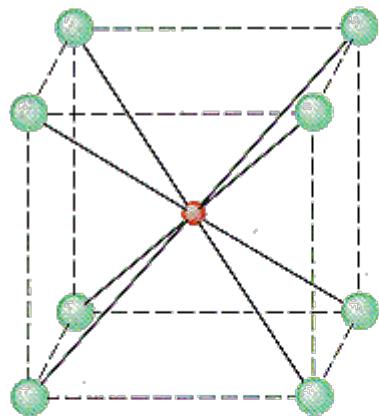
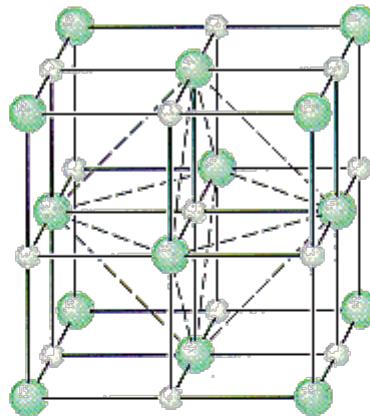


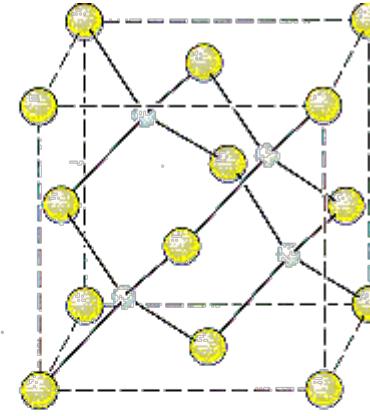
Crystal Structures



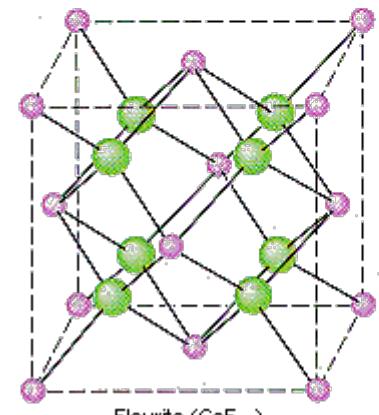
CsCl



NaCl

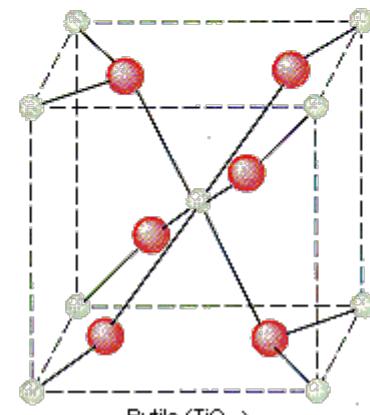


Zinc blende (cubic ZnS)



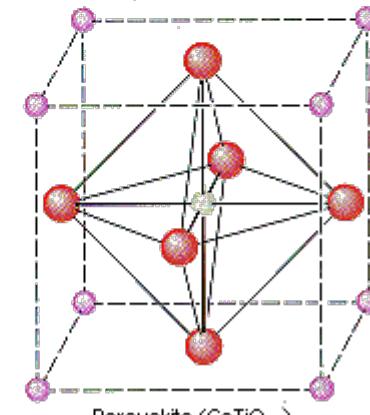
Flourite (CaF₂)

● = Ca²⁺



Rutile (TiO₂)

● = Ti^{IV}

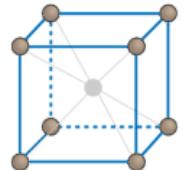


Perovskite (CaTiO₃)

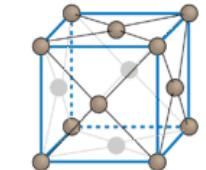
● = Ti^{IV} ● = Ca²⁺ ● = O²⁻

Crystal Structures

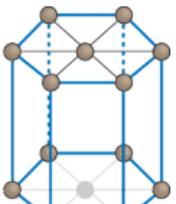
Simple Metals



Cubic body centered (bcc)
Fe, V, Nb, Cr

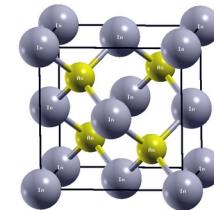


Cubic face centered (fcc)
Al, Ni, Ag, Cu, Au

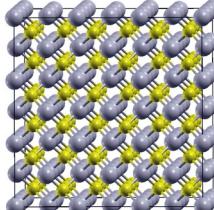


Hexagonal
Ti, Zn, Mg, Cd

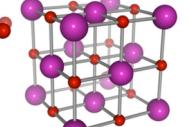
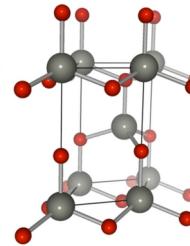
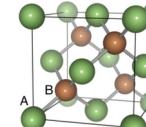
Dielectrics



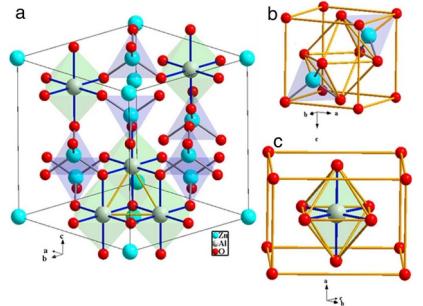
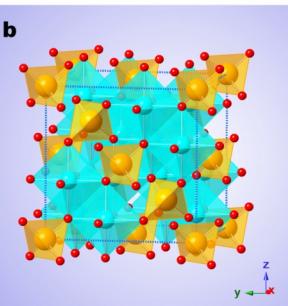
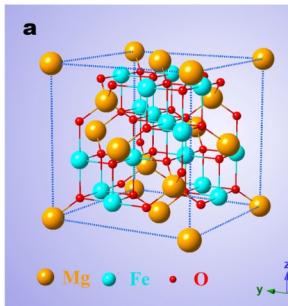
(a)



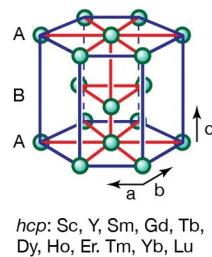
(b)



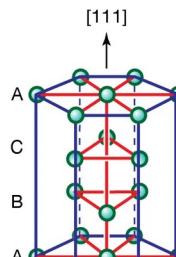
Transition Metal Compounds



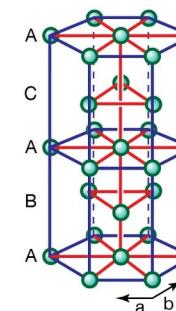
rare-earth metals



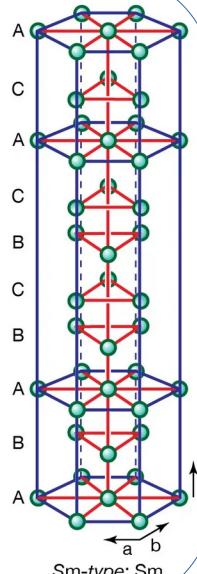
hcp: Sc, Y, Sm, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu



fcc: La, Ce, Yb

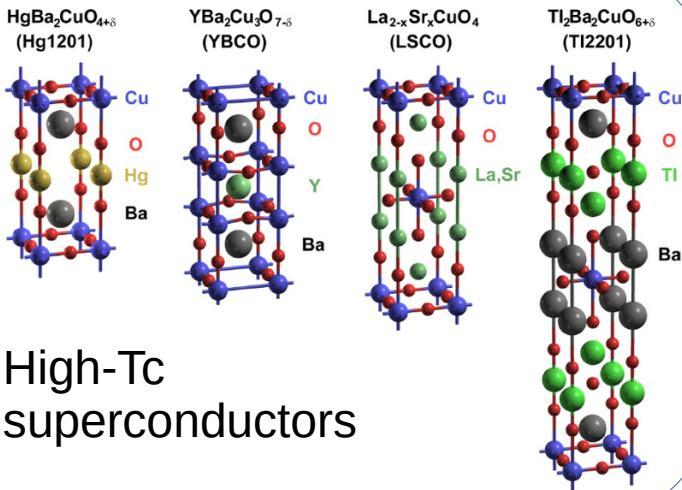


dhcp: La, Ce, Pr, Nd, Pm

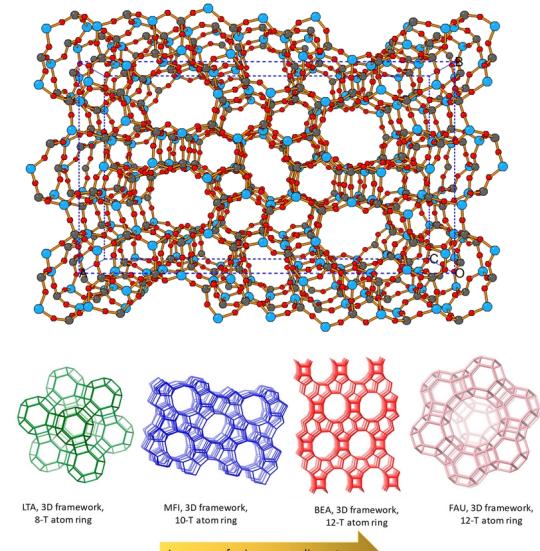


Sm-type: Sm

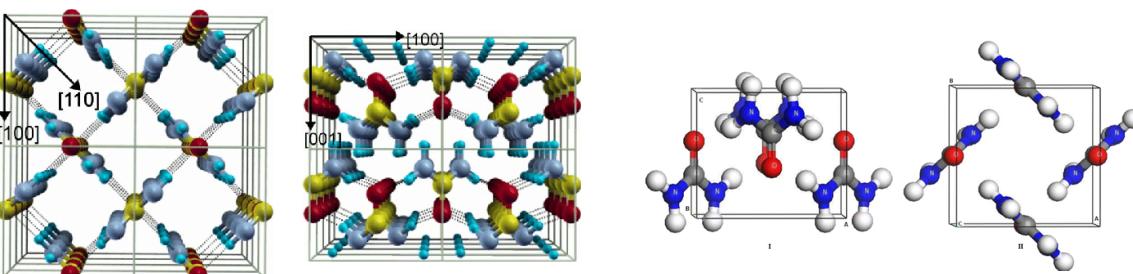
Crystal Structures



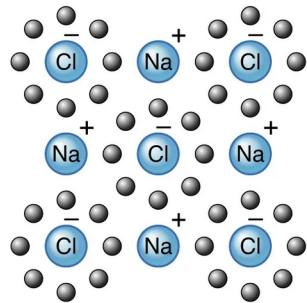
Zeolites



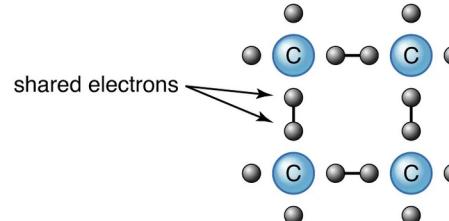
organic crystals: urea crystal



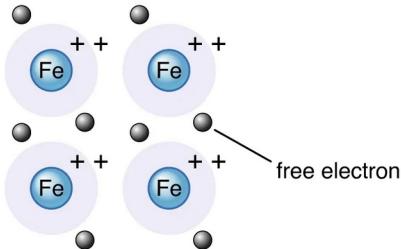
Chemical Bonds



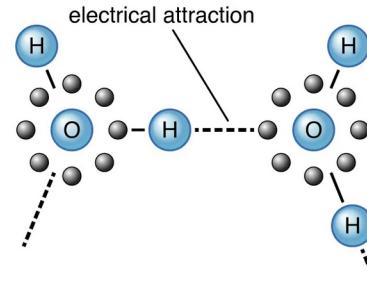
ionic bonding
electron transferred from Na to Cl



