Electron configuration

- Name these elements
  - [Ne] $3s^2 3p^5$
  - [Ar] $4s^2 3d^7$
  - [Rn]$7s^1$
- Answers
  - Chlorine
  - Cobalt
  - Francium

Electron configuration

Give the configuration

- Sulfur
- Yttrium
- Iodine

Answers

- $[Ne]3s^2 3p^4$
- $[Kr]4d^1 5s^2$
- $[Kr]4d^{10} 5s^2 5p^5$

Stable Electron Configuration

- Noble gas electron configuration - p^6
- $1s^2$ exception of Helium
  - The most stable elements - Noble Gases
  - Noble gases are un-reactive
  - All other elements share or transfer electrons to reach **pseudo** Noble gas electron configuration.

Periodic trends
Text reference chapter 14

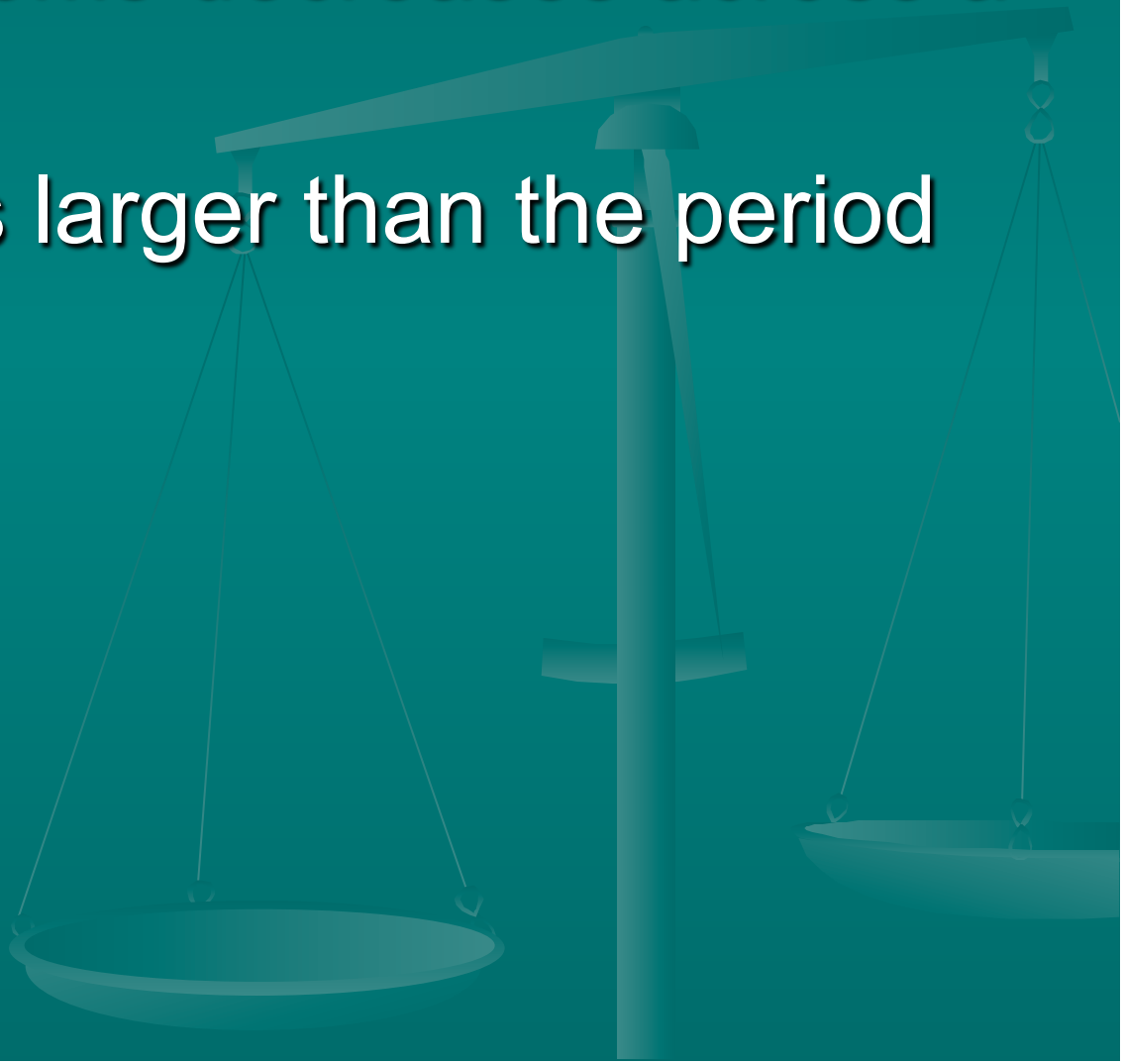
- Atomic size
- Ionic size
- Ionization energy

