

**Periodicity****The Greeks****Who was Dmitry Mendeleev?****Eka Silicon**

*Now appearing as Germanium on a periodic table near you!*

<b>Property</b>	<b>Predicted</b>	<b>Actual</b>
Atomic Weight		
Density		
Specific Heat		
Melting Point		
Oxide formula		
Oxide Density		

## A Kid from Ishpeming Michigan moves to South Gate California

### How is the Modern Periodic Table Organized?

*Groups*

*Periods*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
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	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	Lr	Hg

### Some Important Terms

Luster

Malleability

Ductility

Conduction

**Differences between metals and non-metals**

<b>Property</b>	<b>Metal</b>	<b>Non-Metal</b>	<b>Semi-metal</b>
Appearance			
Malleability			
Ductility			
Luster			
Heat Conductivity			
Electric Conductivity			
Phase at 25°C			
Melting/Boiling Point			
Typical Ion			
Ionization Energy			
Electronegativity			

**Electron Orbital Diagrams and Electron Configuration**

First we look at group 1!

H

Li

Na

How about group 2?

Be

Mg

Ca

Hmm...even the Halogens?

F

Cl

Br

Now the really relevant question, how about Noble Gases?

He

Ne

Ar

Can you see a pattern?

## Periodic Table and Electron Configurations

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1s																	1s
2s	2s											2p	2p	2p	2p	2p	2p
3s	3s											3p	3p	3p	3p	3p	3p
4s	4s	3d	3d	3d	3d	3d	3d	3d	3d	3d	3d	4p	4p	4p	4p	4p	4p
5s	5s	4d	4d	4d	4d	4d	4d	4d	4d	4d	4d	5p	5p	5p	5p	5p	5p
6s	6s	5d	5d	5d	5d	5d	5d	5d	5d	5d	5d	6p	6p	6p	6p	6p	6p
7s	7s	6d	6d	6d	6d	6d	6d	6d	6d	6d	6d	7p	7p	7p	7p	7p	7p

4f	4f	4f	4f	4f	4f	4f	4f	4f	4f	4f	4f	4f	4f	4f	4f	4f	4f
5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f

Now on to ions!

Na<sup>+</sup>

Mg<sup>2+</sup>

Al<sup>3+</sup>

F<sup>-</sup>

O<sup>2-</sup>

N<sup>3-</sup>



## **The Families**

What are the general appearance, properties, characteristics of the following groups?

### **Alkali Metals**

### **Alkaline Earths**

### **Transition Metals**

### **Oxygen Family**

### **Halogens**

### **Noble Gases**

### **Lanthanides and Actinides**

### **Trans-Uranium Elements**

### **Coulombs Law**

The Law of attraction for charged particles is an inverse square law.

