color dialog:



Clicking on the Color picker:  button opens a color dialog, where there is the possibility to choose the desired color or manually enter one color using one of the three models available (RGB, HSL or HEX):



After changing the desired colors it is possible to save the color scheme in a file by clicking on **Write CS to file...**:

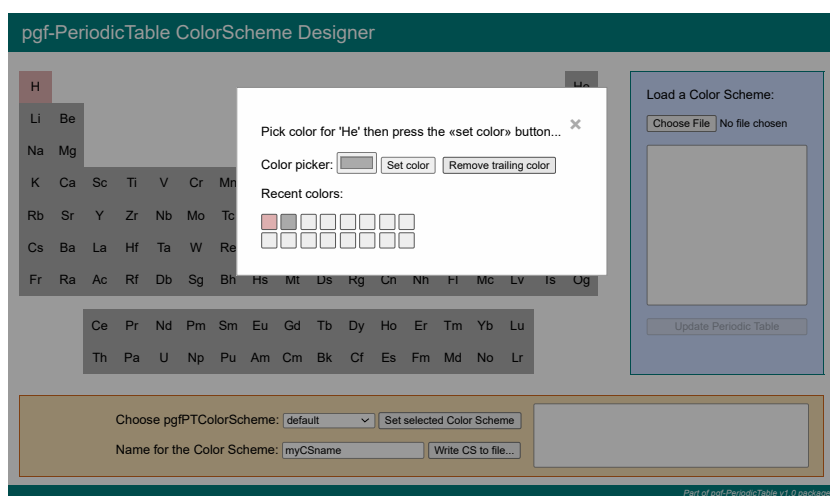


To use a color scheme saved in a file there are two possible ways:

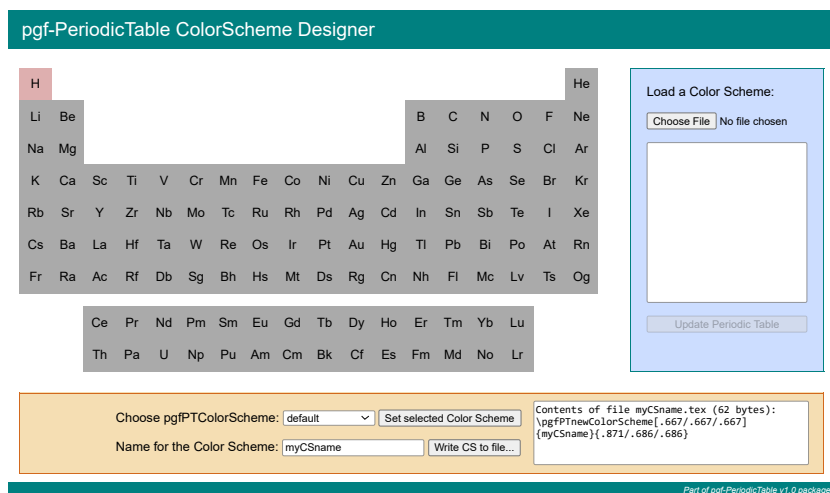
- loading the file in the working document via the `\input` \LaTeX command, for instance, `\input{myCSname.tex}`.
- or by opening the file and copying and pasting its contents into the working document.

In either case, the operation can be performed at any location in the document, but before the named color scheme is used.

Note that in the previous example there is only one color that has been defined (for hydrogen). In that case, it is useful to set the trailing color in helium by clicking in **Set trailing color** (which automatically changes to **Remove trailing color**). After that only the hydrogen and helium are clickable, all the other elements are locked to click:



Then the saved color scheme will have the optional trailing color and the size will be smaller as only the color codes of the changed elements are stored:



To remove the trailing color click on the last enabled element (in the above case helium) and then click on **Remove trailing color**. After that, all elements can be clicked again.

It is also possible to load a color scheme saved to a file by clicking on **Choose File** and then clicking on **Update Periodic Table** for the color scheme to take effect:

pgf-PeriodicTable ColorScheme Designer

Choose pgfPTColorScheme: default Set selected Color Scheme

Name for the Color Scheme: myCSname Write CS to file...

Part of pgf-PeriodicTable v1.0 package

Finally its possible to load a built-in color scheme by choosing a named *pgfPTColorScheme* in the corresponding combo box and then clicking on **Set selected Color Scheme**:

pgf-PeriodicTable ColorScheme Designer

Choose pgfPTColorScheme: Soft Set selected Color Scheme

Name for the Color Scheme: myCSname Write CS to file...

Part of pgf-PeriodicTable v1.0 package

All the operations described are always available.

Libraries

In this part the library packages are documented. They provide additional commands to extend the capabilities provided by this package out of the box. The libraries are not loaded by default since many users will not need them.

► Color Schemes Library

pgf-PeriodicTable Library **colorschemes**

USAGE: `\usepgfPTlibrary{colorschemes}`

This library extends the features provided by the command `\pgfPTnewColorScheme`. It defines a set of commands that automatically generate a new color scheme.

- `\pgfPTGroupColors{name of the new color scheme}{list of colors,options}`
- `\pgfPTPeriodColors{name of the new color scheme}{list of colors,options}`
- `\pgfPTCScombine[proportion,mode]{name of the first color scheme,name of the second color scheme,name of the new color scheme}`
- `\pgfPTCSwrite[filename]{list of color schemes names}`

Color arguments for this library's commands can use both the base package syntax – `namedColor` or `namedColorA!##!namedColorB<!##><!named...>` – or any color model supported by the `xcolor` package^a using the *special syntax* `*[model:values]`, e.g., `*[rgb:.5;.2;.3]` or `*[cmyk:.5;.2;.3;.3]` or `*[HTML:5FA287]`. **The values for the individual color components of a color specified this way must be separated by semicolons instead of commas**, except for the HTML, Gray and wave color models as explained in the `xcolor` package.

^aSee Table 3: Supported color models on page 10 of the documentation of `xcolor` v2.14 2022/06/12

► `\pgfPTGroupColors[default group color]{name of the new color scheme}{list of colors,options}`

This command **creates a Color Scheme** with the name `name of the new color scheme`. **Group colors** can be configured in three different ways:

- ✓ **setting the colors one by one**, using the *key=value* mechanism in the *list of colors*. For example:

```
\pgfPTGroupColors{name of the new color scheme}%
{G1=red,G2=red!50,G3=orange,<...>,G18=blue,options}
```

This will set the specified color for each group. If no color is specified for a group, default group color will be used.

NOTE: default group color is initially set to white.

- ✓ **defining a gradient** using the keys *left color=<color>*, *middle color=<color>* and *right color=<color>* as the *list of colors*. Note that all the keys are optional, but at least one of them is required. This produces a gradient starting from group 1, with *left color*, to group 18, with *right color*. If the *middle color* key is used then the gradient starts at group 1 with *left color*, goes to the middle position of the groups (between groups 9 and 10) with *middle color* and ends at group 18 with *right color*. For example:

```
\pgfPTGroupColors{name of the new color scheme}%
{left color=red,right color=blue,options}
```

defines a gradient from red (group 1) to blue (group 18).

- ✓ **defining a custom gradient** as the *list of colors* by using the *key=value* mechanism inside the *gradient* key. For example:

```
\pgfPTGroupColors{name of the new color scheme}%
{gradient={G1=red,G4=red!50,G18=blue},options}
```

defines a gradient from red (group 1) to red!50 (group 4) and to blue (group 18).

The *options* available to this command are:

- ✓ *H=<color>*, sets the color of the *hydrogen* cell. If not set, group 1's color will be used. If set, the color of the *hydrogen* cell won't be affected by period blending.
- ✓ *La=<color>*, sets the color of the *lanthanum* cell. If not set, group 3's color will be used.
- ✓ *Lanta=<color>*, sets the color of the *lanthanoids* cells. If not set, *lanthanum*'s color will be used.
- ✓ *Ac=<color>*, sets the color of the *actinium* cell. If not set, group 3's color will be used.
- ✓ *Actin=<color>*, sets the color of the *actinoids* cells. If not set, *actinium*'s color will be used.
- ✓ *period blending={color=<color>, percentage=<positive or negative integer>, mode=<add|sub|linear>}*, performs a *mode* blend over the periods up to the specified percentage with the provided color.