shared electrons
covalent bonding
atoms share electrons

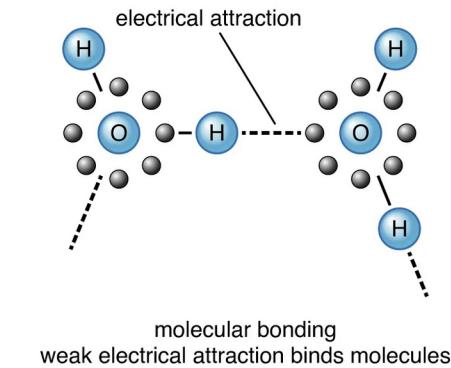
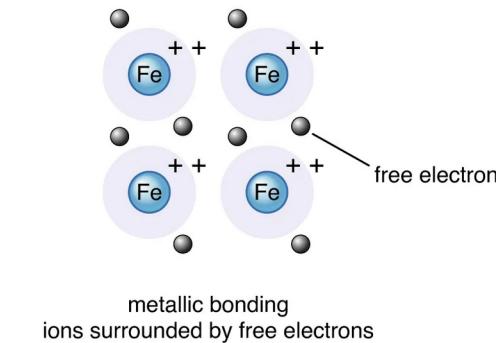
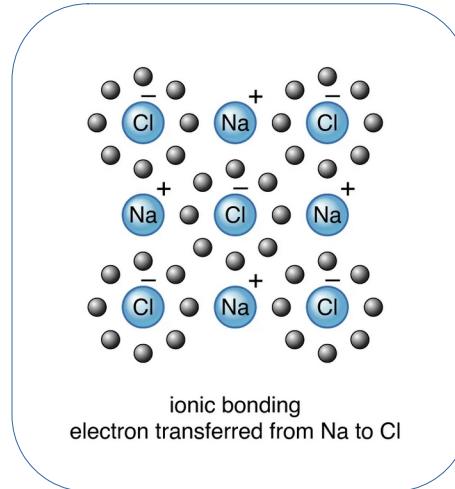
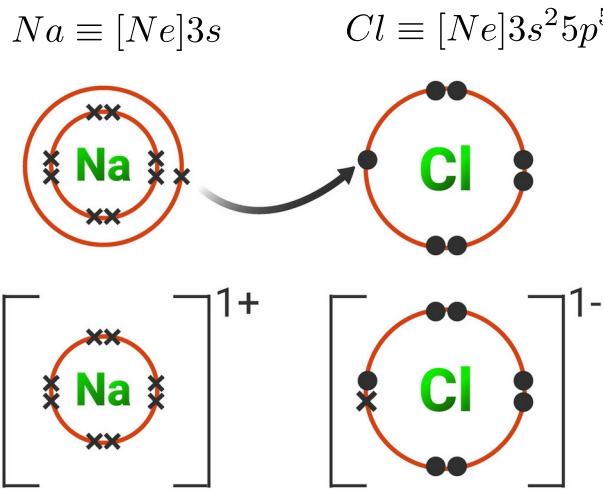


metallic bonding
ions surrounded by free electrons

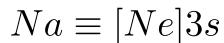


electrical attraction
molecular bonding
weak electrical attraction binds molecules

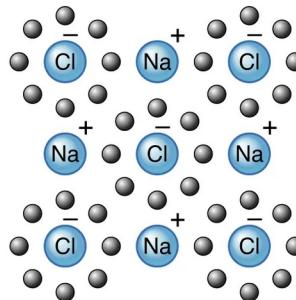
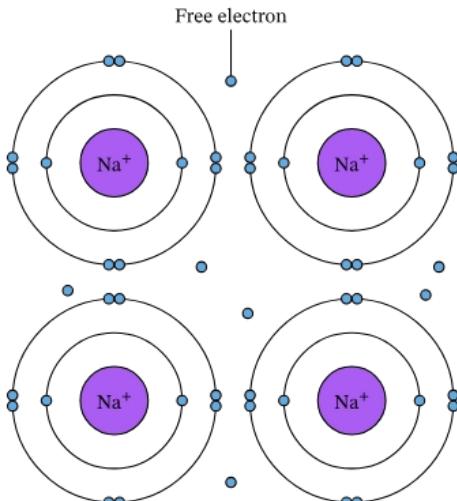
Chemical Bonds



Chemical Bonds

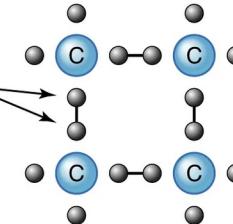


Metallic bonding

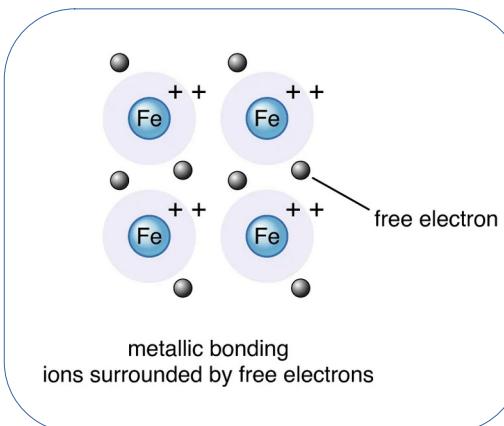


ionic bonding
electron transferred from Na to Cl

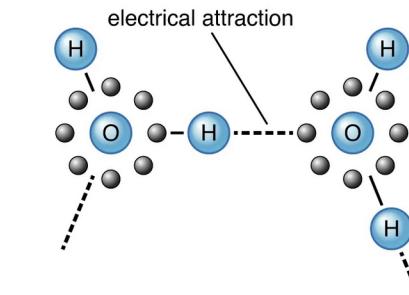
shared electrons



covalent bonding
atoms share electrons

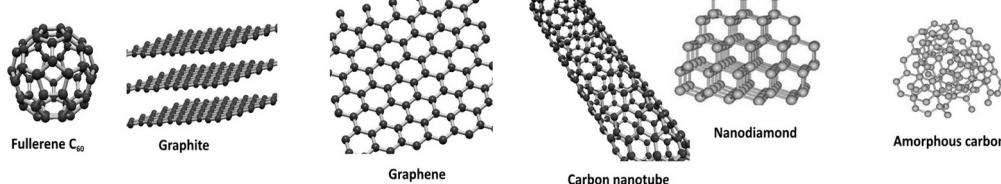
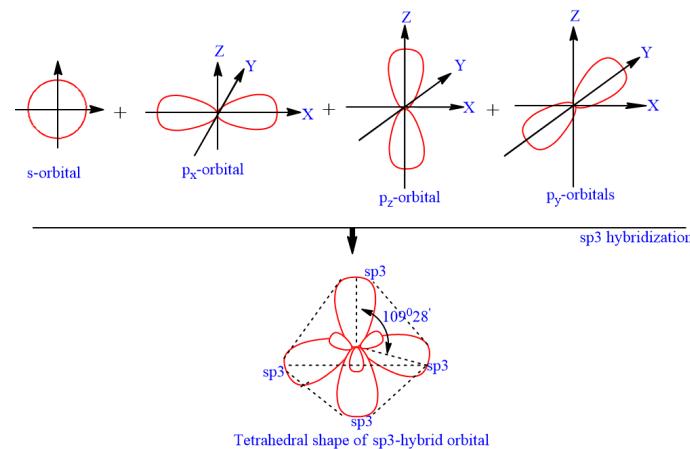
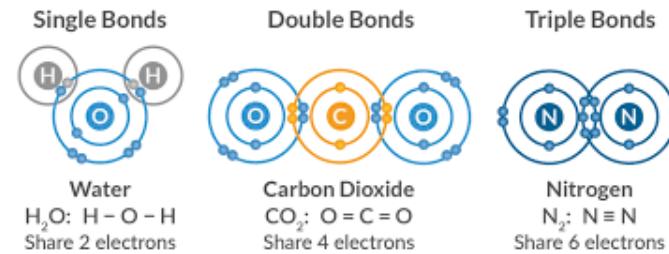
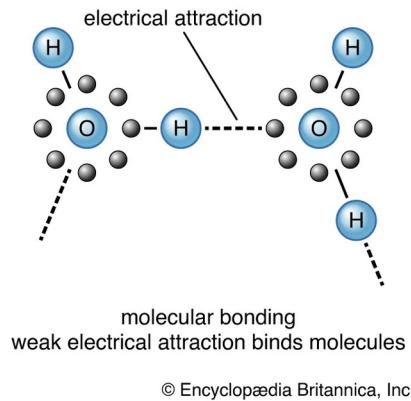
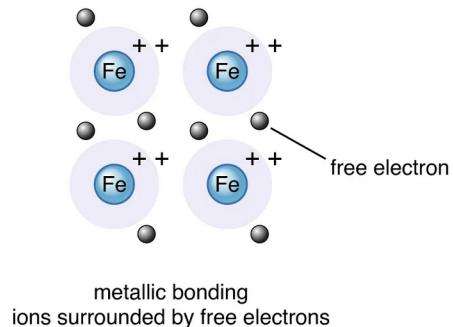
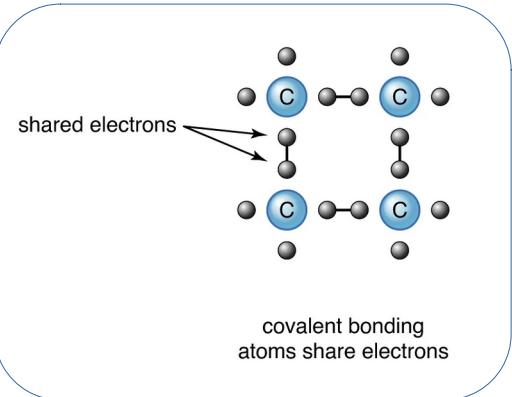
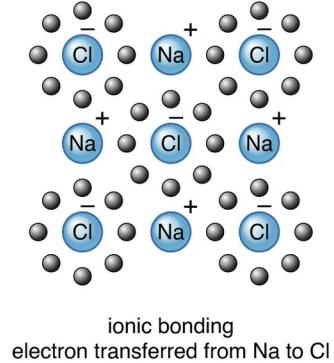


metallic bonding
ions surrounded by free electrons

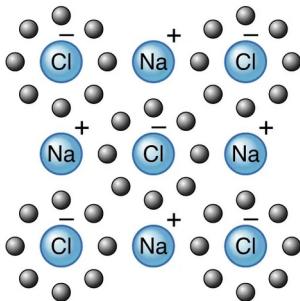


molecular bonding
weak electrical attraction binds molecules

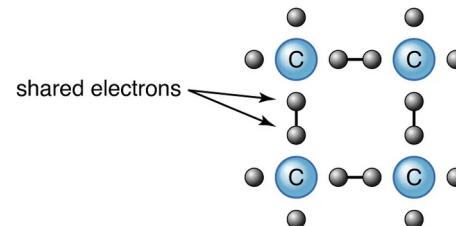
Chemical Bonds



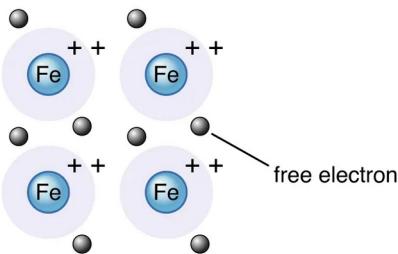
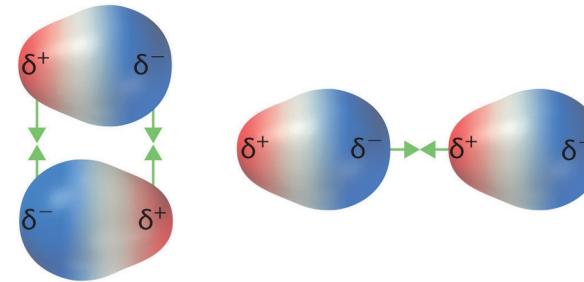
Chemical Bonds



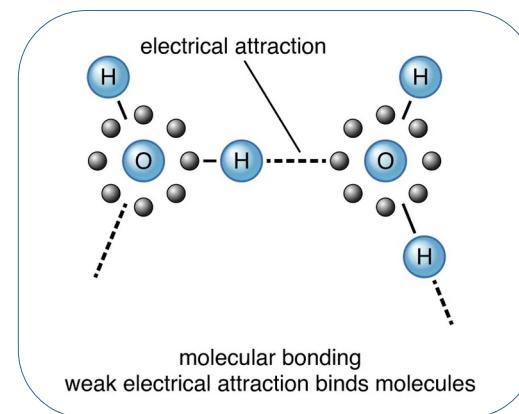
ionic bonding
electron transferred from Na to Cl



covalent bonding
atoms share electrons

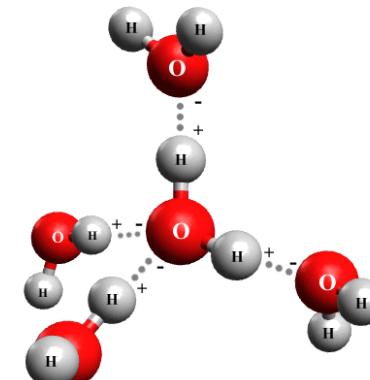


metallic bonding
ions surrounded by free electrons



molecular bonding
weak electrical attraction binds molecules

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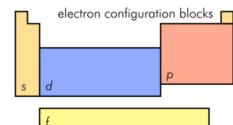
Periodic Table

The Periodic Table of the Elements
by Robert Compton version 1.4

This table provides a comprehensive view of the elements, including their atomic properties and electron configurations.