The structure of an atom

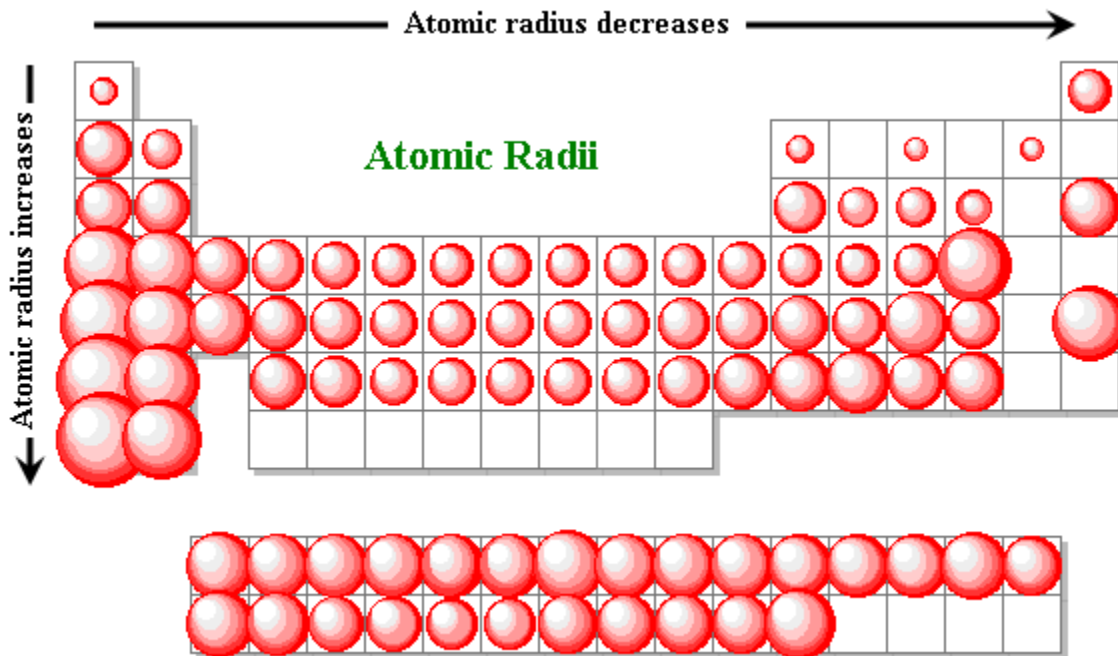
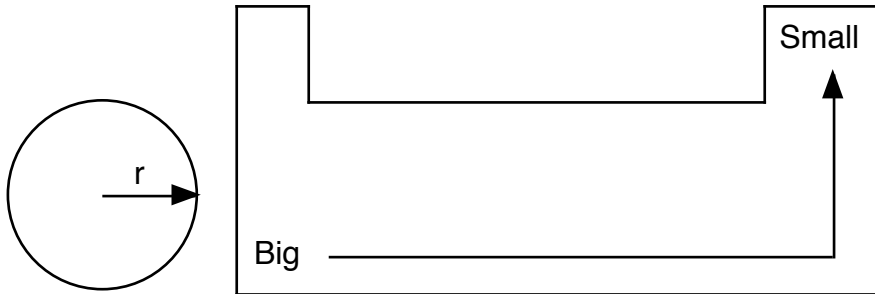
What does this mean for attractive forces between the nucleus (protons) and electrons?

Now what about ions?