NOTES:

- ✓ *percentage* refers to how much of the color, in total, was mixed over the 7 periods. For example 60% adds 10% to each period: P1►0% ~> P2►10% ~> P3►20% ~> ... ~> P7►60%. If the percentage is positive, the mixing is done in descending order (from P1 to P7); if the percentage is negative, the mixing is done in ascending order (from P7 to P1).
- ✓ The *mode*'s values are *add* for *additive* blending, *sub* for *subtractive* blending and *linear* for *linear* blending (as in the *xcolor* package).
- ✓ **If period blending is used without further options** all the default values are used, so *period blending* is equivalent to *period blending={color=white,percentage=60,mode=linear}*.
- ✓ None of the keys *color*, *percentage* and *mode* are mandatory. If omitted the default value is used.

```
\pgfPTGroupColors{example}{G1=purple!10,G3=red!10}
\pgfPT[back color scheme=example,show title=false]
```

The periodic table is displayed with a light blue background. The group colors are set to G1=purple!10 and G3=red!10. The table includes element symbols, names, atomic numbers, and oxidation states. A legend box in the top left corner shows the group color scheme and the oxidation states of the elements.

```
\pgfPTGroupColors[black!10]{example}{G1=purple!10,G3=red!10}
\pgfPT[back color scheme=example,show title=false]
```

The periodic table is displayed with a light blue background. The group colors are set to G1=purple!10 and G3=red!10. The table includes element symbols, names, atomic numbers, and oxidation states. A legend box in the top left corner shows the group color scheme and the oxidation states of the elements.

```
\pgfPTGroupColors{example}{G1=*[HTML:FFAAAA],G2=*[HTML:AA3939],
G3=*[HTML:FFD1AA],G4=*[HTML:D49A6A],G5=*[HTML:AA6C39],
G6=*[HTML:804515],G7=*[HTML:552700],G8=*[HTML:003333],
G9=*[HTML:0D4D4D],G10=*[HTML:226666],G11=*[HTML:407F7F],
G12=*[HTML:669999],G13=*[HTML:88CC88],G14=*[HTML:55AA55],
G15=*[HTML:2D882D],G16=*[HTML:116611],G17=*[HTML:004400],
G18=*[HTML:801515]}
\pgfPT[back color scheme=example,show title=false]
```

The periodic table is displayed with a light blue background. The group colors are set to G1=*[HTML:FFAAAA], G2=*[HTML:AA3939], G3=*[HTML:FFD1AA], G4=*[HTML:D49A6A], G5=*[HTML:AA6C39], G6=*[HTML:804515], G7=*[HTML:552700], G8=*[HTML:003333], G9=*[HTML:0D4D4D], G10=*[HTML:226666], G11=*[HTML:407F7F], G12=*[HTML:669999], G13=*[HTML:88CC88], G14=*[HTML:55AA55], G15=*[HTML:2D882D], G16=*[HTML:116611], G17=*[HTML:004400], G18=*[HTML:801515]. The table includes element symbols, names, atomic numbers, and oxidation states. A legend box in the top left corner shows the group color scheme and the oxidation states of the elements.

```
\pgfPTGroupColors{example}{left color=teal!70,right color=cyan!30}
\pgfPT[back color scheme=example,show title=false]
```

The image shows a periodic table of elements. The elements are colored with a gradient from teal on the left to cyan on the right. The table includes element symbols, atomic numbers, and names. A legend in the top left corner shows the color scheme and the element C (Carbon) with its atomic number 6 and symbol.

```
\pgfPTGroupColors{example}{left color=teal!70,right color=cyan!30,period blending}
\pgfPT[back color scheme=example,show title=false]
```

The image shows a periodic table of elements. The elements are colored with a gradient from teal on the left to cyan on the right, with period blending. The table includes element symbols, atomic numbers, and names. A legend in the top left corner shows the color scheme and the element C (Carbon) with its atomic number 6 and symbol.

```
\pgfPTGroupColors{example}{left color=teal!70,right color=cyan!30,
period blending={color=orange!50,percentage=-40}}
\pgfPT[back color scheme=example,show title=false]
```

The image shows a periodic table of elements. The elements are colored with a gradient from teal on the left to cyan on the right, with period blending and an orange-to-teal gradient. The table includes element symbols, atomic numbers, and names. A legend in the top left corner shows the color scheme and the element C (Carbon) with its atomic number 6 and symbol.

```
\pgfPTGroupColors{example}{left color=teal!70,right color=cyan!30,
period blending={color=orange!50,percentage=-40,mode=add},
H={*[cmymk:.071,0,.055,.035]}}
\pgfPT[back color scheme=example,show title=false]
```

Periodic table of elements showing color scheme: left color=teal!70, right color=cyan!30, period blending={color=orange!50,percentage=-40,mode=add}, H={*[cmymk:.071,0,.055,.035]}. The table includes element symbols, names, and atomic numbers. A legend box shows the color scheme and oxidation states.

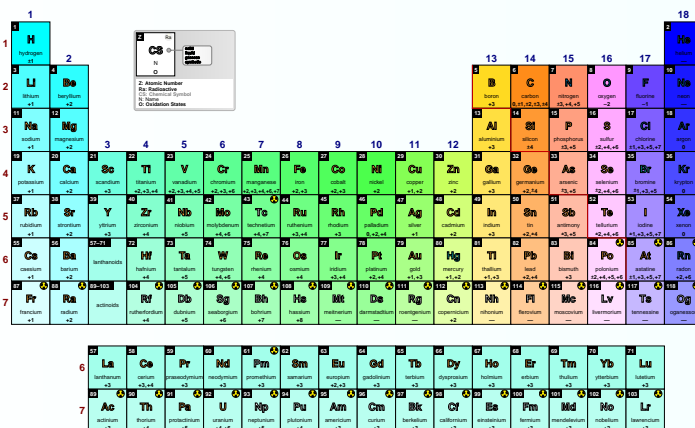
```
\pgfPTGroupColors{example}{left color=teal!70,right color=cyan!30,
period blending={color=orange!50,percentage=-40,mode=sub},
H=*[cmymk:.071;0;.055;.035]}
\pgfPT[back color scheme=example,show title=false]
```

Periodic table of elements showing color scheme: left color=teal!70, right color=cyan!30, period blending={color=orange!50,percentage=-40,mode=sub}, H=*[cmymk:.071;0;.055;.035]. The table includes element symbols, names, and atomic numbers. A legend box shows the color scheme and oxidation states.

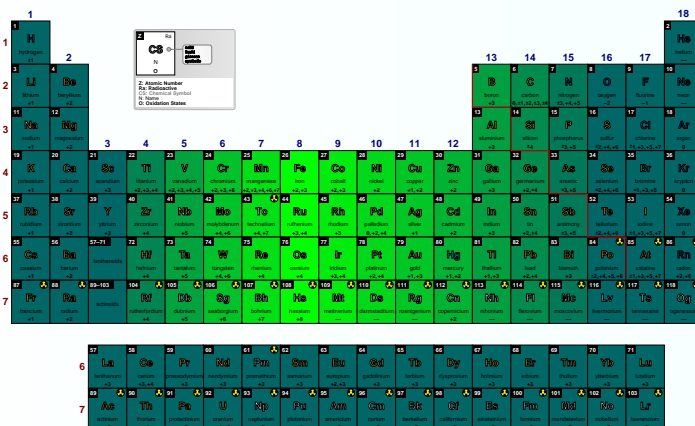
```
\pgfPTGroupColors{example}{left color=teal!70,middle color=yellow!30,right
color=cyan!30,La=teal!70!yellow!50,Ac=teal!60!yellow!50,
Lanta=teal!70!yellow!50!white!50,Actin=teal!60!yellow!50!white!50}
\pgfPT[back color scheme=example,show title=false]
```

Periodic table of elements showing color scheme: left color=teal!70, middle color=yellow!30, right color=cyan!30, La=teal!70!yellow!50, Ac=teal!60!yellow!50, Lanta=teal!70!yellow!50!white!50, Actin=teal!60!yellow!50!white!50. The table includes element symbols, names, and atomic numbers. A legend box shows the color scheme and oxidation states.

```
\pgfPTGroupColors{example}{gradient={G1=teal!50!black,G2=teal,G10=green,
G14=orange,G18=blue},period blending={mode=add}}
\pgfPT[back color scheme=example,show title=false]
```



```
\pgfPTGroupColors{example}{gradient={G3=teal!80!black,G16=teal!80!black,
G8=green}}
\pgfPT[back color scheme=example,show title=false]
```



Note: the group numbers can be specified in any order and the gradient can start or end in any group. In this example, the smallest group number is 3 and the greatest is 16, so the gradient is built from group 3 to group 16 and the colors from group 1 to 3 are equal to group 3's color, just like the colors from group 16 to 18 are equal to group 16's color.

```
\pgfPTPeriodColors[default period color]{name of the new color scheme}{list of
colors,options}
```

This command **creates a Color Scheme** with the name **name of the new color scheme**. **Period colors** can be configured in three different ways:

- ✓ **setting the colors one by one**, using the *key=value* mechanism in the list of colors. For example:

```
\pgfPTPeriodColors{name of the new color scheme}%
{P1=red,P2=red!50,<...>,P7=blue,options}
```

This will set the specified color for each period. If no color is specified for a period,

default period color will be used.