Legend:

- Elements by Group:** group 1, group 2, 13-18, 19-36, 37-48, 49-54, 55-72, 73-82, 83-92, 93-118.
- Element Properties:**
 - atomic mass or most stable mass number
 - 1st ionization energy in kJ/mol
 - chemical symbol
 - name
 - electron configuration
 - oxidation states: most common are bold
 - radioactive elements have masses in parenthesis
- Element Categories:**
 - alkali metals, alkaline metals, other metals, transition metals, lanthanoids, actinoids
 - metalloids
 - nonmetals, halogens, noble gases
 - unknown elements



notes

- as of yet, elements 113-118 have no official name designated by the IUPAC.
- 1 kJ/mol = 96.485 eV.
- all elements are implied to have an oxidation state of zero.

138.9054 57 538.1 1.10	140.116 58 534.4 1.12	140.9076 59 527.0 1.13	144.242 60 533.1 1.14	(145) 61 540.0	150.36 62 544.5 1.17	151.964 63 547.1	157.25 64 593.4 1.20	158.9253 65 565.8	162.500 66 573.0 1.22	164.9303 67 581.0 1.23	167.259 68 589.3 1.24	168.9342 69 596.7 1.25	173.054 70 603.4
La Lanthanum [Xe] 5d ¹ 6s ²	Ce Cerium [Xe] 4f ¹ 5d ¹ 6s ²	Pr Praseodymium [Xe] 4f ¹ 6s ²	Nd Neodymium [Xe] 4f ² 6s ²	Pm Promethium [Xe] 4f ³ 6s ²	Sm Samarium [Xe] 4f ⁵ 6s ²	Eu Europium [Xe] 4f ⁷ 6s ²	Gd Gadolinium [Xe] 4f ⁹ 6s ²	Tb Terbium [Xe] 4f ¹¹ 6s ²	Dy Dysprosium [Xe] 4f ¹³ 6s ²	Ho Holmium [Xe] 4f ¹⁵ 6s ²	Er Erbium [Xe] 4f ¹⁷ 6s ²	Tm Thulium [Xe] 4f ¹⁹ 6s ²	Yb Ytterbium [Xe] 4f ²¹ 6s ²
(227) 89 499.0 1.10	232.0380 90 587.0 1.30	231.0358 91 568.0 1.50	238.0289 92 597.6 1.38	(237) 93 604.5 1.36	(244) 94 584.7 1.28	(243) 95 578.0 1.30	(247) 96 581.0 1.30	(247) 97 601.0 1.30	(251) 98 608.0 1.30	(252) 99 619.0 1.30	(257) 100 635.0 1.30	(258) 101 642.0 1.30	(259) 102 649.0 1.30
Ac Actinium [Xe] 6d ¹ 7s ²	Th Thorium [Xe] 6d ¹ 7s ²	Pa Protactinium [Xe] 5f ¹ 6d ¹ 7s ²	U Uranium [Xe] 5f ² 6d ¹ 7s ²	Np Neptunium [Xe] 5f ³ 6d ¹ 7s ²	Pu Plutonium [Xe] 5f ⁴ 7s ²	Am Americium [Xe] 5f ⁵ 7s ²	Cm Curium [Xe] 5f ⁶ 7s ²	Bk Berkelium [Xe] 5f ⁷ 7s ²	Cf Californium [Xe] 5f ⁸ 7s ²	Es Einsteinium [Xe] 5f ⁹ 7s ²	Fm Mendelevium [Xe] 5f ¹⁰ 7s ²	No Nobelium [Xe] 5f ¹⁴ 7s ²	

Periodic Table

The Periodic Table of the Elements

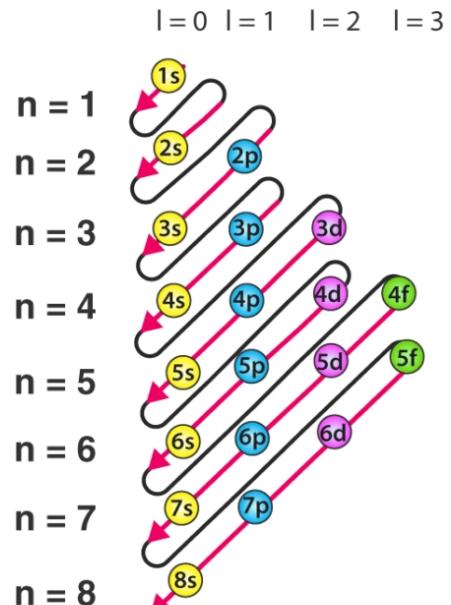
group 1

1.00794 1312.0 Hydrogen $1s^1$	2
6.941 520.2 Li Lithium $1s^2 2s^1$	3 Be Beryllium $1s^2 2s^2$
22.98976 495.8 Na Sodium $[He] 3s^1$	4 Mg Magnesium $[Ar] 3s^2 4s^2$
39.0983 418.6 K Potassium $[Ar] 4s^1$	5 Ca Calcium $[Ar] 3s^2 4p^6$
85.4678 403.0 Rb Rubidium $[Kr] 5s^1$	6 Sc Scandium $[Ar] 3d^1 4s^2$
132.9054 373.7 Cs Cesium $[Xe] 6s^1$	7 Ti Titanium $[Ar] 3d^2 4s^2$
(223) 380.0 0.70 Fr Francium $[Rn] 7s^1$	8 V Vanadium $[Ar] 3d^3 4s^2$
(226) 509.3 0.90 Ra Radium $[Rb] 7s^2$	9 Cr Chromium $[Ar] 3d^5 4s^1$
(261) 470.0 1.03 Lr Lanthanum $[Ba] 5f^1 7s^2$	10 Mn Manganese $[Ar] 3d^5 4s^2$
(262) 580.0 Rf Ruthenium $[Ru] 5f^1 6d^1 7s^2$	11 Fe Iron $[Ar] 3d^6 4s^2$
(227) 499.0 1.89 Ac Actinium $[Ra] 6d^1 7s^2$	12 Co Cobalt $[Ar] 3d^7 4s^1$
232.0380 587.0 Th Thorium $[Ra] 6d^2 7s^2$	13 Ni Nickel $[Ar] 3d^8 4s^1$
90.231 231.0358 Pr Praseodymium $[Ce] 4f^1 5d^1 6s^2$	14 Cu Copper $[Ar] 3d^10 4s^1$
92.180 238.0289 Nd Neodymium $[Ce] 4f^2 5d^1 6s^2$	15 Zn Zinc $[Ar] 3d^10 4s^2$
108.109 533.1 Hs Holmium $[Ce] 4f^3 5d^1 6s^2$	16 Ga Gallium $[Ar] 3d^10 4s^2 4p^1$
109.109 540.5 Mt Meitnerium $[Ce] 4f^3 5d^2 6s^2$	17 Ge Germanium $[Ar] 3d^10 4s^2 4p^3$
(277) 597.6 1.50 Bh Bohrium $[Ra] 5f^1 6d^1 7s^2$	18 As Arsenic $[Ar] 3d^10 4s^2 4p^5$
(237) 597.6 1.38 U Uranium $[Ra] 5f^2 6d^1 7s^2$	19 Se Selenium $[Ar] 3d^10 4s^2 4p^6$
(244) 584.7 1.28 Pa Protactinium $[Ra] 5f^2 6d^2 7s^2$	20 Br Bromine $[Ar] 3d^10 4s^2 4p^6$
93.154 587.0 Np Neptunium $[Ra] 5f^2 6d^3 7s^2$	21 Al Aluminum $[Ar] 3s^2 3p^1$
(243) 587.0 1.30 Pu Plutonium $[Ra] 5f^2 6d^4 7s^2$	22 Si Silicon $[Ar] 3s^2 3p^2$
(247) 581.0 1.30 Am Americium $[Ra] 5f^2 6d^5 7s^2$	23 P Phosphorus $[Ar] 3s^2 3p^3$
(251) 581.0 1.30 Cm Curium $[Ra] 5f^2 6d^6 7s^2$	24 S Sulfur $[Ar] 3s^2 3p^4$
(252) 619.0 1.30 Bk Berkelium $[Ra] 5f^2 6d^7 7s^2$	25 Cl Chlorine $[Ar] 3s^2 3p^5$
(257) 627.0 1.30 Es Einsteinium $[Ra] 5f^2 6d^8 7s^2$	26 F Fluorine $[Ar] 2s^2 2p^5$
(258) 635.0 1.30 Fm Fermium $[Ra] 5f^2 6d^9 7s^2$	27 Ne Neon $[Ar] 2s^2 2p^6$
(259) 642.0 1.30 Md Mendelevium $[Ra] 5f^2 6d^10 7s^2$	28 He Helium $1s^2$

electron configuration blocks

notes

- as of yet, elements 113-118 have no official name designated by the IUPAC.
- 1 kJ/mol = 96.485 eV
- all elements are implied to have an oxidation state of zero.



Periodic Table

Group → 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Period
↓

1		H															He	
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg										Al	Si	P	S	Cl	Ar	
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	**	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og

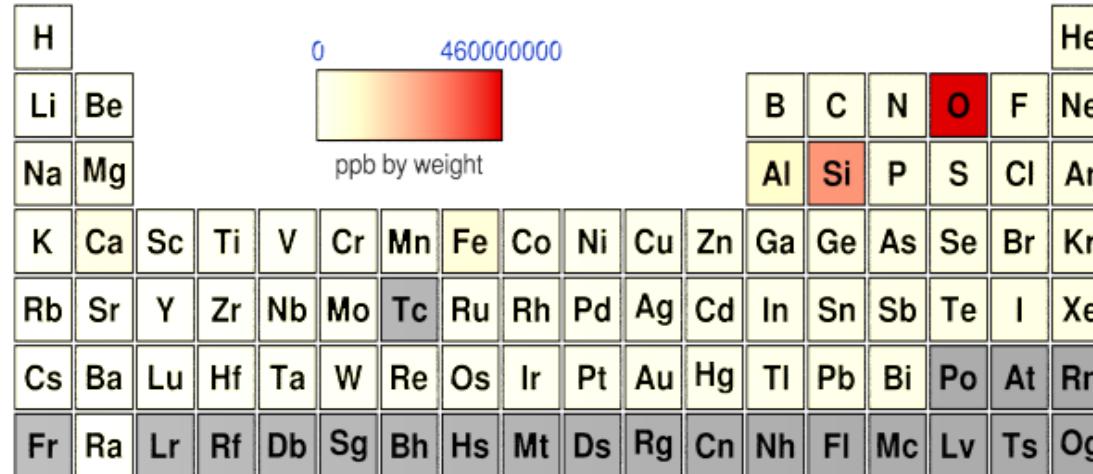
* Lanthanides	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
** Actinide	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Non-Metals	Alkali Metals	Alkaline-Earth Metals	Transition Metals	Noble Metals	Poor Metals	Metalloids
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Rare-Earth/Lanthanides Metals	Halogens	Noble Gases	Synthetically Prepared Elements Note: Tc, Pm, Po, At, Fr, Ac, Pa, Np, Pu were discovered through synthesis before being found in nature
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Solid Liquid Gas Radioactive