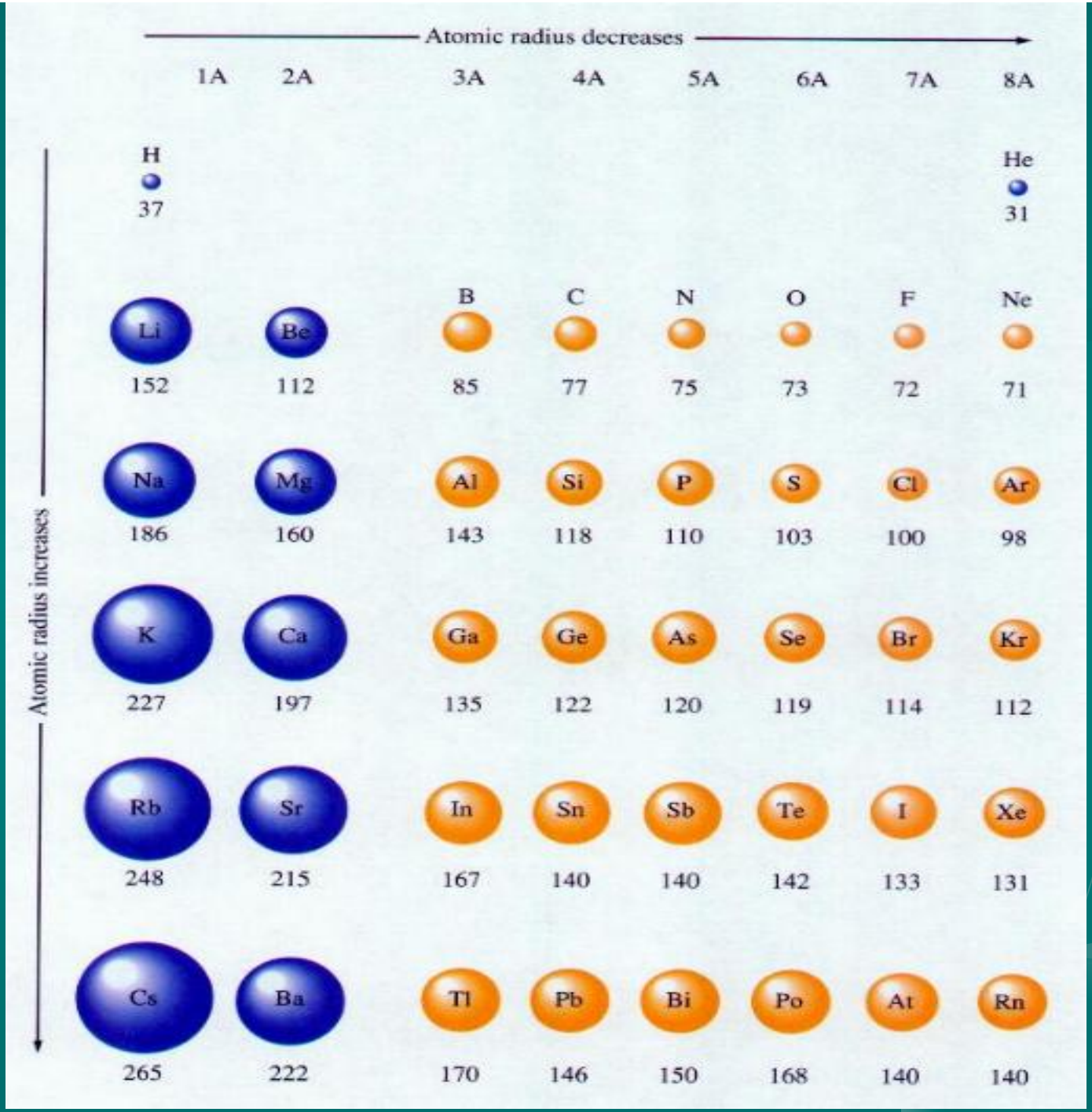
Complete an internet search find the following periodic trends

- Atomic size
- Ionic size
- Ionization energy
- Electronegativity
- Shielding effect

Atomic radii (size of atom)

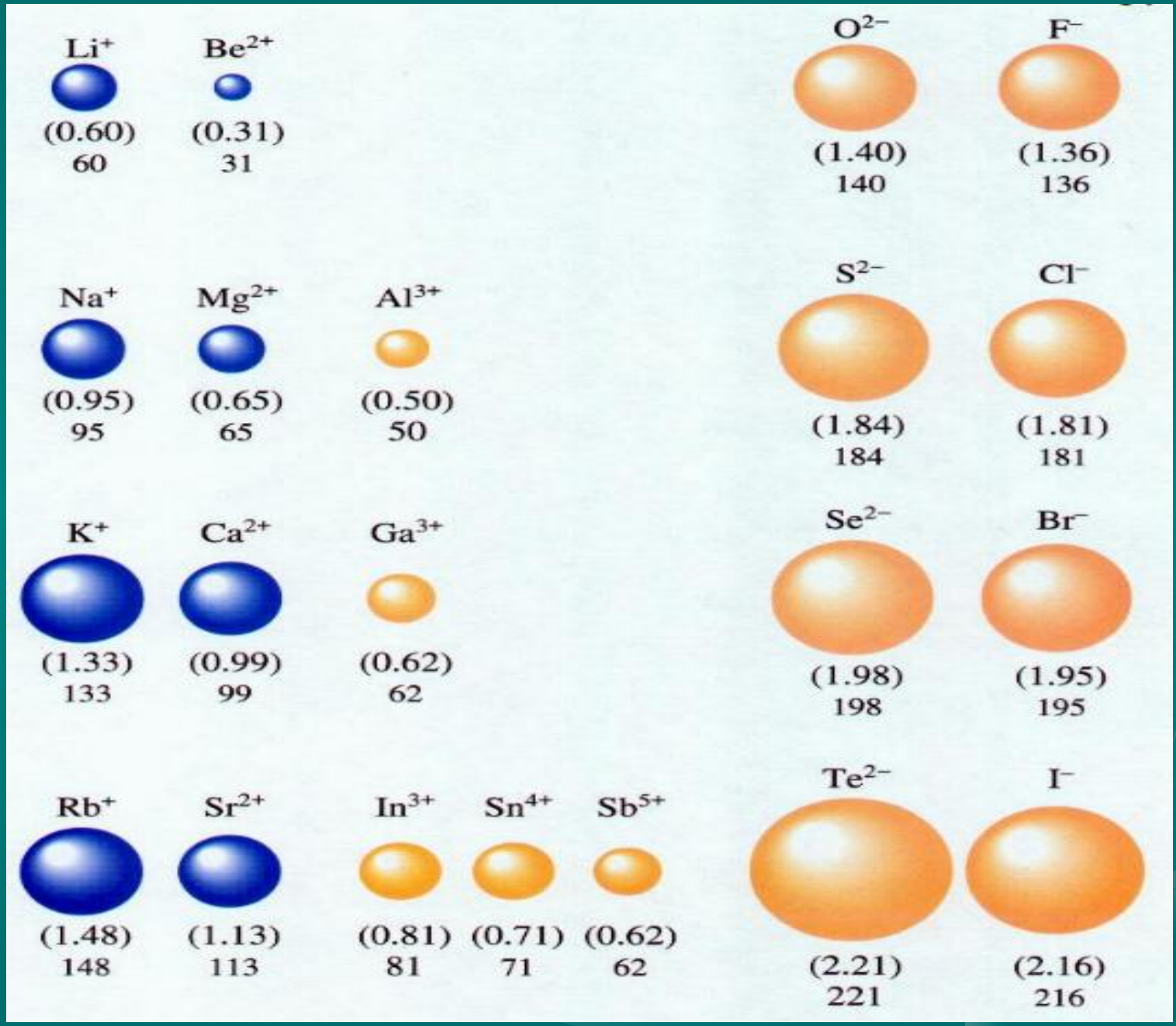
- The size of atoms decreases across a period.
- Each period is larger than the period above