NOTE: default period color is initially set to white.

- ✓ **defining a gradient** using the keys `top color=<color>`, `middle color=<color>` and `bottom color=<color>` as the *list of colors*. Note that all the keys are optional, but at least one of them is required. This produces a gradient starting from period 1, with *top color*, to period 7, with *bottom color*. If the *middle color* key is used then the gradient starts at period 1 with *top color*, goes to the middle position of the periods (period 4) with *middle color* and ends at period 7 with *bottom color*. For example:

```
\pgfPTPeriodColors{name of the new color scheme}%
{top color=red,middle color=yellow,bottom color=blue,options}
```

defines a gradient from red (period 1) to yellow (period 4) and from yellow (period 4) to blue (period 7).

- ✓ **defining a custom gradient** as the *list of colors* by using the *key=value* mechanism inside the `gradient` key. For example:

```
\pgfPTPeriodColors{name of the new color scheme}%
{gradient={P1=red,P3=red!50,P7=blue},options}
```

defines a gradient from red (period 1) to red!50 (period 3) and to blue (period 7).

The *options* available to this command are:

- ✓ `H=<color>`, sets the color of the *hydrogen* cell. If not set, period 1's color will be used. If set, the color of the *hydrogen* cell won't be affected by group blending.
- ✓ `La=<color>`, sets the color of the *lanthanum* cell. If not set, period 6's color will be used.
- ✓ `Lanta=<color>`, sets the color of the *lanthanoids* cells. If not set, *lanthanum*'s color will be used.
- ✓ `Ac=<color>`, sets the color of the *actinium* cell. If not set, period 7's color will be used.
- ✓ `Actin=<color>`, sets the color of the *actinoids* cells. If not set, *actinium*'s color will be used.
- ✓ `group blending={color=<color>, percentage=<positive or negative integer>, mode=<add|sub|linear>}`, performs a *mode* blend over the groups up to the specified percentage with the provided color.

NOTES:

- ✓ *percentage* refers to how much of the color, in total, was mixed over the 18 groups. For example 68% adds 4% to each period: G1▶0% ~ G2▶4% ~ G3▶8% ~ ... ~ G18▶68%. If the percentage is positive, the mixing is done from left to right (from G1 to G18); if the percentage is negative, the mixing is done from right to left (from G18 to G1).
- ✓ The *mode*'s values are *add* for *additive* blending, *sub* for *subtractive* blending and *linear* for *linear* blending (as in the *xcolor* package).
- ✓ **If group blending is used without further options** all the default values are used, so *group blending* is equivalent to `group blending={color=white,percentage=68,mode=linear}`.
- ✓ None of the keys *color*, *percentage* and *mode* are mandatory. If omitted the default value is used.

```
\pgfPTPeriodColors{example}{P1=[RGB:86;139;137],P2=[RGB:49;114;112],
P3=[RGB:23;91;88],P4=[RGB:5;67;64],P5=[RGB:35;54;100],
P6=[RGB:62;82;126],P7=[RGB:101;117;153]}
\pgfPT[back color scheme=example,show title=false]
```

```
\pgfPTPeriodColors{example}{top color=[Hsb:117;.57;.6]}
\pgfPT[back color scheme=example,show title=false]
```

```
\pgfPTPeriodColors{example}{gradient={P1=[Hsb:117;.57;.6],
P5=[Hsb:178;.57;.45]}}
\pgfPT[back color scheme=example,show title=false]
```

```
\pgfPTCScombine[prop1:prop2,mode]{name of color scheme one,name of color scheme two,name of the new color scheme}
```

This command **combines two named Color Schemes** and merges the result into a new Color Scheme with **name of the new color scheme**.

For example `\pgfPTCScombine{myCSA,myCSB,myCSC}` adds the color scheme **myCSA** to the color scheme **myCSB** and their sum will be available as the color scheme **myCSC**.

NOTE: if the Color Schemes have different sizes (*i.e.*, different number of colors), the last color from the color scheme that ends first will be used until the other color scheme also ends.

The optional parameters [*prop1:prop2,mode*] are for controlling how the two Color Schemes are combined:

- ✓ The first parameter – **prop1:prop2** – controls the proportions used to mix the color schemes: **prop1** parts of **name of color scheme one** and **prop2** parts of **name of color scheme two**. Both **prop1** and **prop2** must be integer values between 1 and 999.

NOTE: default proportion is **1:1**.

For example, **1:4** will mix each color in the ratio of 1 to 4, *i.e.*, the *n*th-color from the first color scheme is used as 1/5 of the mixed color and the *n*th-color from the second color scheme is used as 4/5 of the mixed color.

- ✓ The **mode** refers to how the colors are mixed: use **add** for *additive* mixing, **sub** for *subtractive* mixing and **linear** for *linear* mixing (as in the xcolor package).

NOTE: default mode is **linear**.

```
\pgfPTPeriodColors{period}{top color=red}
\pgfPTGroupColors{group}{right color=green}
\pgfPTCScombine{period,group,mix}
\pgfPT[back color scheme=mix,show title=false]
```

```
\pgfPTCScombine[sub]{period,group,mix}
\pgfPT[back color scheme=mix,show title=false]
```

Periodic table of elements showing the color scheme based on subshells (s, p, d, f). The table is divided into blocks: s-block (groups 1-2), p-block (groups 13-18), d-block (transition metals, groups 3-10), and f-block (lanthanides and actinides). The colors are: s-block (red), p-block (green), d-block (blue), and f-block (yellow).

```
\pgfPTCScombine[add]{period,group,mix}
\pgfPT[back color scheme=mix,show title=false]
```

Periodic table of elements showing the color scheme based on adding subshells (s, p, d, f). The table is divided into blocks: s-block (groups 1-2), p-block (groups 13-18), d-block (transition metals, groups 3-10), and f-block (lanthanides and actinides). The colors are: s-block (red), p-block (green), d-block (blue), and f-block (yellow).

```
\pgfPTCScombine[3:1]{period,group,mix}
\pgfPT[back color scheme=mix,show title=false]
```

Periodic table of elements showing the color scheme based on the 3:1 ratio of subshells (s, p, d, f). The table is divided into blocks: s-block (groups 1-2), p-block (groups 13-18), d-block (transition metals, groups 3-10), and f-block (lanthanides and actinides). The colors are: s-block (red), p-block (green), d-block (blue), and f-block (yellow).

```
\pgfPTCScombine[3:1,add]{period,group,mix}
\pgfPT[back color scheme=mix,show title=false]
```

The periodic table is displayed with a mixed color scheme. The colors are determined by the period, group, and a mix of both. The table includes element symbols, names, atomic numbers, and oxidation states. A legend box in the top left corner shows the color coding for the first few elements: H (1), He (2), Li (3), Be (4), B (5), C (6), N (7), O (8), F (9), Ne (10).

```
\pgfPTCScombine[add,2:3]{period,group,mix}
\pgfPT[back color scheme=mix,show title=false]
```

The periodic table is displayed with a mixed color scheme. The colors are determined by the period, group, and a mix of both. The table includes element symbols, names, atomic numbers, and oxidation states. A legend box in the top left corner shows the color coding for the first few elements: H (1), He (2), Li (3), Be (4), B (5), C (6), N (7), O (8), F (9), Ne (10).

Built-in color schemes can also be mixed:

```
\pgfPTCScombine[add]{pgfPTSoft,group,mix}
\pgfPT[back color scheme=mix,show title=false]
```

The periodic table is displayed with a mixed color scheme. The colors are determined by the period, group, and a mix of both. The table includes element symbols, names, atomic numbers, and oxidation states. A legend box in the top left corner shows the color coding for the first few elements: H (1), He (2), Li (3), Be (4), B (5), C (6), N (7), O (8), F (9), Ne (10).

```
\pgfPTCScombine[add,3:1]{pgfPTSoft,pgfPTPS,mix}
\pgfPT[back color scheme=mix,show title=false]
```

```
\pgfPTCScombine[add]{pgfPTRadio,pgfPTWikipedia,mix}
\pgfPT[back color scheme=mix,show title=false]
```

```
\pgfPTCswrite[filename]{list of color schemes names}
```

This command **writes the provided Color Schemes to a file** for later use without loading this library. It has a mandatory argument, the **list of the color schemes names** to be written and an optional argument, the **filename**. If no **filename** is provided the first name on the **list of the color schemes names** is used.