Periodic Quiz



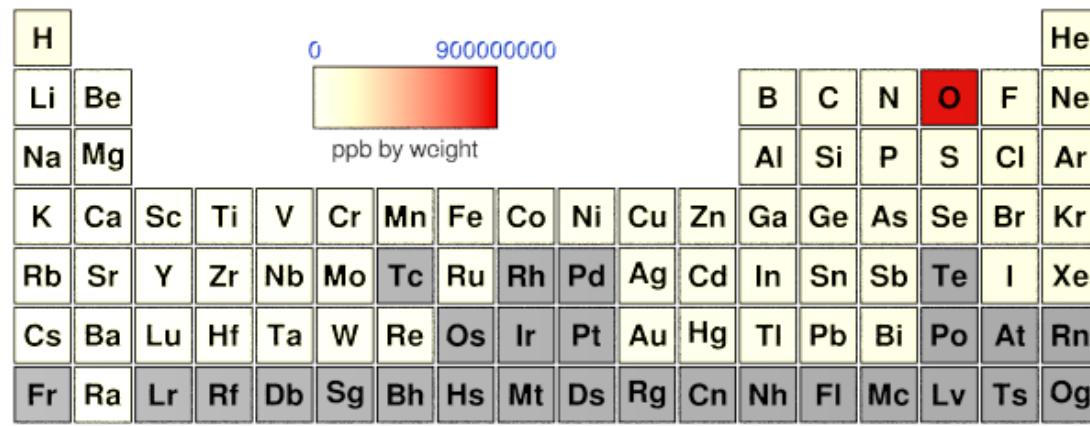
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	No	



Abundance in Earth's crust (by weight)

www.webelements.com

Periodic Quiz



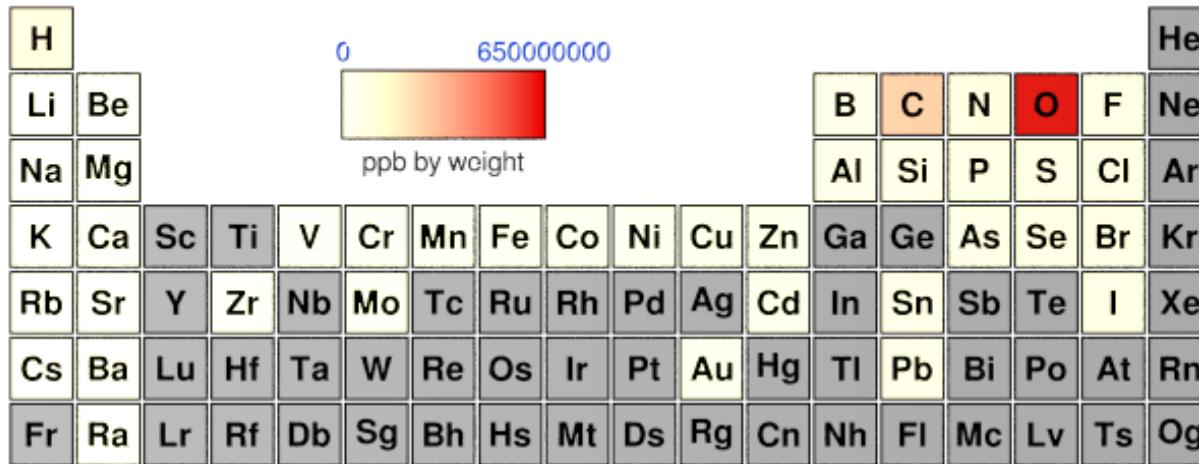
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



Abundance in oceans (by weight)

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Periodic Quiz



La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

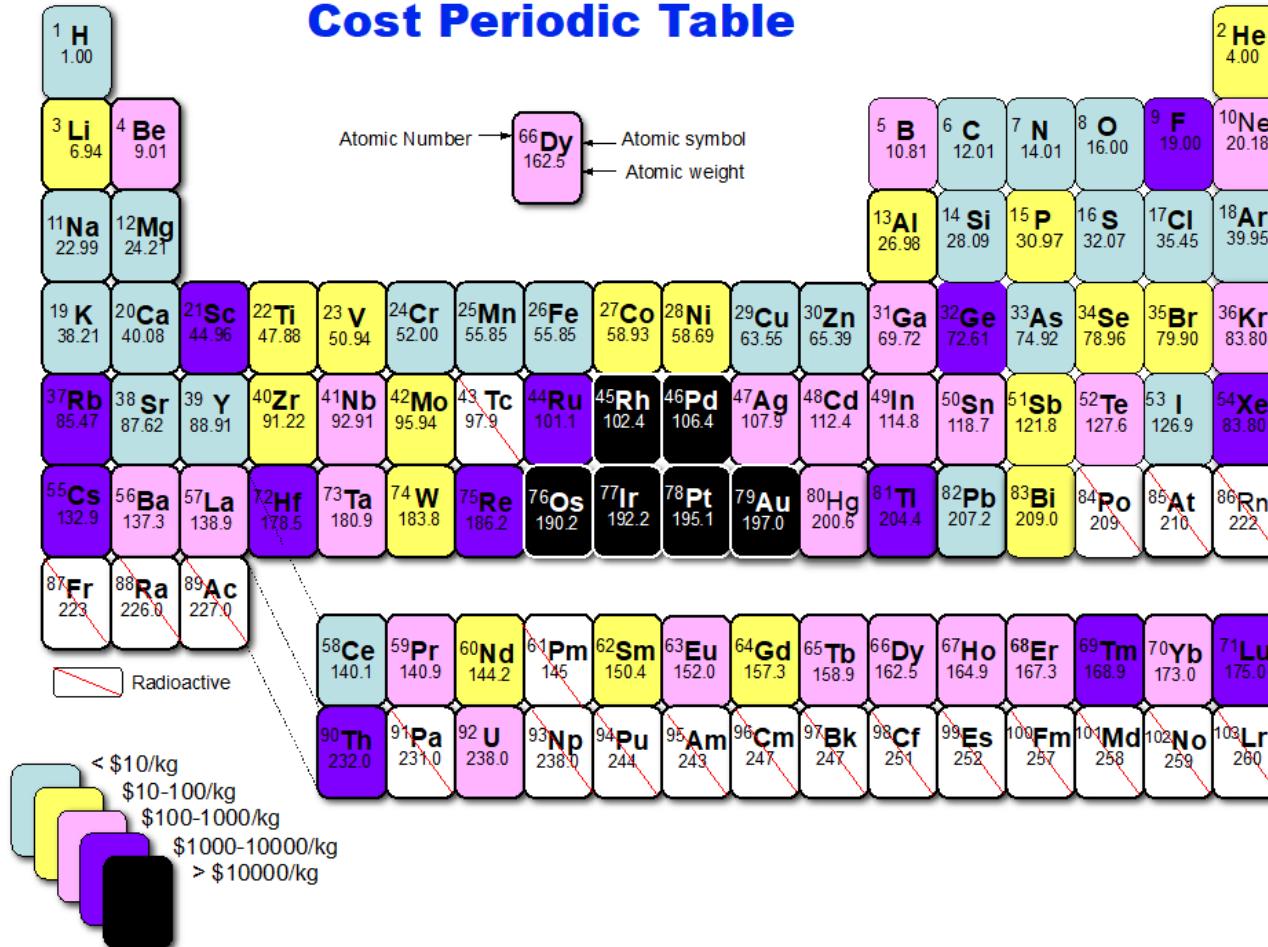


Abundances in humans (by weight)

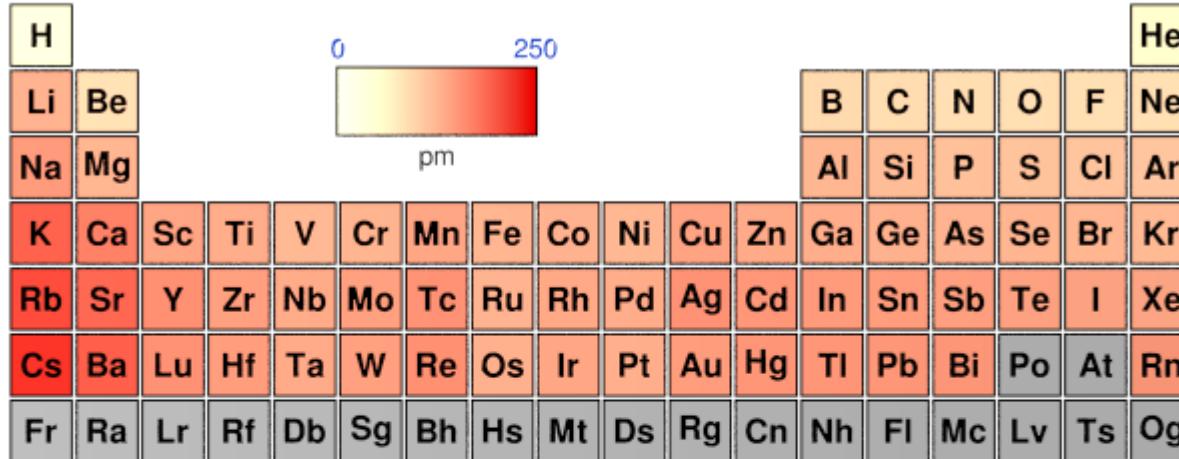
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Periodic Quiz

Cost Periodic Table



Periodic Quiz



La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

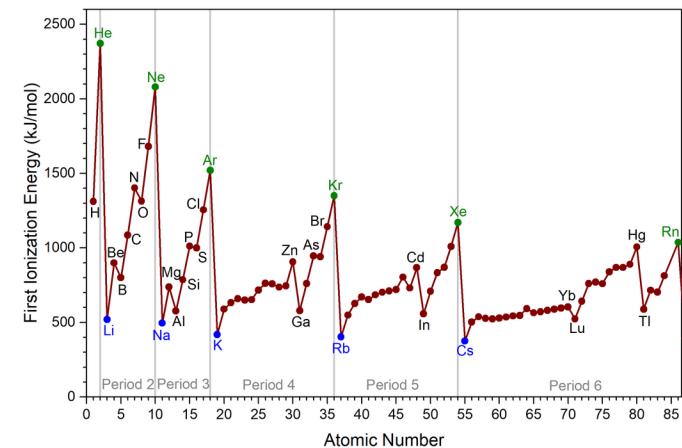
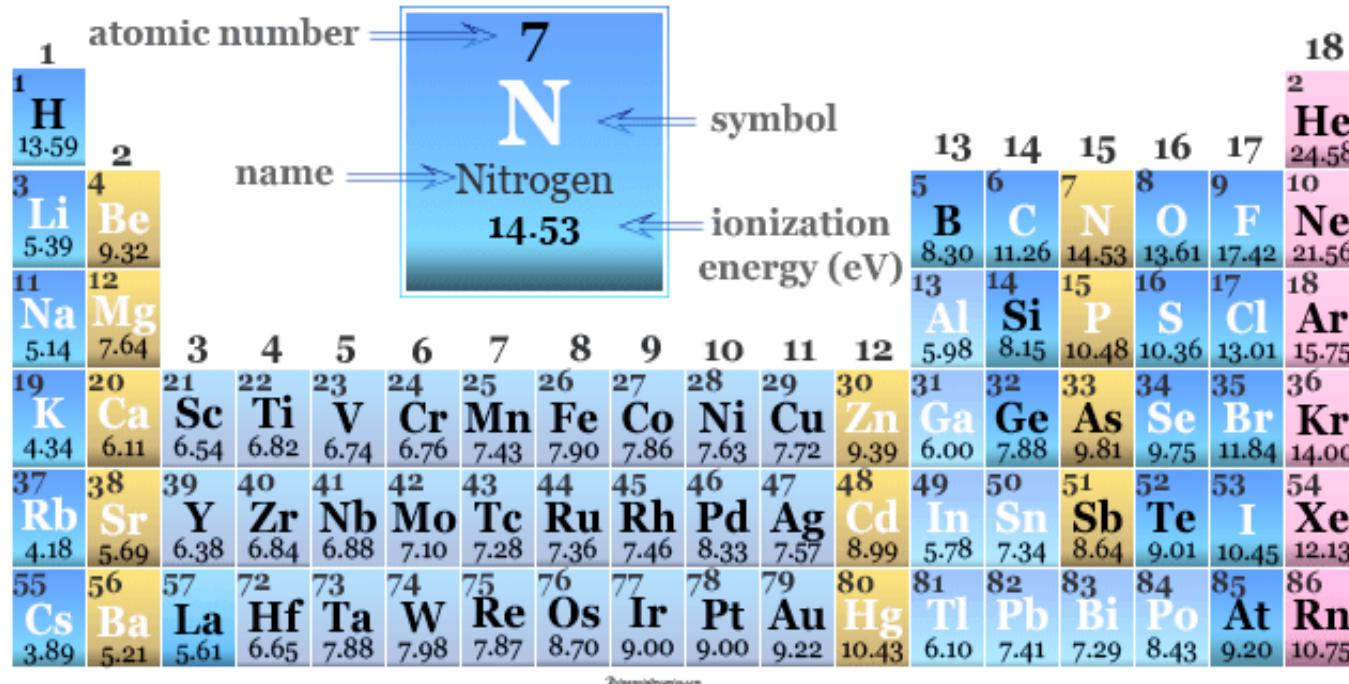