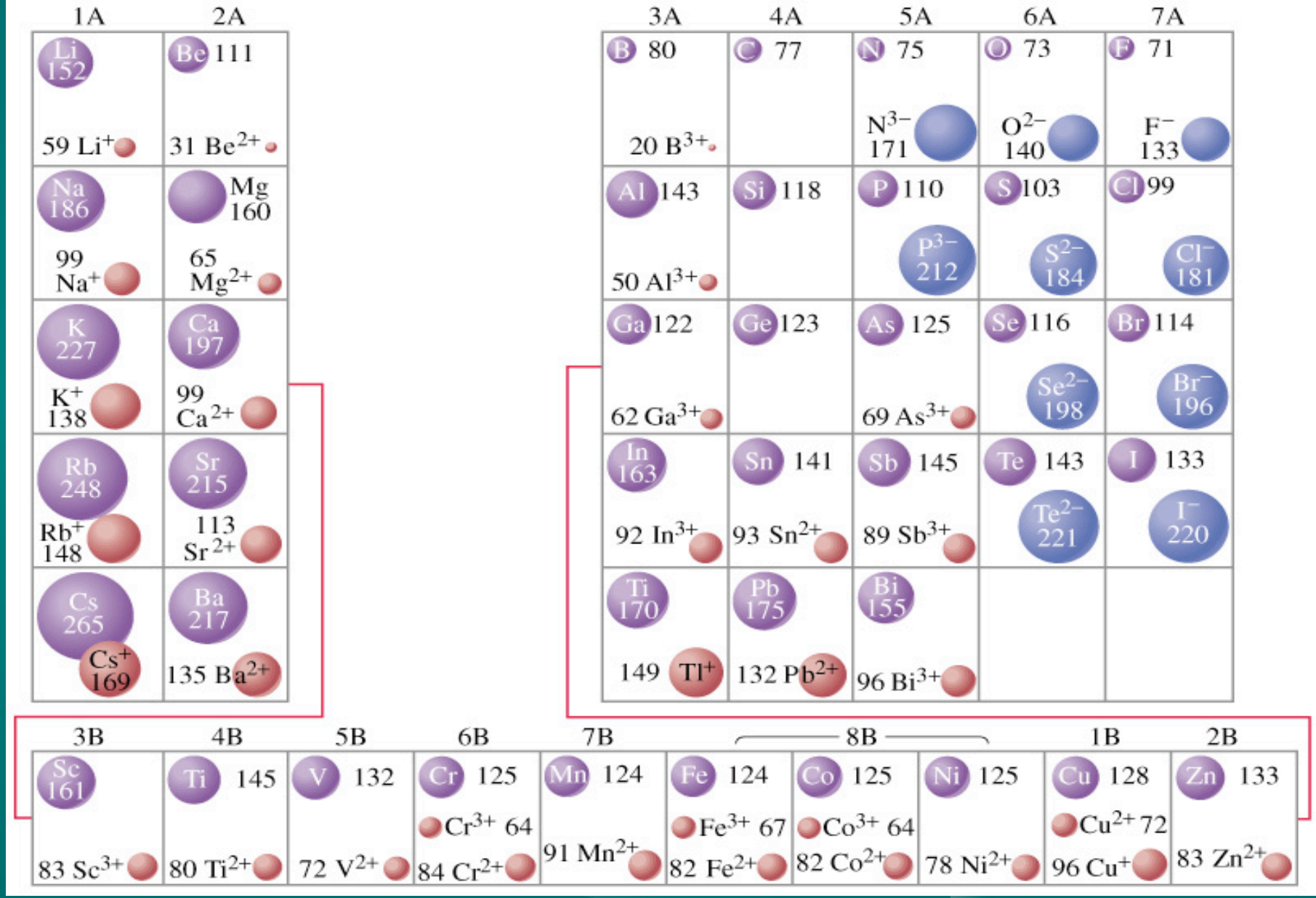

Atomic radius decreases
1A
2A
3A
4A
5A
6A
7A
8A
Atomic radius increases
H
37
He
31
B
C
N
O
F
Ne
Li
Be
152
112
85
77
75
73
72
71
Na
Mg
Al
Si
P
S
Cl
Ar
186
160
143
118
110
103
100
98
K
Ca
Ga
Ge
As
Se
Br
Kr
227
197
135
122
120
119
114
112
Rb
Sr
In
Sn
Sb
Te
I
Xe
248
215
167
140
140
142
133
131
Cs
Ba
Tl
Pb
Bi
Po
At
Rn
265
222
170
146
150
168
140
140

Ionic size

- Metals lose electrons and decrease in size
- Nonmetals gain electrons and increase in size
- This is not always obvious around group IVA elements


Li+
(0.60)
60
Be2+
(0.31)
31
O2−
(1.40)
140
F−
(1.36)
136
Na+
(0.95)
95
Mg2+
(0.65)
65
Al3+
(0.50)
50
S2−
(1.84)
184
Cl−
(1.81)
181
K+
(1.33)
133
Ca2+
(0.99)
99
Ga3+
(0.62)
62
Se2−
(1.98)
198
Br−
(1.95)
195
Rb+
(1.48)
148
Sr2+
(1.13)
113
In3+
(0.81)
81
Sn4+
(0.71)
71
Sb5+
(0.62)
62
Te2−
(2.21)
221
I−
(2.16)
216