For example, `\pgfPTCswrite[myGroupColors]{myGroupGradGreenToRed,myGroupGreens,myGroupGradYellowToRed}`, will create (or overwrite), in the current working directory, a file with name `myGroupColors.tex` with the following contents:

```
\pgfPTnewColorScheme{myGroupGradGreenToRed}{0/1/0,...}
\pgfPTnewColorScheme{myGroupGreens}{0/1/.1,...}
\pgfPTnewColorScheme{myGroupGradYellowToRed}{1/1/0,...}
```

After that, it's possible to use `\input{myGroupColors.tex}`, anywhere in any document (in the same working directory). The named color schemes defined in the loaded file are now available for use as usual:

```

\pgfPTPeriodColors{myGroupGradGreenToRed}{gradient={G1=green!50!black,
G18=red!30!black},H=green!40!white}
\pgfPTPeriodColors{myGroupGreens}{gradient={G1=green!50!black,
G18=green!50!white},H=green!40!white}
\pgfPTPeriodColors{myGroupGradYellowToRed}{gradient={G1=yellow!50!white,
G18=red!30!black},H=yellow!40!white}
\pgfPTCSwrite[myGroupColors]{myGroupGradGreenToRed,myGroupGreens, myGroup-
GradYellowToRed}

```

```

%\usepgfPTlibrary{colorschemes}
\input{myGroupColors.tex}%
\pgfPT[back color scheme=myGroupGreens,show title=false]

```

1																	18	
1	H hydrogen +1																	He helium —
2	3 Li lithium +1	4 Be beryllium +2											5 B boron +3	6 C carbon +3, +2, +3, +4	7 N nitrogen +3, +4, +5	8 O oxygen +2	9 F fluorine +1	10 Ne neon —
3	11 Na sodium +1	12 Mg magnesium +2											13 Al aluminum +3	14 Si silicon +4	15 P phosphorus +3, +4, +5	16 S sulfur +2, +4, +6	17 Cl chlorine +1, +3, +5, +7	18 Ar argon 0
4	19 K potassium +1	20 Ca calcium +2	21 Sc scandium +3	22 Ti titanium +2, +3, +4	23 V vanadium +2, +3, +4, +5	24 Cr chromium +2, +3, +4, +6	25 Mn manganese +2, +3, +4, +6, +7	26 Fe iron +2, +3	27 Co cobalt +2, +3	28 Ni nickel +2	29 Cu copper +1, +2	30 Zn zinc +2	31 Ga gallium +3	32 Ge germanium +2, +4	33 As arsenic +3, +5	34 Se selenium +2, +4, +6	35 Br bromine +1, +3, +5, +7	36 Kr krypton 0
5	37 Rb rubidium +1	38 Sr strontium +2	39 Y yttrium +3	40 Zr zirconium +4	41 Nb niobium +3, +5	42 Mo molybdenum +4, +6	43 Tc technetium +4, +6, +7	44 Ru ruthenium +2, +3, +4	45 Rh rhodium +3	46 Pd palladium +2	47 Ag silver +1	48 Cd cadmium +2	49 In indium +3	50 Sn tin +2, +4	51 Sb antimony +3, +5	52 Te tellurium +2, +4, +6	53 I iodine +1, +3, +5, +7	54 Xe xenon 0
6	55 Cs cesium +1	56 Ba barium +2	57-71 La lanthanum +3	72 Hf hafnium +4	73 Ta tantalum +3, +5	74 W tungsten +3, +4, +6	75 Re rhenium +4, +6, +7	76 Os osmium +2, +3, +4	77 Ir iridium +3, +4	78 Pt platinum +2, +4	79 Au gold +1, +3	80 Hg mercury +1, +2	81 Tl thallium +1, +3	82 Pb lead +2, +4	83 Bi bismuth +3, +5	84 Po polonium +2, +4	85 At astatine +3, +5	86 Rn radon 0
7	87 Fr francium +1	88 Ra radium +2	89-103 Ac actinium +3	104 Rf rutherfordium +4	105 Db dubnium +5	106 Sg seaborgium +6	107 Bh bohrium +7	108 Hs hassium +8	109 Mt meitnerium —	110 Ds darmstadtium —	111 Nh nihonium —	112 Fl flerovium —	113 Nh tennessine —	114 Lv livermorium —	115 Ts tennessine —	116 Og oganesson —	117 Ts tennessine —	118 Nh nihonium —
8	89 La lanthanum +3	90 Ce cerium +3, +4	91 Pr praseodymium +3	92 Nd neodymium +3	93 Pm promethium +3	94 Sm samarium +2, +3	95 Eu europium +2, +3	96 Gd gadolinium +3	97 Tb terbium +3	98 Dy dysprosium +3	99 Ho holmium +3	100 Er erbium +3	101 Tm thulium +3	102 Yb ytterbium +2, +3	103 Lu lutetium +3			
9	105 Ac actinium +3	106 Th thorium +3, +4	107 Pa protactinium +3	108 U uranium +3, +4	109 Np neptunium +3, +4	110 Pu plutonium +3, +4	111 Am americium +3	112 Cm curium +2, +3	113 Bk berkelium +3	114 Cf californium +2, +3	115 Es einsteinium +3	116 Fm fermium +2	117 Md mendelevium +3	118 No nobelium +2	119 Lr lawrencium +3			

► Fit to Width Library

pgf-PeriodicTable Library `fittowidth`

USAGE: `\usepgfPTlibrary{fittowidth}`

This library offers an easy way to adjust the overall width of the entire Periodic Table to the width of the text. It is particularly useful when used with the `Z links` option, where the `\resizebox` command (from the `graphicx` package) doesn't work – the links are not placed in the correct location. Two commands are defined, one to start and another to stop adjusting the text width.

- `\pgfPTfittowidth[font size]`
- `\pgfPTendfittowidth`

► `\pgfPTfittowidth[font size]`

This command **starts adjusting** the entire Periodic Table to fit the text width, assuming the text width of the base \LaTeX classes, meaning that the page layout has not been altered in any other way. It accepts a font size as an optional argument. This font size will cause the adjustment to be made as if the document's font size were '10pt', '11pt' or '12pt'. If the optional font size is not provided, the current document font size will be used. *Note that any other font size will have no effect on the adjustment.*

`\pgfPTfittowidth%` this document font size: 10pt
`\pgfPT`

Periodic Table of Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen +1	2 He helium —																
3 Li lithium +1	4 Be beryllium +2											5 B boron +3	6 C carbon +4, +2, +3, +4	7 N nitrogen +3, +4, +5, -2	8 O oxygen -2	9 F fluorine -1	10 Ne neon —
11 Na sodium +1	12 Mg magnesium +2											13 Al aluminum +3	14 Si silicon +4	15 P phosphorus +3, +5	16 S sulfur +2, +4, +6	17 Cl chlorine +1, +3, +5, -1	18 Ar argon 0
19 K potassium +1	20 Ca calcium +2	21 Sc scandium +3	22 Ti titanium +2, +3, +4	23 V vanadium +2, +3, +4, +5	24 Cr chromium +2, +3, +4, +6	25 Mn manganese +2, +3, +4, +6, +7	26 Fe iron +2, +3	27 Co cobalt +2, +3	28 Ni nickel +2	29 Cu copper +1, +2	30 Zn zinc +2	31 Ga gallium +3	32 Ge germanium +2, +4	33 As arsenic +3, +5	34 Se selenium +2, +4, +6	35 Br bromine +1, +3, +5, -1	36 Kr krypton 0
37 Rb rubidium +1	38 Sr strontium +2	39 Y yttrium +3	40 Zr zirconium +4	41 Nb niobium +4, +5	42 Mo molybdenum +4, +6	43 Tc technetium +4, +6, +7	44 Ru ruthenium +3, +4	45 Rh rhodium +3	46 Pd palladium 0, +2, +4	47 Ag silver +1	48 Cd cadmium +2	49 In indium +3	50 Sn tin +2, +4	51 Sb antimony +3, +5	52 Te tellurium +2, +4, +6	53 I iodine +1, +3, +5, -1	54 Xe xenon 0
55 Cs caesium +1	56 Ba barium +2	57–71 lanthanoids	72 Hf hafnium +4	73 Ta tantalum +4, +5	74 W tungsten +4, +6	75 Re rhenium +4, +6, +7	76 Os osmium +3, +4	77 Ir iridium +3, +4	78 Pt platinum +2, +4	79 Au gold +1, +3	80 Hg mercury +1, +2	81 Tl thallium +3	82 Pb lead +2, +4	83 Bi bismuth +3, +5	84 Po polonium +2, +4, +6	85 At astatine +1, +3, +5, -1	86 Rn radon 0
87 Fr francium +1	88 Ra radium +2	89–103 actinoids	104 Rf rutherfordium +4	105 Db dubnium +5	106 Sg seaborgium +6	107 Bh bohrium +7	108 Hs hassium +8	109 Mt meitnerium +7	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium +2	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganesson —
6 La lanthanum +3	58 Ce cerium +3, +4	59 Pr praseodymium +3	60 Nd neodymium +3	61 Pm promethium +3	62 Sm samarium +2, +3	63 Eu europium +2, +3	64 Gd gadolinium +3	65 Tb terbium +3	66 Dy dysprosium +3	67 Ho holmium +3	68 Er erbium +3	69 Tm thulium +3	70 Yb ytterbium +2, +3	71 Lu lutetium +3			
7 Ac actinium +3	90 Th thorium +3	91 Pa protactinium +3	92 U uranium +3, +4, +5, +6	93 Np neptunium +3, +4, +5, +6	94 Pu plutonium +3, +4	95 Am americium +3	96 Cm curium +3	97 Bk berkelium +3	98 Cf californium +3	99 Es einsteinium +3	100 Fm fermium +3	101 Md mendelevium +3	102 No nobelium +2	103 Lr lawrencium +3			