Covalent radius

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Periodic Quiz

Ionization energy (eV) in periodic table



Periodic Quiz

Ionization Energy **Increases**



Ionization Energy
Decreases

		Group ↓																				
		Period →																				
		1																				
1	H	1.008	2																18	4.026		
2	Li	6.938	3	Be	9.012														He	20.379		
3	Na	11.22989	4	Mg	12.4304														Neon	39.948		
4	K	19.29983	5	Ca	20.40.078	Sc	21.44.3329	6	Ti	22.47.867	7	V	23.50.9415	8	Cr	24.51.5951	9	Mn	25.54.938	10	Fe	26.55.849
5	Rb	37.85.4678	6	Sr	38.87.62	Y	39.88.908	7	Zr	40.91.224	8	Nb	41.92.906	9	Mo	42.95.95	10	Tc	43.98	11	Ru	44.101.07
6	Cs	55.132.965	7	Ba	56.137.327	Lanthanoids*	57.71	8	Hf	72.178.49	9	Ta	73.180.546	10	W	74.183.84	11	Re	75.186.397	12	Os	76.190.23
7	Fr	87. (223)	8	Ra	88. (226)	Actinoids**	89-103	9	Rf	104. (267)	10	Dubnium	105. (268)	11	Sg	106. (269)	12	Bh	107. (270)	13	Hs	108. (277)

*Lanthanoids

57	138.905	La	Lanthanum
58	140.116	Ce	Cerium
59	140.968	Pr	Praseodymium
60	144.242	Nd	Neodymium
61	144.951	Pm	Promethium
62	150.36	Sm	Samarium
63	151.964	Eu	Europium
64	157.25	Gd	Gadolinium
65	158.955	Tb	Terbium
66	162.566	Dy	Dysprosium
67	164.939	Ho	Holmium
68	167.259	Er	Erbium
69	168.934	Tm	Thulium
70	173.045	Yb	Ytterbium
71	174.968	Lu	Lutetium

**Actinoids

89	(227)	Ac	Actinium
90	232.0377	Th	Thorium
91	231.036	Pa	Protactinium
92	234.029	U	Uranium
93	(237)	Np	Neptunium
94	(244)	Pu	Plutonium
95	(243)	Am	Americium
96	(247)	Cm	Curium
97	(247)	Bk	Berkelium
98	(251)	Cf	Californium
99	(252)	Es	Einsteinium
100	(257)	Fm	Fermium
101	(258)	Md	Hendersonium
102	(259)	No	Nobelium
103	(266)	Lr	Lawrencium

Periodic Quiz

Periodic Table of Elements Electronegativity



1 H Hydrogen	2 He Helium
3 Li Lithium	4 Be Beryllium
11 Na Sodium	12 Mg Magnesium
19 K Potassium	20 Ca Calcium
37 Rb Rubidium	38 Sr Strontium
55 Cs Caesium	56 Ba Barium
87 Fr Francium	88 Ra Radium
57 Lanthanides Lanthanum	58 Actinides Rutherfordium
89 Ac Actinium	90 Th Thorium
58 Ce Cerium	91 Pa Protactinium
59 Pr Praseodymium	92 U Uranium
60 Nd Neodymium	93 Np Neptunium
61 Pm Promethium	94 Pu Plutonium
62 Sm Samarium	95 Am Americium
63 Eu Europium	96 Cm Curium
64 Gd Gadolinium	97 Bk Berkelium
65 Tb Terbium	98 Cf Californium
66 Dy Dysprosium	99 Es Einsteinium
67 Ho Holmium	100 Fm Fermium
68 Er Erbium	101 Md Mendelevium
69 Tm Thulium	102 No Nobelium
70 Yb Ytterbium	103 Lr Lawrencium
71 Lu Lutetium	

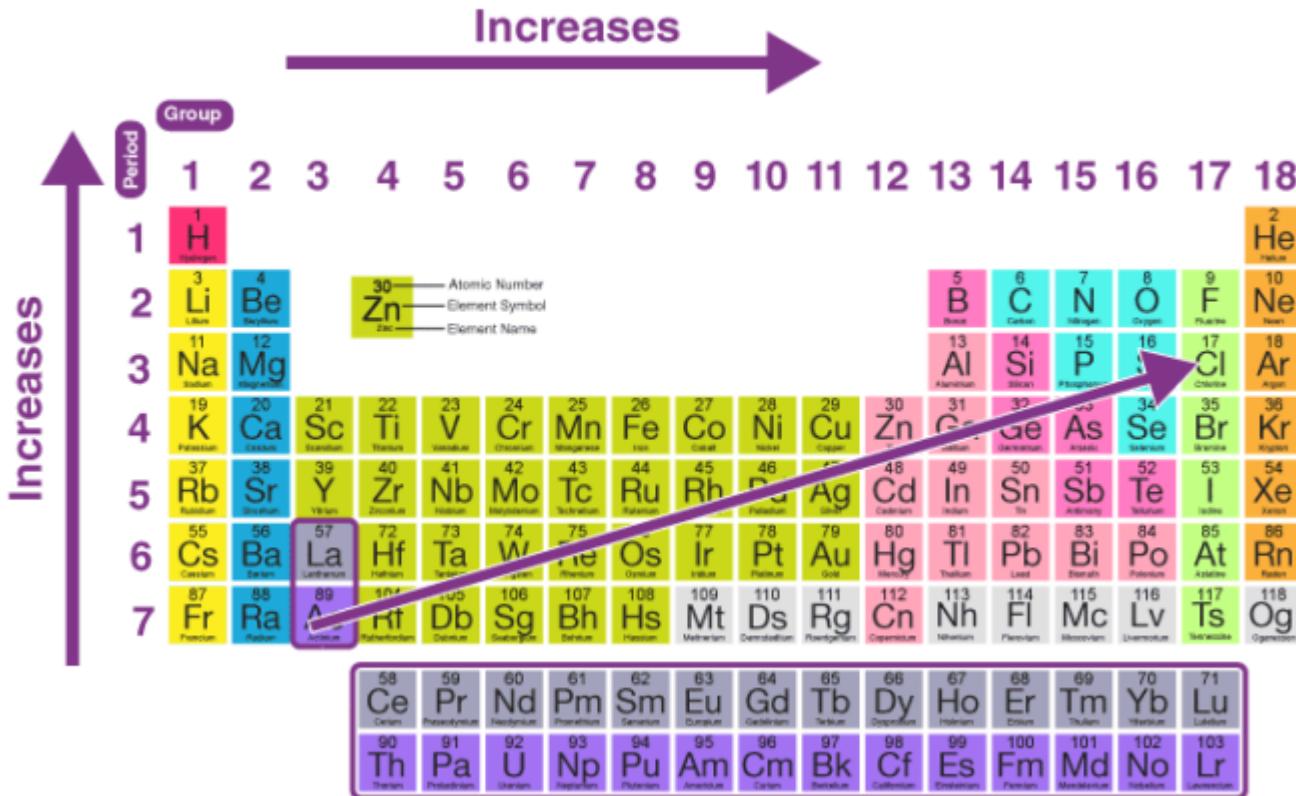


Periodic Quiz

electronegativity

Periodic Quiz

ELECTRON AFFINITY



Periodic Quiz

Electron affinity

Periodic Quiz

Periodic Table of the Elements

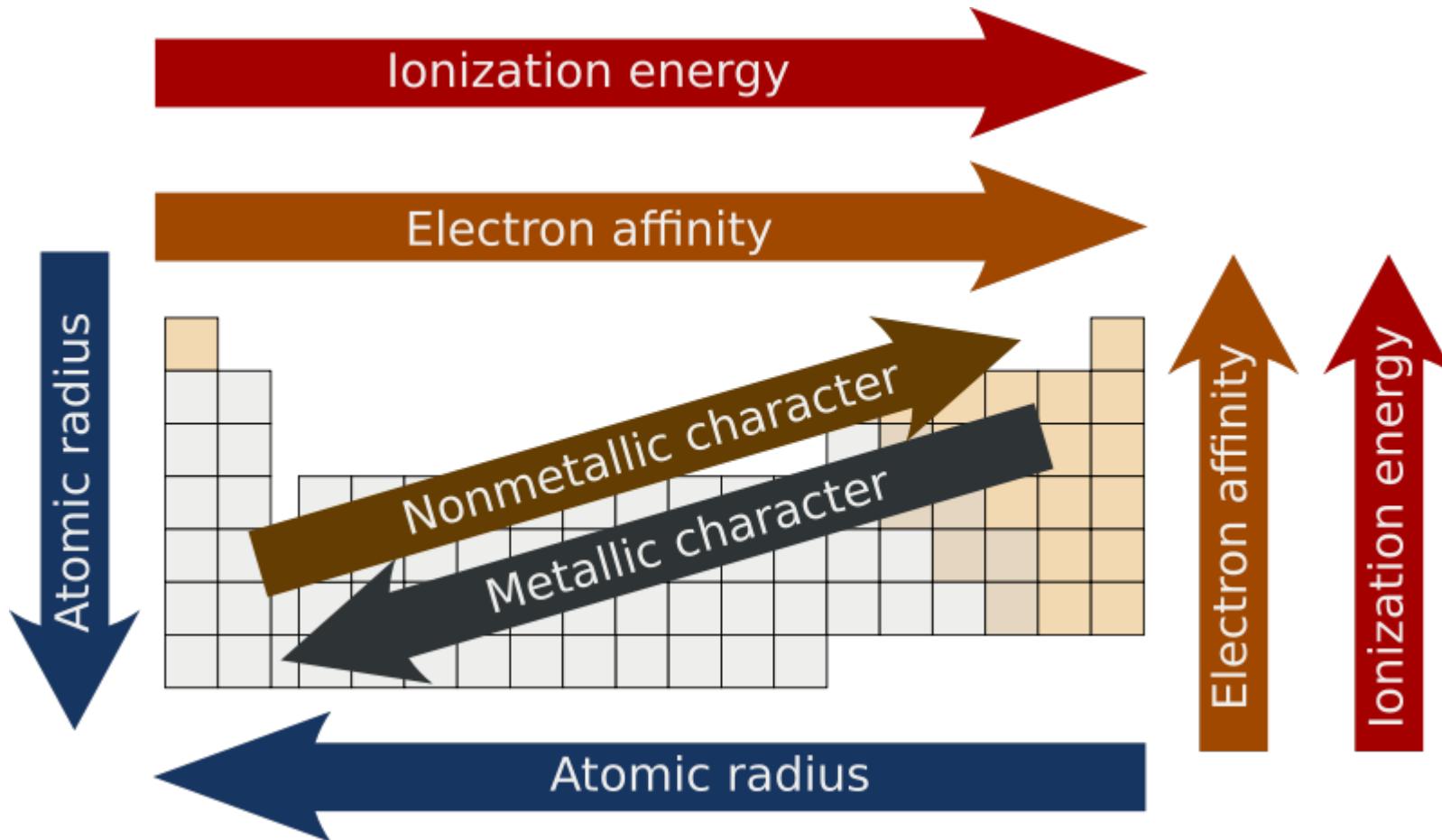
The periodic table displays elements from Hydrogen (H) to Radium (Ra) and Thorium (Th) to Lanthanum (Lu). The table is color-coded according to the following categories:

- hydrogen**: Green
- alkali metals**: Yellow
- alkali earth metals**: Light blue
- transition metals**: Orange
- poor metals**: Medium blue
- nonmetals**: White
- noble gases**: Red-orange
- rare earth metals**: Gray

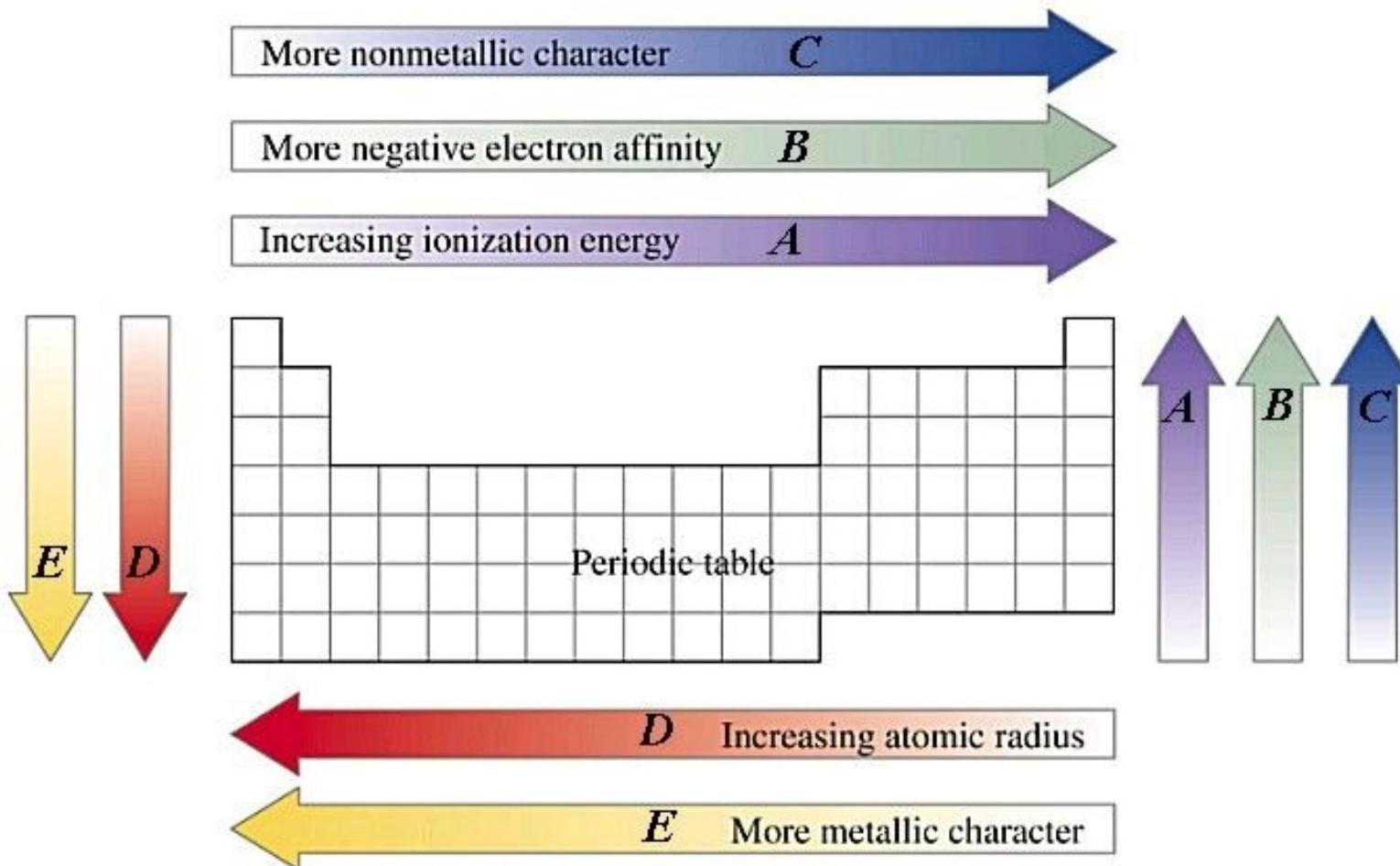
H																				He
Li		Be																		Ne
Na		Mg																		Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	30	Ga	Ge	As	Se	Br		Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	48	In	Sn	Sb	Te	I		Xe	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	80	Tl	Pb	Bi	Po	At		Rn	
Fr	Ra	Ac	Unq	Unp	Unh	Uns	Uno	Une	Unn											

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
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