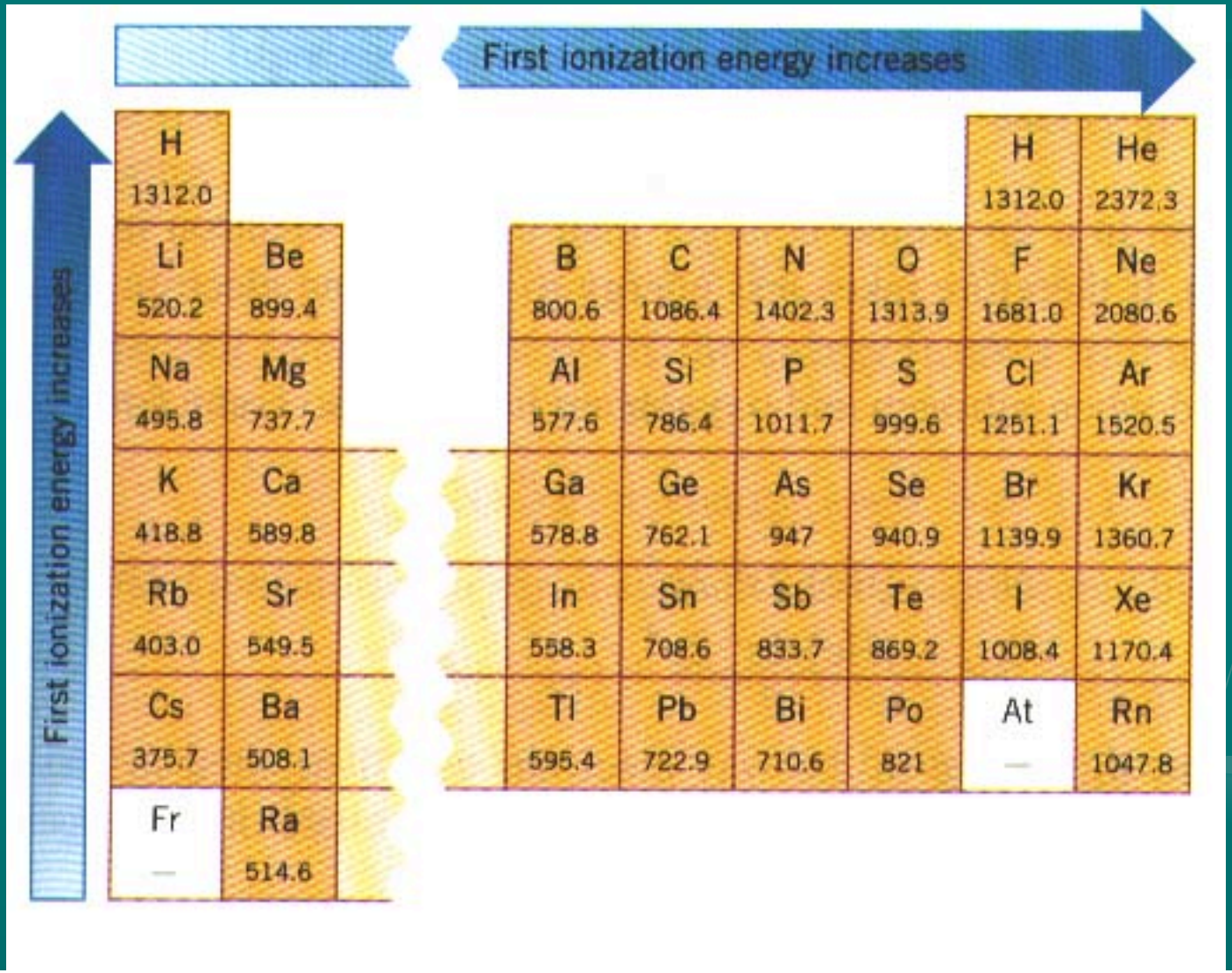
Atomic radii and ionic radii comparison

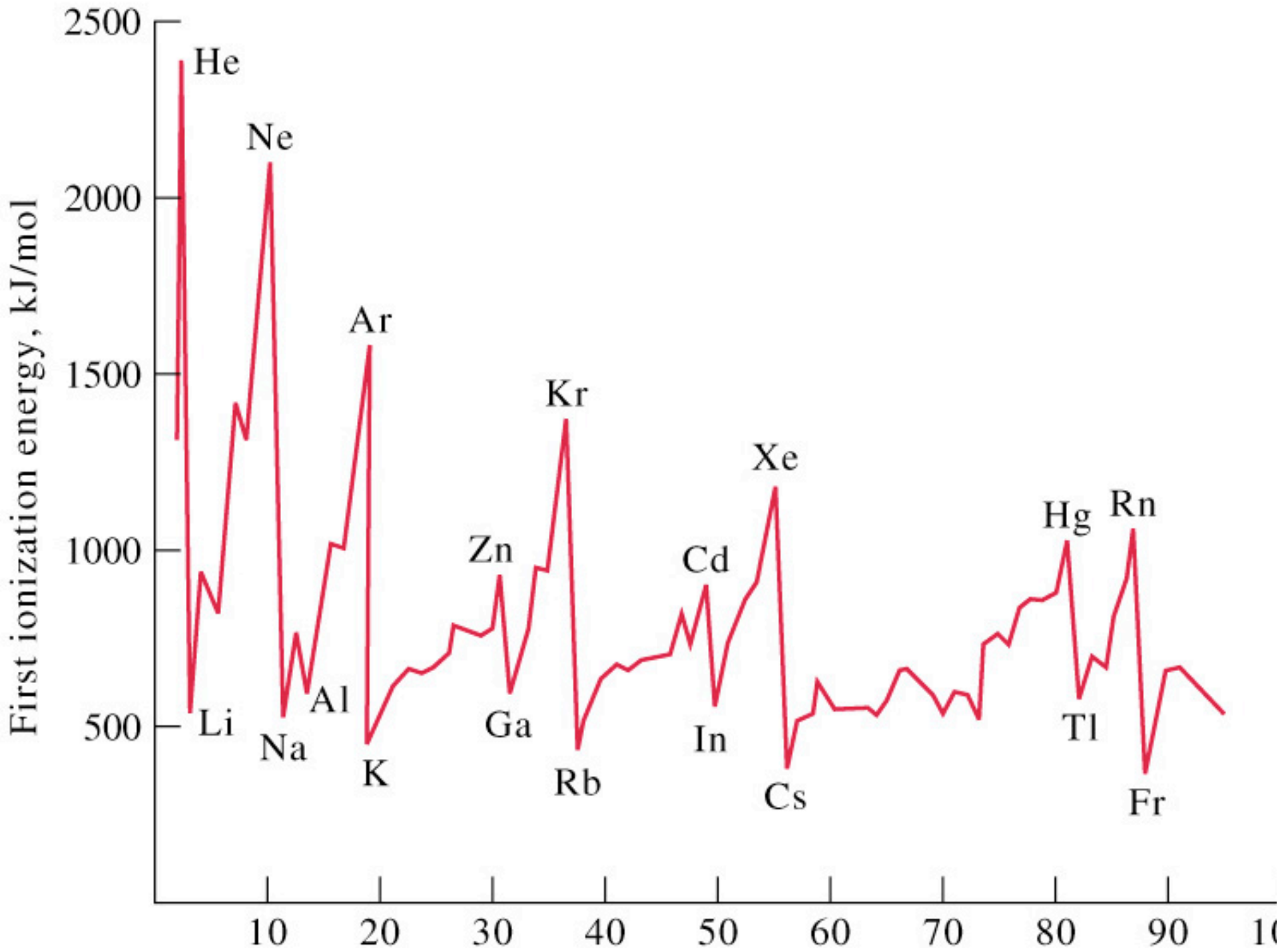


Ionization energy

- The energy required to remove an electron from a neutral atom
- ?? Predict - which elements would have a low ionization energy? Why?
- ?? Predict - which elements would have a high ionization energy? Why?