Periodic Table of Elements

Periodic Table of Elements																				
1																	2			
1	H hydrogen +1																	2	He helium —	
2	Li lithium +1	Be beryllium +2																	10	Ne neon —
3	Na sodium +1	Mg magnesium +2																	18	Ar argon 0
4	K potassium +1	Ca calcium +2	Sc scandium +3	Ti titanium +2, +3, +4	V vanadium +2, +3, +4, +5	Cr chromium +2, +3, +4, +6	Mn manganese +2, +3, +4, +6, +7	Fe iron +2, +3	Co cobalt +2, +3	Ni nickel +2	Cu copper +1, +2	Zn zinc +2	Ga gallium +3	Ge germanium +2, +4	As arsenic +3, +5	Se selenium +2, +4, +6	Br bromine +1, +3, +5, +7	Kr krypton 0		
5	Rb rubidium +1	Sr strontium +2	Y yttrium +3	Zr zirconium +4	Nb niobium +3, +4, +5	Mo molybdenum +2, +4, +6	Tc technetium +4	Ru ruthenium +2, +3, +4	Rh rhodium +3	Pd palladium 0, +2, +4	Ag silver +1	Cd cadmium +2	In indium +3	Sn tin +2, +4	Sb antimony +2, +3, +5	Te tellurium +2, +4, +6	I iodine +1, +3, +5, +7	Xe xenon 0		
6	Cs caesium +1	Ba barium +2	lanthanoids		Hf hafnium +4	Ta tantalum +3, +5	W tungsten +2, +4, +6	Re rhenium +4, +6	Os osmium +2, +3, +4	Ir iridium +3, +4	Pt platinum +2, +4	Au gold +1, +3	Hg mercury +1, +2	Tl thallium +1, +3	Pb lead +2, +4	Bi bismuth +2, +3, +5	Po polonium +2, +4, +6	At astatine +1, +3, +5, +7	Rn radon 0	
7	Fr francium +1	Ra radium +2	actinoids		Rf rutherfordium +4	Db dubnium +5	Sg seaborgium +6	Bh bohrium +7	Hs hassium +8	Mt meitnerium +7	Ds darmstadtium +10	Rg roentgenium +12	Cn copernicium +12	Nh nihonium +11	Fl flerovium +12	Mc moscovium +11	Lv livermorium +12	Ts tennessine +11	Og oganesson +12	
8	La lanthanum +3	Ce cerium +3	Pr praseodymium +3	Nd neodymium +3	Pm promethium +3	Sm samarium +2, +3	Eu europium +2, +3	Gd gadolinium +3	Tb terbium +3	Dy dysprosium +3	Ho holmium +3	Er erbium +3	Tm thulium +3	Yb ytterbium +2, +3	Lu lutetium +3					
9	Ac actinium	Th thorium	Pa protactinium	U uranium	Np neptunium	Pu plutonium	Am americium	Cm curium	Bk berkelium	Cf californium	Es einsteinium	Fm fermium	Md mendelevium	No nobelium	Lr lawrencium					