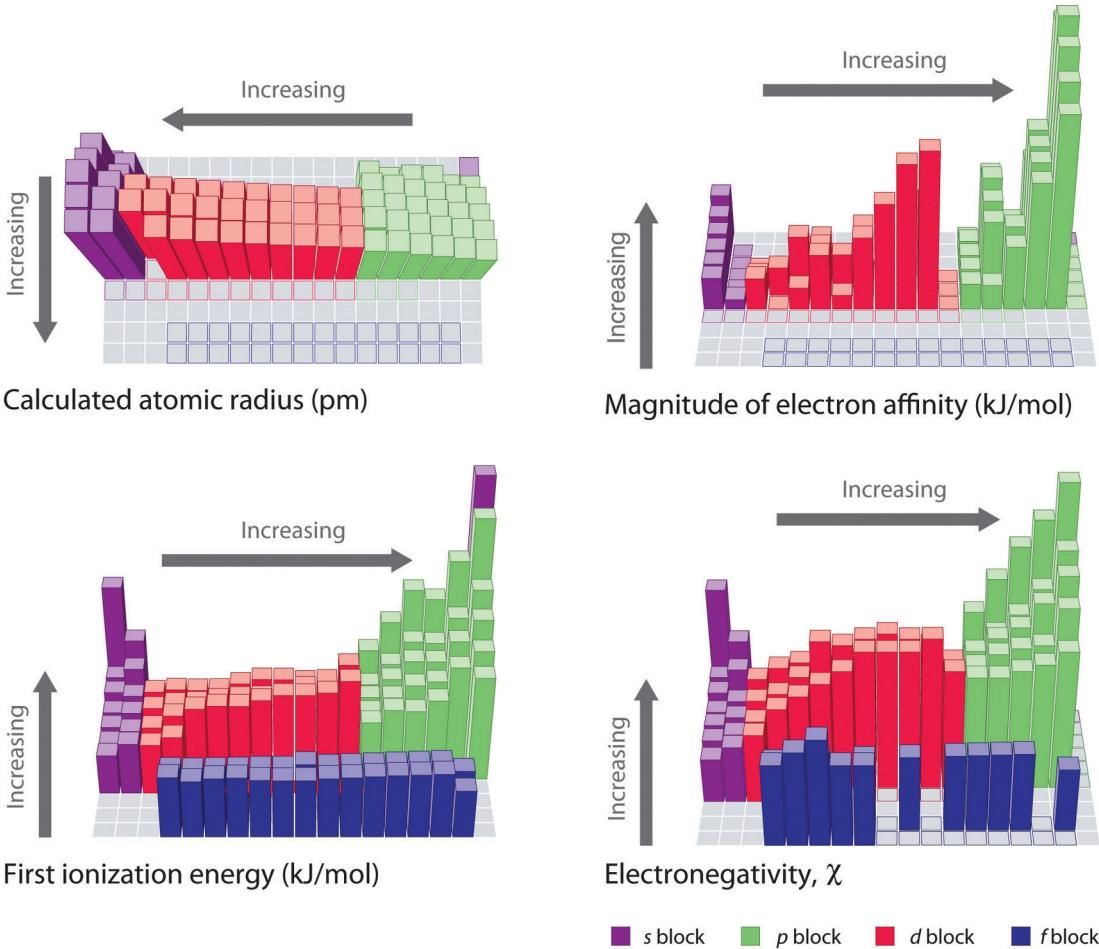
Periodic Quiz



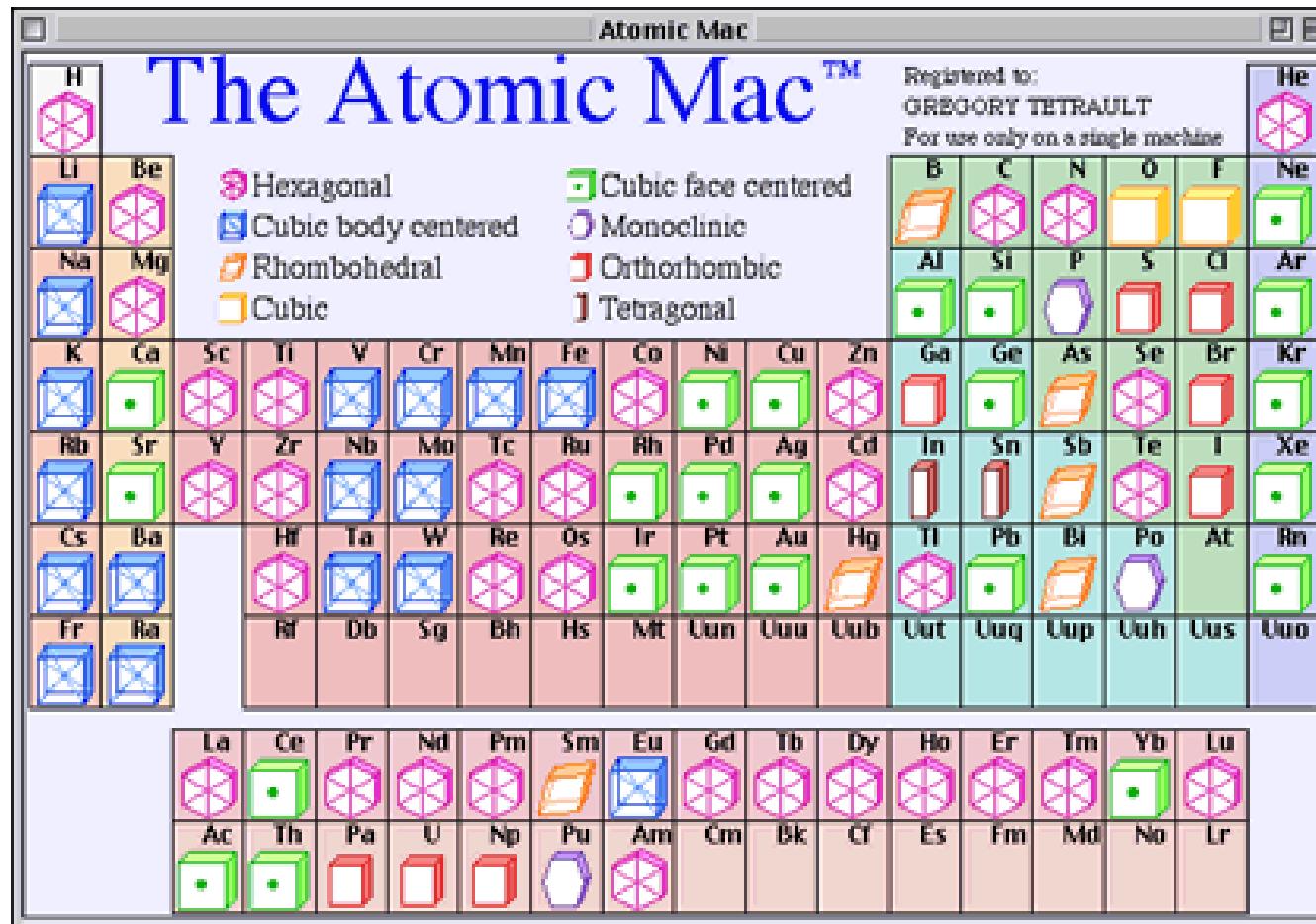
Periodic Quiz



Periodic Quiz



Periodic Quiz



Periodic Quiz

Crystal Structures of Elements at STP

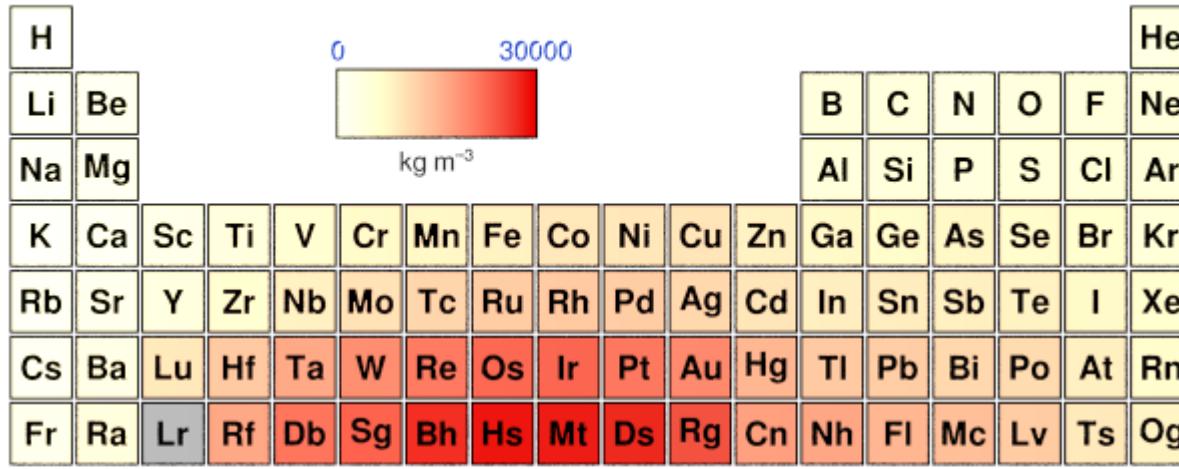
STP - Standard Temperature and Pressure

H	BCC - Body-centered Cubic FCC - Face-centered Cubic HEX - Simple Hexagonal HCP - Close-packed Hexagonal DHCP - Double Close-packed Hexagonal RHO - Rhombohedral																		He
Li	Be	B	C	N	O	F	Ne												
BCC	HCP	RHO	HEX	complex HCP	P-cubic	P-cubic	FCC												
Na	Mg	Al	Si	P	S	Cl	Ar												
BCC	HCP	FCC	DC	ORTH	ORTH	complex C-ORTH	FCC												
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
BCC	FCC	HCP	HCP	BCC	BCC	α-Mn	BCC	HCP	FCC	FCC	HCP	complex F-ORTH	DC	P-RHO	complex HEX	complex C-ORTH	FCC		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
BCC	FCC	HCP	HCP	BCC	BCC	HCP	HCP	FCC	FCC	FCC	HCP	BCT	DT	P-RHO	complex HEX	complex C-ORTH	FCC		
Cs	Ba	57-71	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn		
BCC	BCC		HCP	BCC	BCC	HCP	HCP	FCC	FCC	RHO	HCP	FCC	RHO	SC	FCC*	FCC*	FCC*		
Fr	Ra	89-103	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og		
BCC*	BCC		HCP*	BCC*	BCC*	HCP*	HCP*	FCC*	BCC*	BCC*	HCP*	HCP*	FCC*	UNKNOWN	UNKNOWN	UNKNOWN	FCC*		

- Solid state at STP
- Liquid state at STP
- Gaseous state at STP

La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu				
DHCP	DHCP	DHCP	DHCP	DHCP	complex RHO	BCC	HCP	HCP	HCP	HCP	HCP	HCP	FCC	HCP	FCC	FCC*	FCC*	
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr				
FCC	FCC	BCT	ORTH	ORTH	MONO	DHCP	DHCP	DHCP	DHCP	FCC	FCC*	FCC*	FCC*	HCP*	FCC*	FCC*	FCC*	

Periodic Quiz



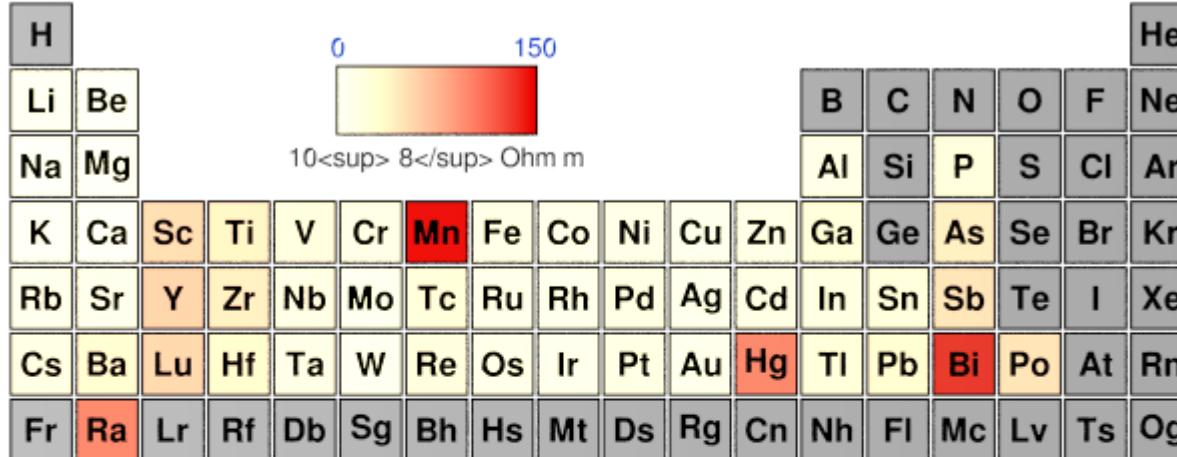
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Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



Density of solid

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Periodic Quiz



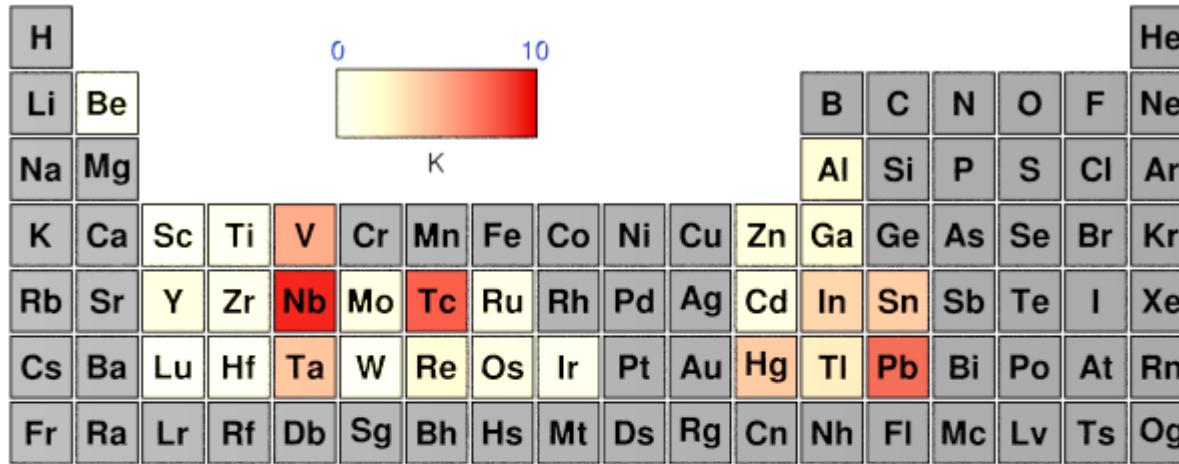
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



Electrical resistivity

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Periodic Quiz

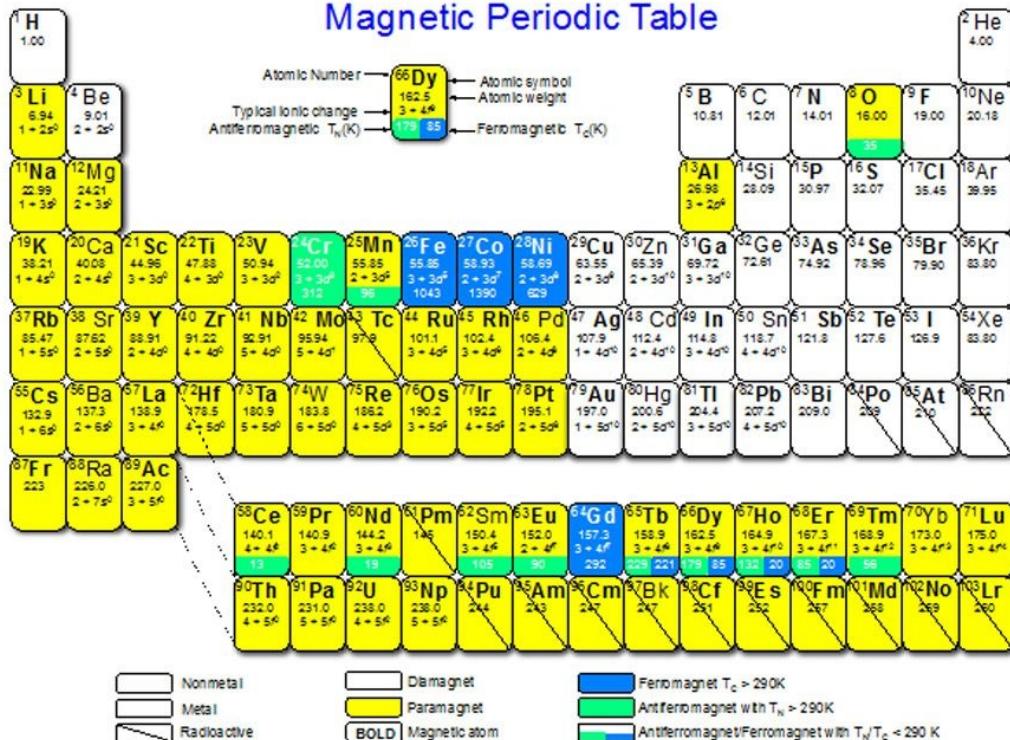


Superconductivity temperature

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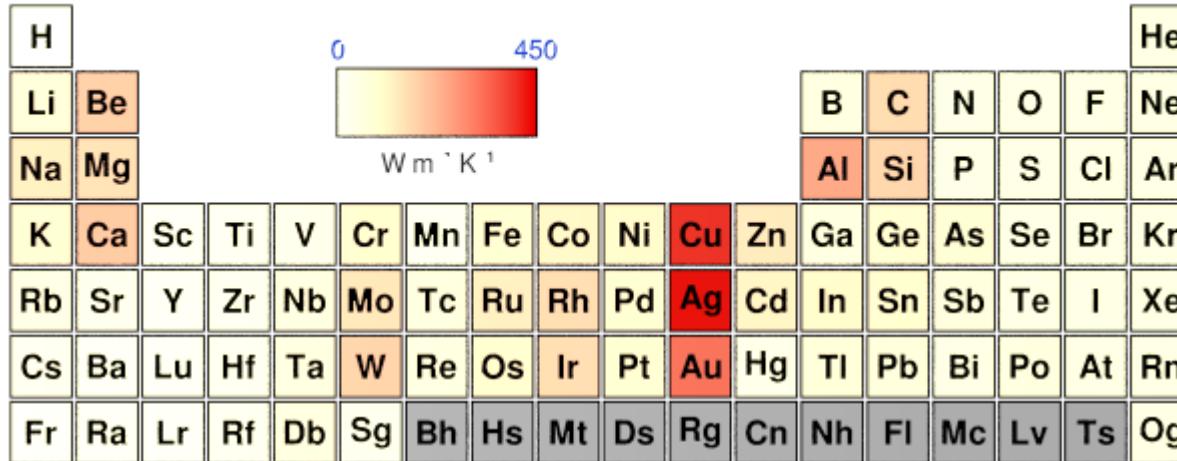
Periodic Quiz