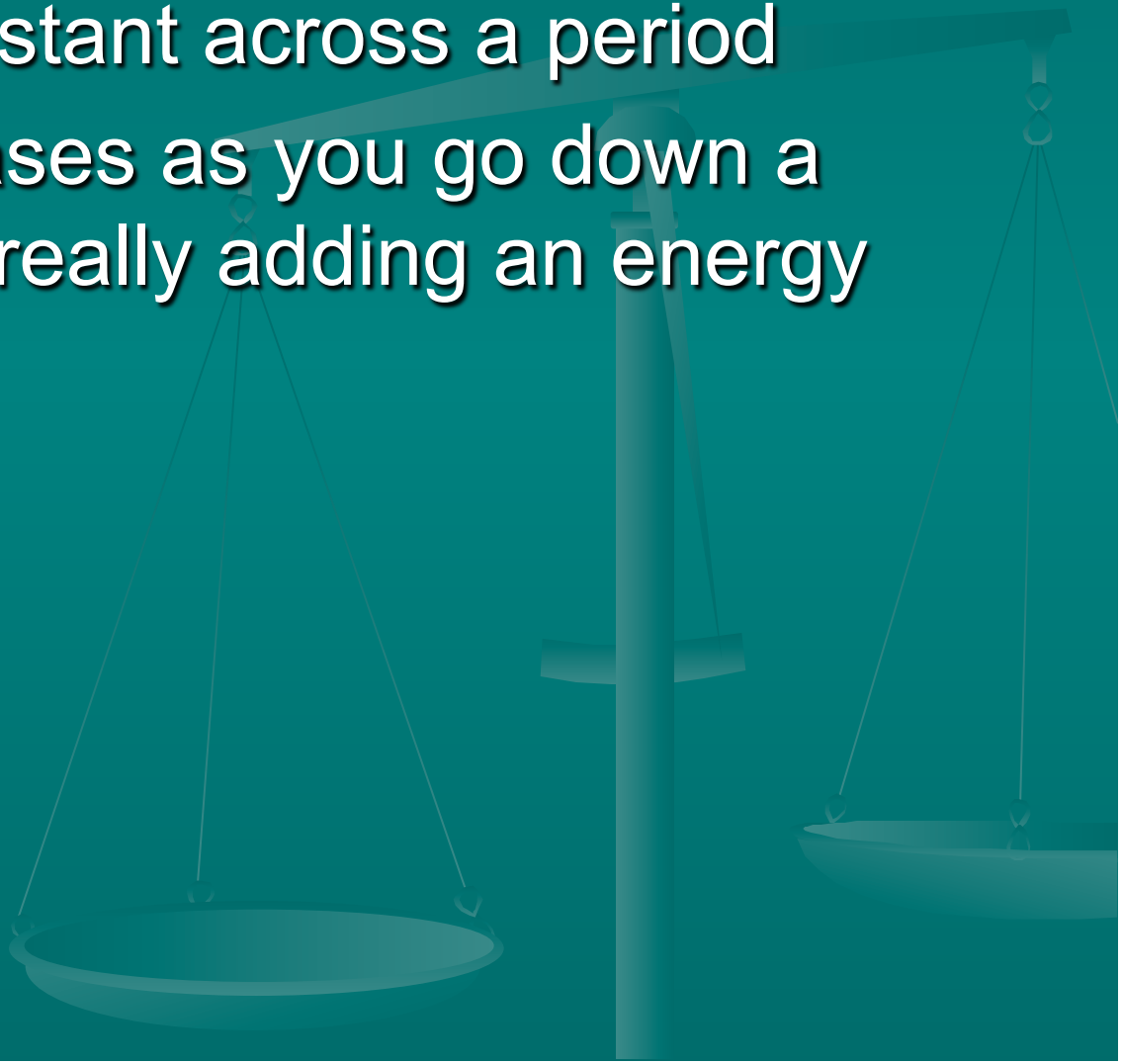
Ionization Energy




First ionization energy, kJ/mol
2500
2000
1500
1000
500
He
Ne
Ar
Kr
Xe
Rn
Li
Na
K
Rb
Cs
Fr
Be
Mg
Ca
Sr
Ba
Ra
B
Al
Ga
In
Tl
C
Si
Ge
Sn
Pb
N
P
As
Sb
Bi
O
S
Se
Te
Po
F
Cl
Br
I
At
Ne
Ar
Kr
Xe
Rn
10
20
30
40
50
60
70
80
90