### **Periodic Properties**

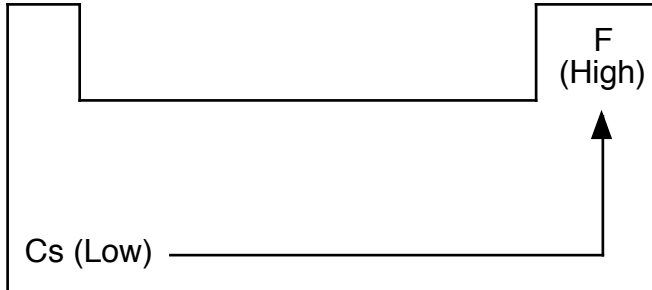


### Atomic Radii



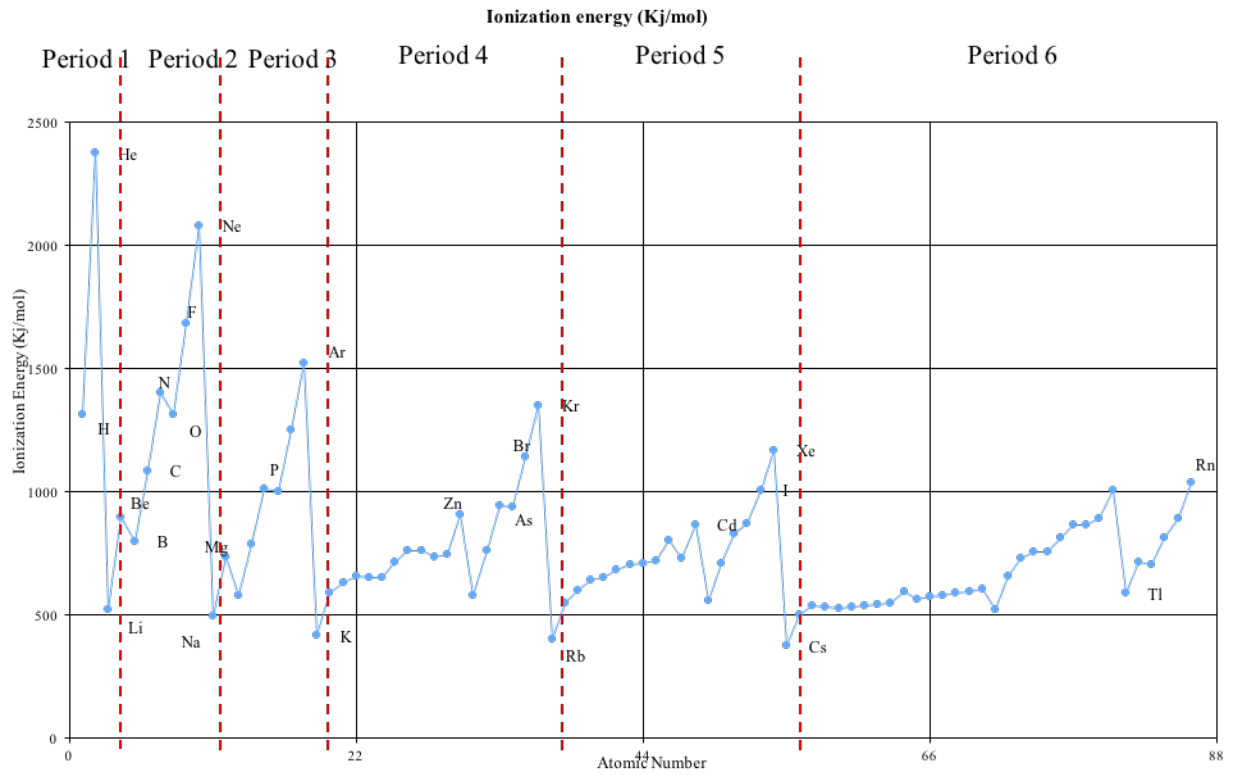
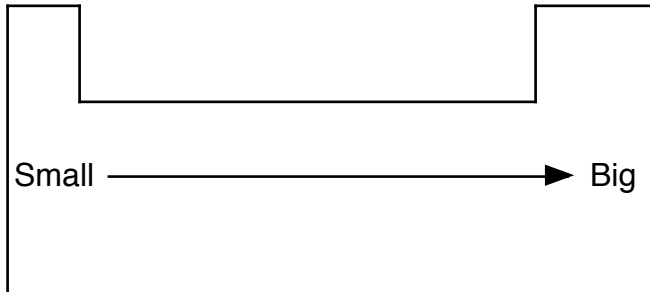
What about ions?

**Electronegativity**



2.1																
H																
1.0	1.5											2.0	2.5	3.0	3.5	4.0
Li	Be											B	C	N	O	F
0.9	1.2											1.5	1.8	2.1	2.5	3.0
Na	Mg											Al	Si	P	S	Cl
0.8	1.0	1.3	1.5	1.6	1.6	1.5	1.8	1.8	1.8	1.9	1.6	1.6	1.8	2.0	2.4	2.8
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br
0.8	1.0	1.2	1.4	1.6	1.8	1.9	2.2	2.2	2.2	1.9	1.7	1.7	1.8	1.9	2.1	2.5
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I
0.7	0.9		1.3	1.5	1.7	1.9	2.2	2.2	2.2	2.4	1.9	1.8	1.8	1.9	2.0	2.2
Cs	Ba		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At
0.7	0.9															
Fr	Ra															

### Ionization Energy



**Electron Affinity**