Magnetic Periodic Table



PERIODIC TABLE																	
H																	He
Li	Be																
Na	Mg																
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	57-71	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	89-103	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			

Periodic Quiz



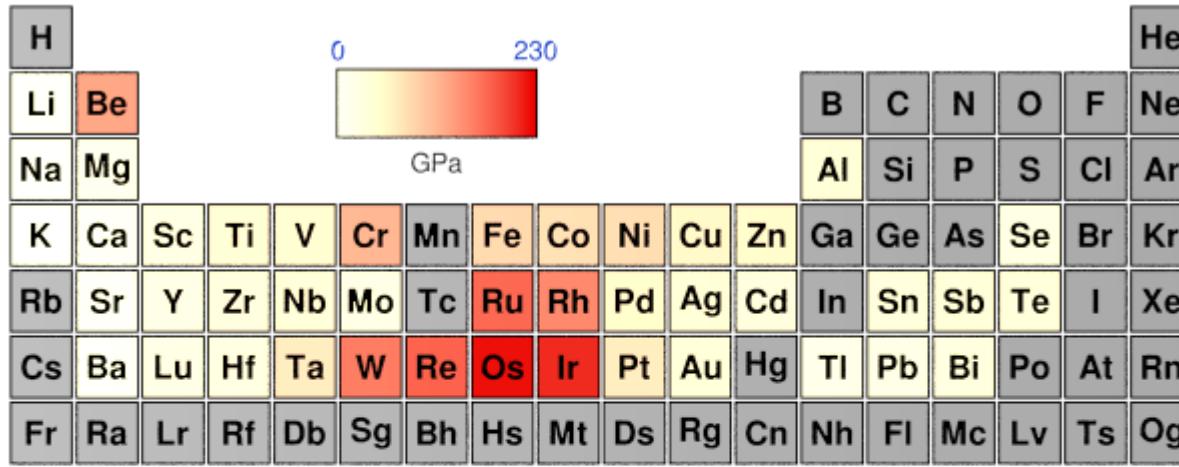
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	No	



Thermal conductivity

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Periodic Quiz



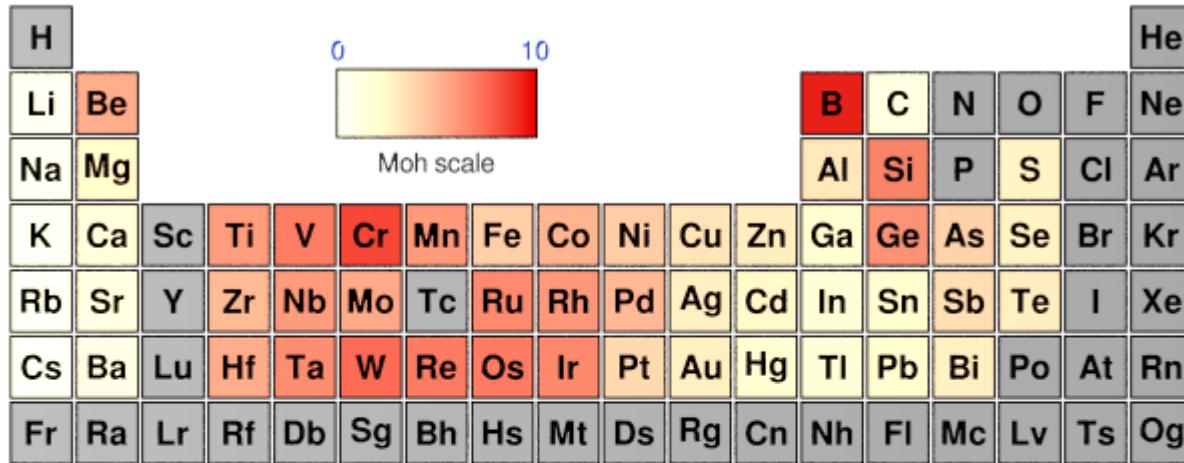
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



Rigidity modulus

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Periodic Quiz



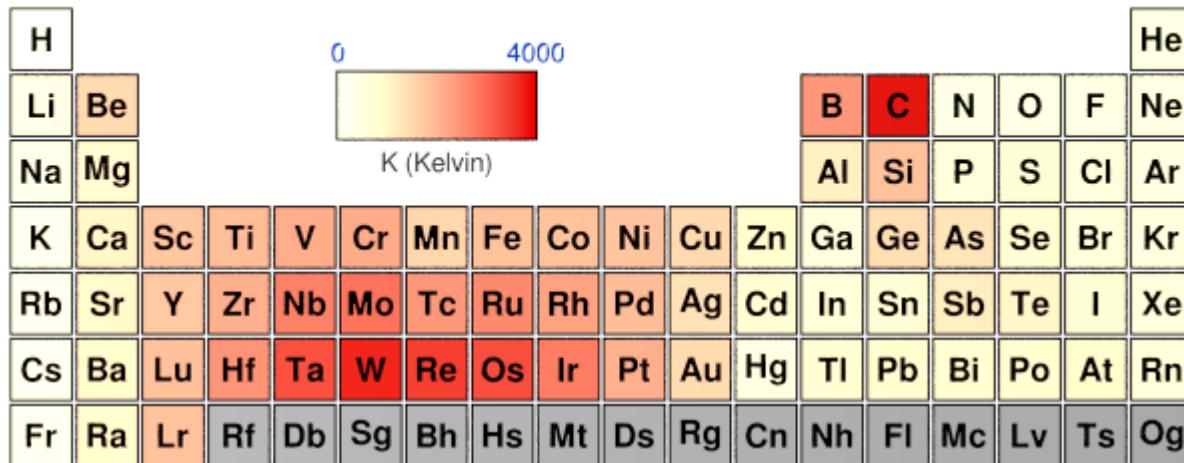
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



Mineralogical hardness

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Periodic Quiz



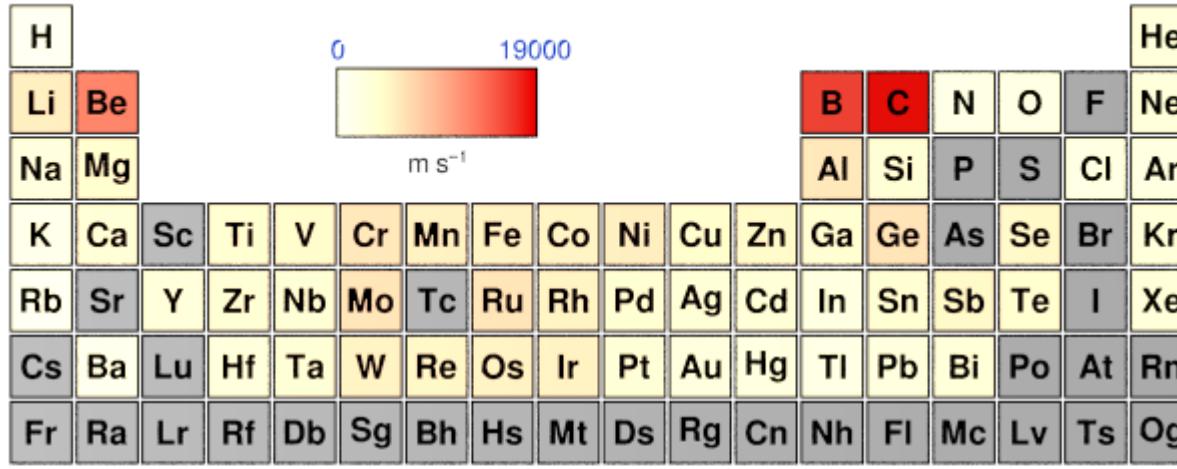
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



Melting point

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Periodic Quiz



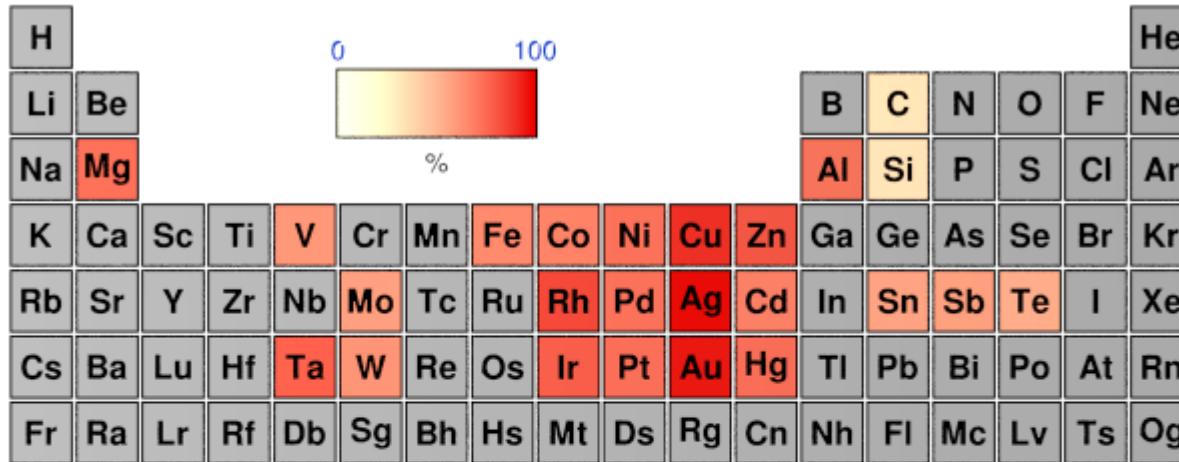
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



Velocity of sound

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Periodic Quiz



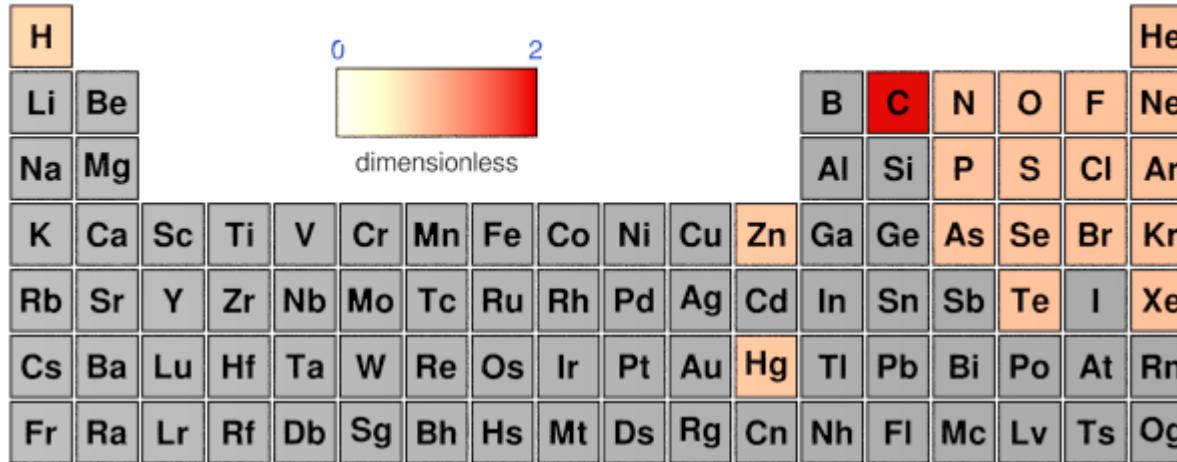
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb							
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	No								



Reflectivity

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Periodic Quiz



La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	No	



Refractive index

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