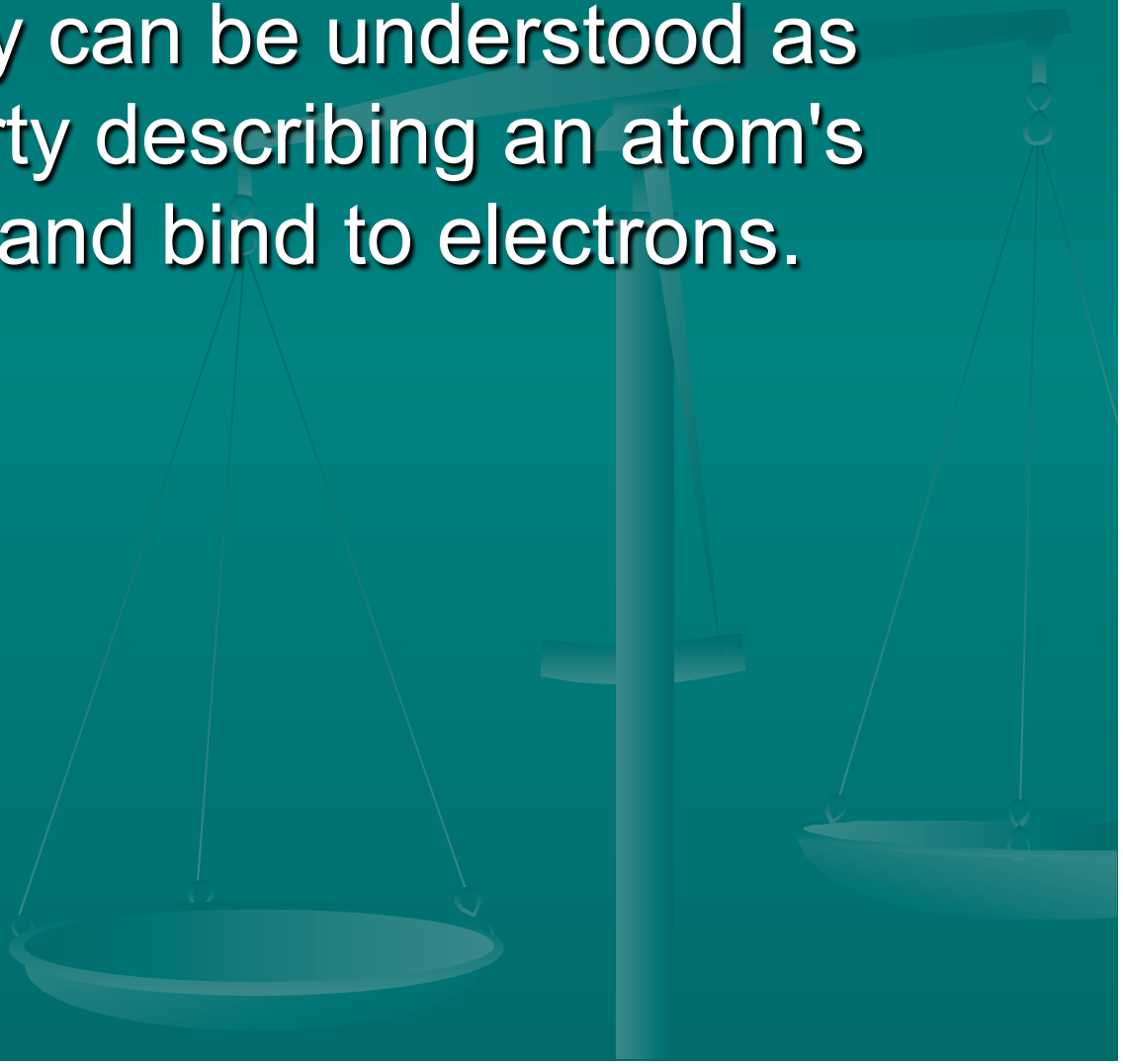
Shielding effect

- Shielding is constant across a period
- Shielding increases as you go down a group, which is really adding an energy level