Periodic Table of Elements

1

1

H

hydrogen

#1

2

2

He

helium

#2

3

3

Li

lithium

+1

4

4

Be

beryllium

+2

11

11

Na

sodium

+1

12

12

Mg

magnesium

+2

19

19

K

potassium

+1

20

20

Ca

calcium

+2

37

37

Rb

rubidium

+1

38

38

Sr

strontium

+2

55

55

Cs

caesium

+1

56

56

Ba

barium

+2

87

87

Fr

francium

+1

88

88

Ra

radium

+2

104

104

Rf

rutherfordium

+4

105

105

Db

dubnium

+5

106

106

Sg

seaborgium

+6

107

107

Bh

bohrium

+7

108

108

Hs

hassium

+8

109

109

Mt

meitnerium

+7

110

110

Ds

darmstadtium

+10

111

111

Rg

roentgenium

+11

112

112

Cn

copernicium

+12

113

113

Nh

nihonium

+3

114

114

Fl

flerovium

+4

115

115

Mc

moscovium

+5

116

116

Lv

livermorium

+6

117

117

Ts

tennessine

+7

118

118

Og

oganesson

+8

13

13

B

boron

+3

14

14

C

carbon

0,+1,+2,+3,+4

15

15

N

nitrogen

-2

16

16

O

oxygen

-2

17

17

F

fluorine

-1

18

18

Ne

neon

0

19

19

Al

aluminum

+3

20

20

Si

silicon

+4

21

21

P

phosphorus

+3,+5

22

22

S

sulfur

+2,+4,+6

23

23

Cl

chlorine

+1,+3,+5,+7

24

24

Ar

argon

0

31

31

Ga

gallium

+3

32

32

Ge

germanium

+2,+4

33

33

As

arsenic

+3,+5

34

34

Se

selenium

+2,+4,+6

35

35

Br

bromine

+1,+3,+5

36

36

Kr

krypton

0

49

49

In

indium

+3

50

50

Sn

tin

+2,+4

51

51

Sb

antimony

+3,+5

52

52

Te

tellurium

+2,+4,+6

53

53

I

iodine

+1,+3,+5,+7

54

54

Xe

xenon

0

61

61

Tl

thallium

+1,+3

62

62

Pb

lead

+2,+4

63

63

Bi

bismuth

+3

64

64

Po

polonium

+2,+4,+5,+6

65

65

At

astatine

+1,+3,+5,+7

66

66

Rn

radon

+2,+6

6

6

Ce

cerium

+3

7

7

Pr

praseodymium

+3

8

8

Nd

neodymium

+3

9

9

Pm

promethium

+3

10

10

Sm

samarium

+3

11

11

Eu

europtium

+3

12

12

Gd

gadolinium

+3

13

13

Tb

terbium

+3

14

14

Dy

dysprosium

+3

15

15

Ho

holmium

+3

16

16

Er

erbium

+3

17

17

Tm

ytterbium

+3

18

18

Yb

ytterbium

+3

19

19

Lu

lutetium

+3

20

20

Ac

actinium

+3

21

21

Th

thorium

+3

22

22

Pa

protactinium

+3

23

23

U

uranium

+3

24

24

Np

neptunium

+3

25

25

Pu

plutonium

+3

26

26

Am

americium

+3

27

27

Cm

curium

+3

28

28

Bk

berkelium

+3

29

29

Cf

californium

+3

30

30

Es

einsteinium

+3

31

31

Fm

fermium

+3

32

32

Md

mendelevium

+3

33

33

No

nobelium

+3

34

34

Lr

lawrencium

+3

➡ \pgfPTEndfittowidth

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Periodic Table of Elements

1																	2			
1	H hydrogen +1																	2	He helium	
2	Li lithium +1	Be beryllium +2																	10	Ne neon
3	Na sodium +1	Mg magnesium +2	3	4	5	6	7	8	9	10	11	12	13	Al aluminum +3	Si silicon +2, +3, +4	P phosphorus +3, +4, +5	S sulfur +2, +4, +6	Cl chlorine +1, +3, +5, +7	Ar argon	
11																				
19	K potassium +1	Ca calcium +2	Sc scandium	Ti titanium +2, +3, +4	V vanadium +2, +3, +4, +5	Cr chromium +2, +3, +4, +6	Mn manganese +2, +3, +4, +6, +7	Fe iron +2, +3	Co cobalt +2, +3	Ni nickel +2	Cu copper +1, +2	Zn zinc +2	Ga gallium +3	Ge germanium +2, +4	As arsenic +3, +5	Se selenium +2, +4, +6	Br bromine +1, +3, +5	Kr krypton		
27																				
37	Rb rubidium +1	Sr strontium +2	Y yttrium +3	Zr zirconium +4	Nb niobium +3, +5	Mo molybdenum +4, +6	Tc technetium +4, +7	Ru ruthenium +3, +4, +6	Rh rhodium +3, +4	Pd palladium +2, +4	Ag silver +1	Cd cadmium +2	In indium +3	Sn tin +2, +4	Sb antimony +3, +5	Te tellurium +2, +4, +6	I iodine +1, +3, +5	Xe xenon		
55																				
63	Cs cesium +1	Ba barium +2	lanthanoids	Hf hafnium +4	Ta tantalum +5	W tungsten +4, +6	Re rhenium +4, +6, +7	Os osmium +3, +4	Ir iridium +3, +4	Pt platinum +2, +3, +4	Au gold +1, +3	Hg mercury +1, +2	Tl thallium +1, +3	Pb lead +2, +4	Bi bismuth +3, +5	Po polonium +2, +4, +6	At astatine +3, +5, +7	Rn radon		
87																				
89	Fr francium	Ra radium	actinoids	Rf rutherfordium	Db dubnium	Sg seaborgium	Bh bohrium	Hs hassium	Mt meitnerium	Ds darmstadtium	Cs coerentium	Rg roentgenium	Cn copernicium	Nh nihonium	Fl flerovium	Mc moscovium	Lv livermorium	Ts tennessine	Og oganeson	

Periodic Table of Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen ±1	2 He	3 Li lithium +1	4 Be beryllium +2	5 B boron +3	6 C carbon 0, ±1, ±2, ±3, ±4	7 N nitrogen ±3, +4, +5	8 O oxygen ±2, ±3	9 F fluorine -1	10 Ne	11 Na sodium +1	12 Mg magnesium +2	13 Al aluminium +3	14 Si silicon ±4	15 P phosphorus ±3, +5	16 S sulfur ±2, ±3, ±4, ±6	17 Cl chlorine -1, +1, +3, +5, +7	18 Ar
19 K potassium +1	20 Ca calcium +2	21 Sc scandium +3	22 Ti titanium +2, +3, +4	23 V vanadium +2, +3, +4, +5	24 Cr chromium +2, +3, +6	25 Mn manganese +2, +3, +4, +6, +7	26 Fe iron +2, +3	27 Co cobalt +2, +3	28 Ni nickel +2	29 Cu copper +1, +2	30 Zn zinc +2	31 Ga gallium +3	32 Ge germanium +2, ±4	33 As arsenic ±3, +5	34 Se selenium ±2, ±3, ±4, ±6	35 Br bromine -1, +1, +3, +5	36 Kr
37 Rb rubidium +1	38 Sr strontium +2	39 Y yttrium +3	40 Zr zirconium +4	41 Nb niobium +5	42 Mo molybdenum +4, +6	43 Tc technetium +4, +7	44 Ru ruthenium +3, +4	45 Rh rhodium +3	46 Pd palladium 0, +2, +4	47 Ag silver +1	48 Cd cadmium +2	49 In indium +3	50 Sn tin +2, ±4	51 Sb antimony ±3, +5	52 Te tellurium ±2, ±3, ±4, ±6	53 I iodine -1, +1, +3, +5, +7	54 Xe
55 Cs caesium +1	56 Ba barium +2	57–71 lanthanoids	72 Hf hafnium +4	73 Ta tantalum +5	74 W tungsten +4, +6	75 Re rhenium +4	76 Os osmium +4	77 Ir iridium +3, +4	78 Pt platinum +2, +4	79 Au gold +1, +3	80 Hg mercury +1, +2	81 Tl thallium +1, +3	82 Pb lead +2, +4	83 Bi bismuth +3	84 Po	85 At	86 Rn
87 Fr	88 Ra	89–103 actinoids	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og

Z: Atomic Number
Ra: Radioactive
CS: Chemical Symbol
N: Name
O: Oxidation States

Legend:
solid
liquid
gaseous
synthetic

► Override Library

 pgf-PeriodicTable Library `fittowidth`

USAGE: `\usepgfPTlibrary{fittowidth}`

This library offers the user the possibility to change the default acronyms or names of the elements. Two sets of commands are defined, one for acronyms and another for element names. Each set has a command to override and a command to restore the default values.

- `\pgfPToverrideacros[language flag]{override list}`
- `\pgfPTrestoreacros[language flag]{override list}`
- `\pgfPToverridenames[language flag]{override list}`
- `\pgfPTrestorenames[language flag]{override list}`

 ► `\pgfPToverrideacros[language flag]{override list}`

This command can be used to override the acronyms – defined at package level – used in the legend of the contents of the Periodic Table cells. It has one optional argument and one mandatory argument:

- ✓ **language flag:** this is the optional argument that specifies the language in which the acronym replacement will occur. If not provided, the default language will be used.
- ✓ **override list:** this mandatory argument is a comma separated list of the form **what/new acronym**, where **what** is one of the cell contents (Z, name, CS, Ar, Ar*, radio, R, Rcov, Rion, Ei, eneg, eaff, O, Tmelt, TmeltC, Tboil, TboilC, eDist, eConfig, eConfignl, d, Cp, kT, ls, lsa, lsb, lsc, lsca, DiscY, DiscC or spectra).

```
% For example, in German, electronegativity is
% often/sometimes abbreviated as
% "EN" instead of "en" and "Z" as "OZ"
\pgfPTbuildcellstyle{exAcroDE}(5,3)%
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-2.5;Ar),(5;2.5-3;eneg)]
\pgfPT[Z list={1,...,36},cell style=exAcroDE,language=de]
\pgfPToverrideacros[de]{Z/OZ,eneg/EN}
\pgfPT[Z list={1,...,36},cell style=exAcroDE,language=de]
```

Periodensystem der Elemente

1	2											13	14	15	16	17	18												
1 H Wasserstoff 1.008 2.2	2 He Helium 4.0026											5 B Bor 10.81 2.04	6 C Kohlenstoff 12.011 2.55	7 N Stickstoff 14.007 3.04	8 O Sauerstoff 15.999 3.44	9 F Fluor 18.998 3.98	10 Ne Neon 20.18												
3 Li Lithium 6.94 0.98	4 Be Beryllium 9.0122 1.57											11 Na Natrium 22.99 0.93	12 Mg Magnesium 24.305 1.31											13 Al Aluminium 26.982 1.61	14 Si Silicium 28.085 1.9	15 P Phosphor 30.974 2.19	16 S Schwefel 32.06 2.58	17 Cl Chlor 35.45 3.16	18 Ar Argon 39.95
4 K Kalium 39.098 0.82	5 Ca Calcium 40.078 1	21 Sc Scandium 44.956 1.36	22 Ti Titan 47.867 1.54	23 V Vanadium 50.942 1.63	24 Cr Chrom 51.996 1.66	25 Mn Mangan 54.938 1.55	26 Fe Eisen 55.845 1.83	27 Co Kobalt 58.933 1.88	28 Ni Nickel 58.693 1.91	29 Cu Kupfer 63.546 1.9	30 Zn Zink 65.38 1.65	31 Ga Gallium 69.723 1.81	32 Ge Germanium 72.63 2.01	33 As Arsen 74.922 2.18	34 Se Selen 78.971 2.55	35 Br Brom 79.904 2.96	36 Kr Krypton 83.798 3												

Periodensystem der Elemente

The periodic table displays elements from Hydrogen (H) to Oganesson (Og). Each element cell contains its atomic number (top left), symbol (top center), name (middle), and relative atomic mass (bottom). A legend box in the upper left corner defines the abbreviations: OZ (Ordnungszahl), R (radioaktiv), CS (chemisches Symbol), N (Name), Ar (Relative Atommasse), and EN (Elektronenaktivität).

