Dmitri Mendeleev

Mendeleev's Periodic Law:

If the elements are arranged according to their atomic mass, a pattern can be seen in which similar properties occur regularily.

-began with 64 known elements and tried to organize them somehow based on atomic mass, solubility, density, flammability etc
-when a spot occured that "should" have an element in it, Mendeleev left it blank but predicted its properties

In 1871, he predicted an element with atomic mass of 68, a density of 5.9 g/cubic cm, low melting point and a medium solubility in acids

In 1875, Gallium was discovered with atomic mass of 69.9, a density of 5.94 g/cubic cm, a melting point of 30 C and a medium solubility in acids

Mendeleev's Law and Atomic Radius

-atomic radius is the distance between the centre of the positive nucleus and the 'outer' edge of the atom

-generally, atomic radius:

-increases as we move down a column

-decreases as we move to the right in a row

-the more electrons there are, the more protons there are,

-more protons means a greater positive attractive force pulling on the very light electrons

Mendeleev's Law and Melting Point

-melting point is the temperature that the solid changes state and becomes a liquid

-melting point tends to:

-increase as we move right to left

-decrease as we move down

-as the particle gets larger, the nuclei of each adjacent atom get farther apart

-in order to 'melt', the forces holding the particles together must be overcome

-'large' atoms require generally less heat energy to seperate them

Other trends

atom's size decreases from left to right in a given period

atom's size increases from top to bottom in groups

as you go down a group the tendency to lose electrons increases

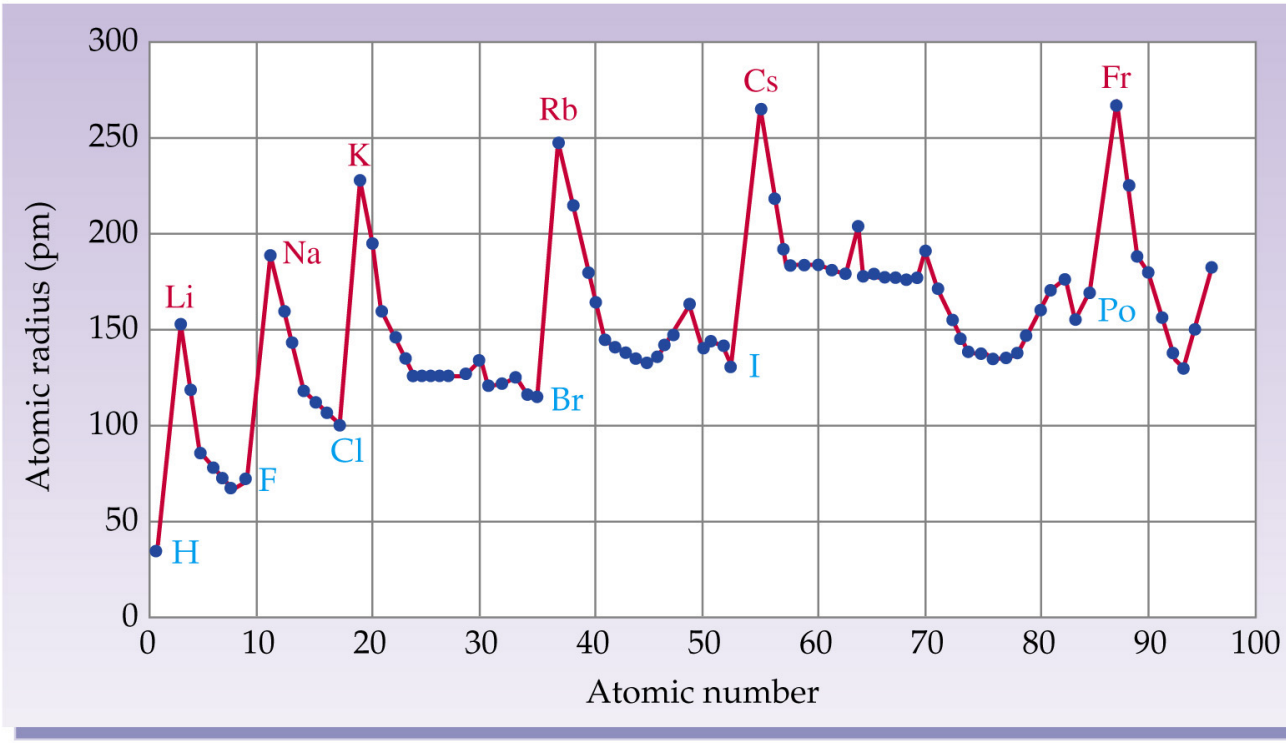
ionization energies increase across periods and decrease down groups

electronegativity increases from left to right in a period and decreases from top to bottom

negative ions are larger than their atoms and positive ions are smaller than their atoms

Read p. 104-105, Definitions

Activity 4.3, p. 108-109


Atomic radius (pm)
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
Atomic number
H
Li
F
Na
Cl
K
Br
Rb
I
Cs
Po
Fr