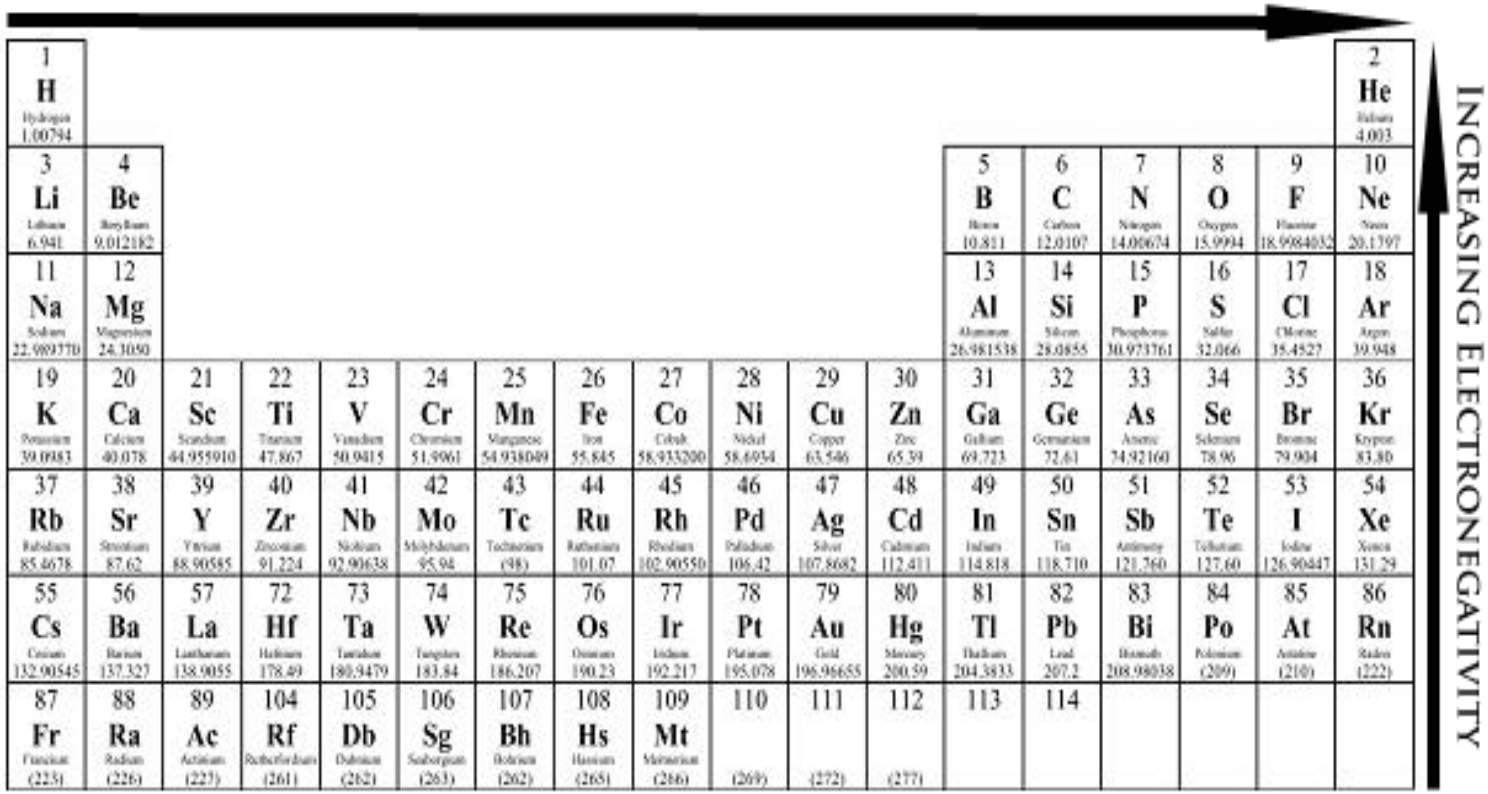


Electronegativity

- Electronegativity can be understood as chemical property describing an atom's ability to attract and bind to electrons.