► `\pgfPTrestoreacros[language flag]{restore list}`

This command restores the acronyms used in the legend to the default ones, defined at package level. It has one optional argument and one mandatory argument:

- ✓ **language flag**: this is the optional argument that specifies the language in which the acronyms replacement will occur. If not provided, the default language will be used.
- ✓ **restore list**: this mandatory argument is a comma separated list containing the contents of **what's** to be restored (Z, name, CS, Ar, Ar*, radio, R, Rcov, Rion, Ei, eneg, eaff, O, Tmelt, TmeltC, Tboil, TboilC, eDist, eConfig, eConfignl, d, Cp, kT, ls, lsa, lsb, lsc, lsa, DiscY, DiscC or spectra).

```
% For example, in German, electronegativity is
% often/sometimes abbreviated as
% "EN" instead of "en" and "Z" as "OZ"
\pgfPTbuildcellstyle{exAcroDE}(5,3)%
[(1;1-2;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4;1-3;name),(5;1-2.5;Ar),(5;2.5-3;eneg)]
\pgfPToverrideacros[de]{Z/OZ,eneg/EN}
\pgfPT[Z list={1,...,36},cell style=exAcroDE,language=de]
\pgfPTrestoreacros[de]{Z}
\pgfPT[Z list={1,...,36},cell style=exAcroDE,language=de]
\pgfPTrestoreacros[de]{eneg}
\pgfPT[Z list={1,...,36},cell style=exAcroDE,language=de]
```

Periodensystem der Elemente

This is a second instance of the periodic table, identical to the one above, showing elements from Hydrogen (H) to Oganesson (Og) with their respective atomic numbers, symbols, names, and relative atomic masses. The legend box defines the abbreviations: OZ (Ordnungszahl), R (radioaktiv), CS (chemisches Symbol), N (Name), Ar (Relative Atommasse), and EN (Elektronenaktivität).

Periodensystem der Elemente

Periodensystem der Elemente

► `\pgfPToverridenames[language flag]{override list}`

This command can be used to override the names – defined at package level – of the elements in the Periodic Table. It has one optional argument and one mandatory argument:

- ✓ **language flag**: this is the optional argument that specifies the language in which the name replacement will occur. If not provided, the default language will be used.
- ✓ **override list**: this mandatory argument is a comma separated list of the form **Z/new name**.

```
% In Spain, both names "tungsteno" and "wolframio" are used.
% In fact, in northwest region, there were some tungsten mines and
% traditionally old people use "wolframio" for historical reasons.
\pgfPT[Z list={73,74,75},show legend=false,show title=false,languages=es]
\pgfPToverridenames[es]{74/wolframio}
\pgfPT[Z list={73,74,75},show legend=false,show title=false,languages=es]
```

	5	6	7
6	73 Ta tantalio +5	74 W tungsteno +4,+6	75 Re renio +4
	5	6	7
6	73 Ta tantalio +5	74 W wolframio +4,+6	75 Re renio +4

➡ `\pgfPTrestorenames[language flag]{override list}`

This command restores the names of the elements to the default ones, defined at package level. It has one optional argument and one mandatory argument:

- ✓ **language flag**: this is the optional argument that specifies the language in which the name replacement will occur. If not provided, the default language will be used.
- ✓ **restore list**: this mandatory argument is a comma separated list containing the atomic numbers, **Z**, to be restored.

```
% In Spain, both names "tungsteno" and "wolframio" are used.
% In fact, in northwest region, there were some tungsten mines and
% traditionally old people use "wolframio" for historical reasons.
\pgfPT[Z list={73,74,75},show legend=false,show title=false,language=es]
\pgfPTrestorenames[es]{74}
\pgfPT[Z list={73,74,75},show legend=false,show title=false,language=es]
```

	5	6	7
	73	74	75
6	Ta	W	Re
	tantalio	wolframio	renio
	+5	+4,+6	+4

	5	6	7
	73	74	75
6	Ta	W	Re
	tantalio	tungsteno	renio
	+5	+4,+6	+4

Tips & Tricks: inspired by user questions

In this section a list of selected user questions and the corresponding answers can be found, hoping it can be useful to anyone using this package.

Control overall width of table

Is there a simple way to set the periodic table to text width, column width, etc.?

Yes, there is. It can be done using the `\resizebox` command provided by the `graphicx` package (and also by the `graphics` package). For example:

```
\resizebox{\linewidth}{!}{\pgfPT}
```

or

```
\resizebox{\linewidth}{!}{\pgfPT[show title=false]}
```

will produce a Periodic Table with the width of the current `\linewidth`, whatever is its value (the text width, the column width, the width of a minipage, ...), and with the proper scaling of its height.

There is no need of loading the `graphicx` package since `pgf-PeriodicTable` loads the `tikz` package, which in turn loads the `graphicx` package.

Compact Periodic Table

Is there a way to put groups 1 and 2 really next to group 13 to 18? That would make the whole thing more compact. I sometimes need just the representative elements for teaching purposes.

Although it is not common usage, it can be done:

```
\documentclass[border=10pt]{standalone}
\usepackage{pgf-PeriodicTable}
\usepgfPTlibrary{color schemes}
\pgfPTGroupColors{example}{G1=blue!50!white,G2=green!90!white}
\pgfPTsetLanguage{de}
\begin{document}
% \pgfPTstyle[show title=false, back color scheme=example, show legend=false]
% \pgfPT[Z list = G1]\foreach \n in {2,13,14,15,16,17,18} {%
% \pgfPT[show period numbers=false,Z list = G\n]%
% }% make sure there are no spaces between \pgfPT
% or
% \pgfPTstyle[show title=false, show period numbers=false, back color scheme=example,
% show legend=false]
% \pgfPT[show period numbers,Z list = G1]\pgfPT[Z list = G2]\pgfPT[Z list = p]% make
% sure there are no spaces between \pgfPT
% or
\pgfPTstyle[show title=false, show period numbers=false, back color scheme=example,
show legend=false]
\pgfPT[show period numbers,Z list = s]\pgfPT[Z list = p]
\end{document}
```


1																	18
1	H Wasserstoff 1.008																He Helium 4.0026
2	Li Lithium 6.94	Be Beryllium 9.0122	B Bor 10.81	C Kohlenstoff 12.011	N Stickstoff 14.007	O Sauerstoff 15.999	F Fluor 18.998	Ne Neon 20.18									
3	Na Natrium 22.99	Mg Magnesium 24.305	Al Aluminium 26.982	Si Silizium 28.085	P Phosphor 30.974	S Schwefel 32.06	Cl Chlor 35.45	Ar Argon 39.95									
4	K Kalium 39.098	Ca Kalzium 40.078	Ga Gallium 69.723	Ge Germanium 72.63	As Arsen 74.922	Se Selen 78.971	Br Brom 79.904	Kr Krypton 83.798									
5	Rb Rubidium 85.468	Sr Strontium 87.62	In Indium 114.82	Sn Zinn 118.71	Sb Antimon 121.76	Te Tellur 127.6	I Iod 126.9	Xe Xenon 131.29									
6	Cs Cäsium 132.91	Ba Barium 137.33	Tl Thallium 204.38	Pb Blei 207.2	Bi Bismut 208.98	Po Polonium [209]	At Astat [210]	Rn Radon [222]									
7	Fr Francium [223]	Ra Radium [226]	Nh Nihonium [286]	Fl Flerovium [289]	Mc Moscovium [290]	Lv Livermorium [293]	Ts Tenness [294]	Og Oganesson [294]									

A few more examples

The following examples could be used for students or for any other purposes.

```
\pgfPTbuildcell(8,3)% 8 rows by 3 columns
[(1;1.4-2.8;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4.2;1-3;name),
(5.4;1-3;Ar),(6.5;1-3;eDist),(7.55-8.95;1-2.25;DiscC),(7.55-8.95;2.25-3.8;DiscY)]
\pgfPT
```

Periodic Table of Elements

The periodic table displays elements from Hydrogen (1) to Oganesson (118) in the main body, and Lanthanides and Actinides in the bottom sections. Each element cell contains its atomic number, symbol, name, and discovery year. A legend on the right side categorizes elements by region (Asia Minor, Europe, Africa, etc.) and element type (Radioactive, Chemical Symbol, etc.).

```
\pgfPT[eDist color=blue!70!black,Ar precision=2,DiscC
font=\fontsize{4}{4}\selectfont,DiscY font=\fontsize{4}{4}\selectfont\bfseries]
```

Periodic Table of Elements

This periodic table is a variation of the first one, using the same data but with different styling. The discovery years are rendered in a larger, bold font, and the color scheme for the element cells is different, as specified in the code block above.

```
\pgfPTbuildcell(8,3)% 8 rows by 3 columns
[(1;1-2;Z),(1;3;radio),(2-3;1-3;CS),(4;1-3;name),(5;1-2.5;Ar),(5;2.5-3;spectra),
(7;1-2.5;DiscY),(7;2.5-3;DiscC),(8;1-3;eDist)]
\pgfPT[csPS,Ar label=w,background={left color=black!20}]
```

Periodic Table of Elements

```
\pgfPTbuildcell(8,3)% 8 rows by 3 columns
[(1;1-3;Z),(1;3;radio),(2-3;1.5-3.5;CS),(4.2;1-3;name),(5.4;1-3;Ar),
(6.5;1-3;eConfigI),(7.55-8.95;1-2.45;DiscC),(7.55-8.95;2.45-3;DiscY)]
\pgfPT[eConfigI color=blue!70!black,Ar precision=2,DiscC
font=\fontsize{4}{4}\selectfont,DiscY font=\fontsize{4}{4}\selectfont\bfseries]
```