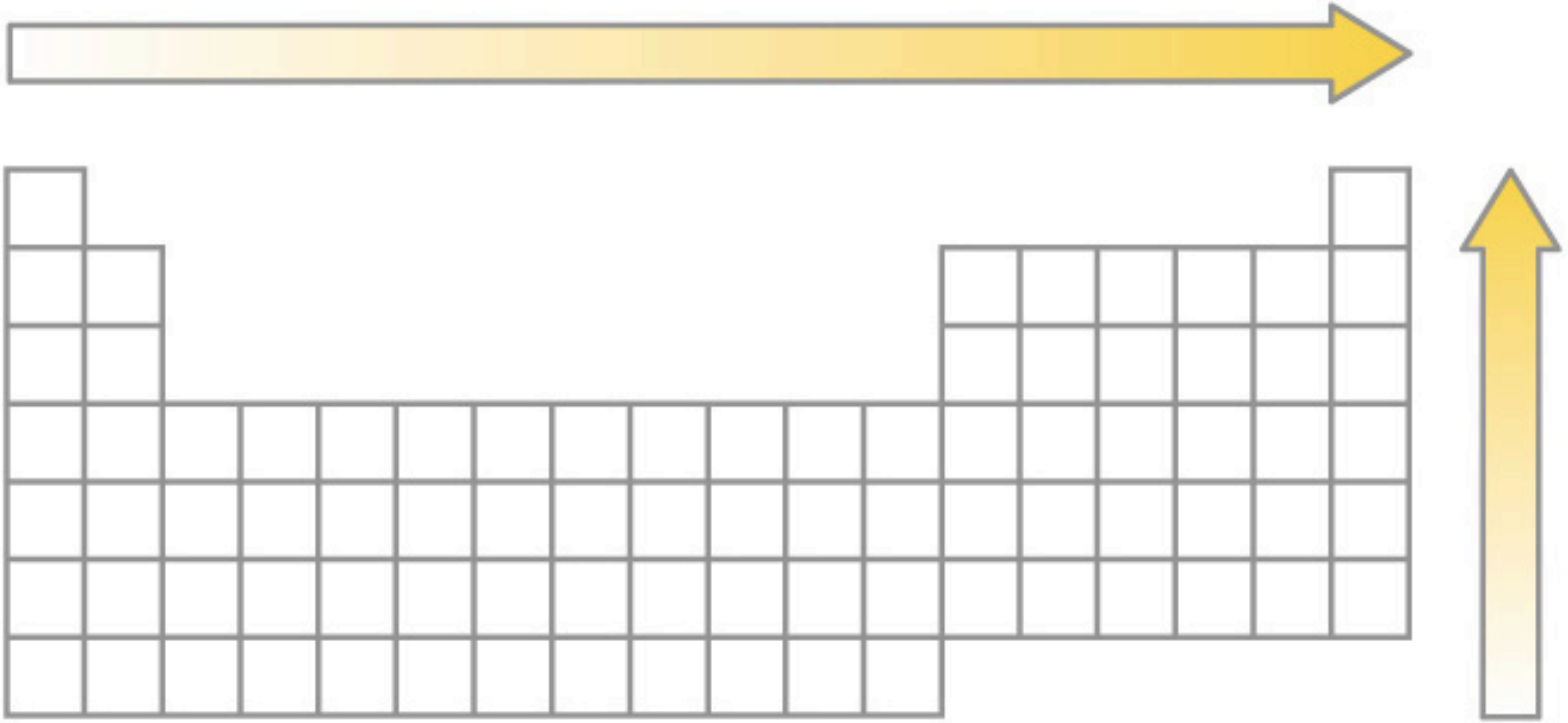


Increasing Electronegativity



1 H Hydrogen 1.00794																	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012182											5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.00674	8 O Oxygen 15.9994	9 F Fluorine 18.9984032	10 Ne Neon 20.1797
11 Na Sodium 22.989770	12 Mg Magnesium 24.3050											13 Al Aluminum 26.981538	14 Si Silicon 28.0855	15 P Phosphorus 30.973761	16 S Sulfur 32.066	17 Cl Chlorine 35.4527	18 Ar Argon 39.948
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955910	22 Ti Titanium 47.867	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938049	26 Fe Iron 55.845	27 Co Cobalt 58.933200	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.61	33 As Arsenic 74.92160	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.90447	54 Xe Xenon 131.29
55 Cs Cesium 132.90545	56 Ba Barium 137.327	57 La Lanthanum 138.9055	72 Hf Hafnium 178.49	73 Ta Tantalum 180.9479	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.078	79 Au Gold 196.96655	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.98038	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)
87 Fr Francium (223)	88 Ra Radium (226)	89 Ac Actinium (227)	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (263)	107 Bh Bohrium (262)	108 Hs Hassium (265)	109 Mt Meitnerium (266)	110 (269)	111 (272)	112 (277)	113	114				

Increasing electronegativity



Increasing electro-negativity