Periodic Table of Elements

```

\usepgfPTlibrary{colorschemes}
\pgfPTPeriodColors{period}{P5=red!20}
\pgfPTGroupColors{group}{G14=green!20}
\pgfPTCScombine{period,group,mix}
\pgfPT[back color scheme=mix,show title=false]

```

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen 1.008	2 He helium 4.0026																
3 Li lithium 6.94	4 Be beryllium 9.0122											5 B boron 10.81	6 C carbon 12.011	7 N nitrogen 14.007	8 O oxygen 15.999	9 F fluorine 18.998	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.305											13 Al aluminum 26.982	14 Si silicon 28.085	15 P phosphorus 30.974	16 S sulfur 32.06	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.098	20 Ca calcium 40.078	21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845	27 Co cobalt 58.933	28 Ni nickel 58.693	29 Cu copper 63.546	30 Zn zinc 65.38	31 Ga gallium 69.723	32 Ge germanium 72.63	33 As arsenic 74.922	34 Se selenium 78.971	35 Br bromine 79.904	36 Kr krypton 83.798
37 Rb rubidium 85.468	38 Sr strontium 87.62	39 Y yttrium 88.906	40 Zr zirconium 91.224	41 Nb niobium 92.906	42 Mo molybdenum 95.95	43 Tc technetium [98]	44 Ru ruthenium 101.07	45 Rh rhodium 102.91	46 Pd palladium 106.42	47 Ag silver 107.87	48 Cd cadmium 112.41	49 In indium 114.82	50 Sn tin 118.71	51 Sb antimony 121.76	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.29
55 Cs caesium 132.91	56 Ba barium 137.33	57-71 lanthanoids	72 Hf hafnium 178.49	73 Ta tantalum 180.95	74 W tungsten 183.84	75 Re rhenium 186.21	76 Os osmium 190.23	77 Ir iridium 192.22	78 Pt platinum 195.08	79 Au gold 196.97	80 Hg mercury 200.59	81 Tl thallium 204.38	82 Pb lead 207.2	83 Bi bismuth 208.98	84 Po polonium [209]	85 At astatine [210]	86 Rn radon [222]
87 Fr francium [223]	88 Ra radium [226]	89-103 actinoids	104 Rf rutherfordium [261]	105 Db dubnium [268]	106 Sg seaborgium [269]	107 Bh bohrium [270]	108 Hs hassium [278]	109 Mt meitnerium [278]	110 Ds darmstadtium [281]	111 Rg roentgenium [282]	112 Cn copernicium [285]	113 Nh nihonium [286]	114 Fl flerovium [289]	115 Mc moscovium [289]	116 Lv livermorium [293]	117 Ts tennessine [294]	118 Og oganeson [294]
57 La lanthanum 138.91	58 Ce cerium 140.12	59 Pr praseodymium 140.91	60 Nd neodymium 144.24	61 Pm promethium [145]	62 Sm samarium 150.36	63 Eu europium 151.96	64 Gd gadolinium 157.25	65 Tb terbium 158.93	66 Dy dysprosium 162.5	67 Ho holmium 164.93	68 Er erbium 167.26	69 Tm thulium 168.93	70 Yb ytterbium 173.05	71 Lu lutetium 174.97			
89 Ac actinium [227]	90 Th thorium 232.04	91 Pa protactinium 231.04	92 U uranium 238.03	93 Np neptunium [237]	94 Pu plutonium [244]	95 Am americium [243]	96 Cm curium [247]	97 Bk berkelium [247]	98 Cf californium [251]	99 Es einsteinium [252]	100 Fm fermium [257]	101 Md mendelevium [258]	102 No nobelium [259]	103 Lr lawrencium [260]			

In the Periodic Table, a row is called a **period** and a column is called a **group**.

Representative elements: element families



For the **representative elements** (groups **1**, **2** and **13** to **18**) it is common to speak of families that reflect their common characteristics. So we have **the families**:

GROUP 1: Alkali metals

► *lithium, sodium, potassium, rubidium, cesium and francium.*

The atoms of these elements **have only one valence electron**.

- ✓ They react violently with water to form hydroxides.
- ✓ They have a silver-gray color, with the exception of cesium, which has a golden hue.

GROUP 2: Alkaline earth metals

► *beryllium, magnesium, calcium, strontium, barium and radium.*

The atoms of these elements **have two valence electrons**.

- ✓ Their oxides remain solid at high temperatures and form alkaline solutions.
- ✓ They react violently with water to form hydroxides.
- ✓ When they burn, they have reddish flames, excluding barium, which presents a greenish flame.

GROUP 13: Boron group

► *boron, aluminium, gallium, indium, thallium and nihonium.*

The atoms of these elements **have three valence electrons**.

- ✓ Boron is a metalloid and the other are metals.
- ✓ Boron, aluminium, gallium, indium and thallium are often used as p-type silicon dopants.
- ✓ Aluminium is the third most abundant element in the Earth's crust (7.4%)

GROUP 14: Carbon group

► *carbon, silicon, germanium, tin, lead and flerovium.*

The atoms of these elements **have four valence electrons**.

- ✓ Carbon is a non-metal, silicon and germanium are metalloids, and tin and lead are metals.
- ✓ Silicon and germanium are used in semiconductors.

GROUP 15: Pnictogens

► *nitrogen, phosphorus, arsenic, antimony, bismuth and moscovium.*

The atoms of these elements **have five valence electrons**.

- ✓ Nitrogen and phosphorus are non-metals, arsenic and antimony are metalloids and bismuth is a metal.
- ✓ Phosphorus, arsenic, antimony and bismuth are often used as n-type silicon dopants.
- ✓ Diatomic nitrogen is the main constituent of the Earth's atmosphere (78%).

GROUP 16: Chalcogens

► *oxygen, sulfur, selenium, tellurium, polonium and livermorium.*

The atoms of these elements **have six valence electrons**.

- ✓ Oxygen, sulfur and selenium are non-metals, tellurium is a metalloid and polonium is a metal.
- ✓ Diatomic oxygen is the second constituent of the Earth's atmosphere (21%).

GROUP 17: Halogens

► *fluorine, chlorine, bromine, iodine, astatine and tennessine.*

The atoms of these elements **have seven valence electrons**.

- ✓ They are extremely reactive elements, as they are very electronegative.
- ✓ Fluorine is able to *attack* inert substances, including the heavier noble gas atoms.

GROUP 18: Noble gases

► *helium, neon, argon, krypton, xenon, radon and oganesson.*

The atoms of these elements have the valence shell fully filled, which corresponds to **eight valence electrons**, with the exception Helium, which has only one shell and, consequently, has **two valence electrons**.

- ✓ They are extremely inert elements, that is, they do not react with other elements, as they are the most stable elements in Nature.

EXERCISE:

In the following scheme of the Periodic Table, the positions of some chemical elements are represented by letters:

THE LETTERS DO NOT CORRESPOND TO THE CHEMICAL SYMBOLS OF THE ELEMENTS.

A																B
C	D														E	
	F														G	H
I	J					K		L					M		N	O
												P				Q
						R										S
T																

Using the letters shown:


1. identify group 2 elements of the Periodic Table.
2. identify the elements of the 2nd period of the Periodic Table.
3. identify group 17 elements of the Periodic Table.
4. identify the elements of s-block.
5. identify the elements of p-block.
6. identify the elements of d-block.
7. identify the metallic elements.
8. identify the non-metallic elements.
9. identify the transition metals.
10. identify the alkaline earth metals.
11. identify the noble gases.
12. tell which element belongs, simultaneously, to the 4th period and to group 14.
13. identify the representative elements that tend to generate positive ions.
14. indicate an element that forms bivalent ions.
15. indicate the halogen whose mononegative ion has the largest radius.
16. write the chemical formula of the compound formed by the elements **F** and **O**.
17. identify, justifying, the element with the largest atomic radius.
18. identify, justifying, the element with the lowest 1st ionization energy.

For the source of this example please see the file pgf-PeriodicTableManual_Examples.tex

EXERCISE:

Using the following notation,

☒ for the elements in the gaseous state (NTP),

 for the elements in the liquid state (NTP) and

\triangle for the synthetic elements,

fill in the following Periodic Table:

A 10x10 grid with a 2x2 block of cells in the top-left corner and a 2x2 block of cells in the top-right corner, both highlighted in light gray. The rest of the grid is white.

For the source of this example please see the file pgf-PeriodicTableManual_Examples.tex

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