Warm Up:(use Aufbau Diagram on p. 133 of your textbook.)
What element corresponds to the following electron configurations?

1. $1s^2 2s^2 2p^4$ 

2. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$ 

3. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$ 

Warm Up

What is the electron configuration of calcium?

Use p. 133 of your text book. That means go get your textbook.

Warm Up: Use p. 133 of your text and write the electron configuration of Tc.

Warm Up

Use your book to define the following vocabulary words:

1. atom
2. element
3. compound
4. Electron Cloud Model
5. Atomic Mass Unit
6. Isotope
7. Atomic orbital

Objectives

TSWBAT:

1.Summarize atomic properties (including electron configuration,ionization energy,electron affinity, atomic size, and ionic size.)

2. Summarize the periodic table's property trends. This includes electron configuration, ionization energy, electron affinity, atomic size, ionic size, and reactivity.

Organizing the Periodic Table

- Element vs Compound dilemma
- Organize by properties, but which ones?

Dmitri Mendeleev

1869

Mendeleev found that when he arranged the known elements by the properties he thought were important it turned out they were arranged in increasing atomic mass. (What is atomic mass?) He thought he was set until he looked at Iodine...

What do we now know about subatomic particles that Mendeleev could not know in 1869?

When you look at the modern periodic table what <u>does</u> seem to be the number we organize around? (Hint: It is NOT atomic mass.)

The winner is...

The modern periodic table is arranged in order of increasing atomic number.
(Review in your head:
what is atomic number?)
This does lead to several situations where the atomic mass is out of order.
See Co/Ni.
It's okay- it works.

Warm Up

Why did Mendeleev think the atomic mass of Iodine was calculated incorrectly?

We put up with the odd out-of-order exceptions because arranging by atomic number allows elements to stay in "families" and that makes more sense to most scientists.

Chlorine
35.453 amu

Bromine
79.904 amu

Iodine
126.90 amu

Halogen Family

What's so amazing about the periodic table?

Look first at how it is organized:

1. It has 7 horizontal rows. We call these "periods."

Period 1 = 2 elements

Period 2 = 8 elements

Period 3 = 8 elements

Period 4 = 18 elements

Period 5 = 18 elements

Period 6 = 32 elements

Notice if we pull certain sections out of periods 6 and 7 and put them down at the bottom, the table stays a compact block.

There were "chemical reasons" to pull these "series" of elements out of the periodic table and put them at the bottom.

Period 6 elements form the lanthanide series.
Period 7 elements form the actinide series.

Both the lanthanide and actinide series elements possess f-electrons. These highly energetic electrons give these elements very unusual chemistry. ALL of the actinide series are radioactive.

There is a cutoff after which
all elements are radioactive...

It is Bismuth. What do we eat Bismuth in?

Warm Up:

How is the modern periodic table organized? (By what number?)

We get important information by arranging the elements in periods. This information makes more sense if we first look at vertical columns on the periodic table. We call the vertical columns "Groups" or "Families." These families tend to behave in similar ways chemically.

The groups can go by a number OR
in some cases a name.

Look in the back of your textbooks.
At the top of each group is a red number, which everyone on the planet uses. You will later see why. America decided a while back to use the black numbers.
This system is way less useful.
I don't use it. You will also see some periodic tables with the numbers shown as Roman numerals- these are the same numbers.

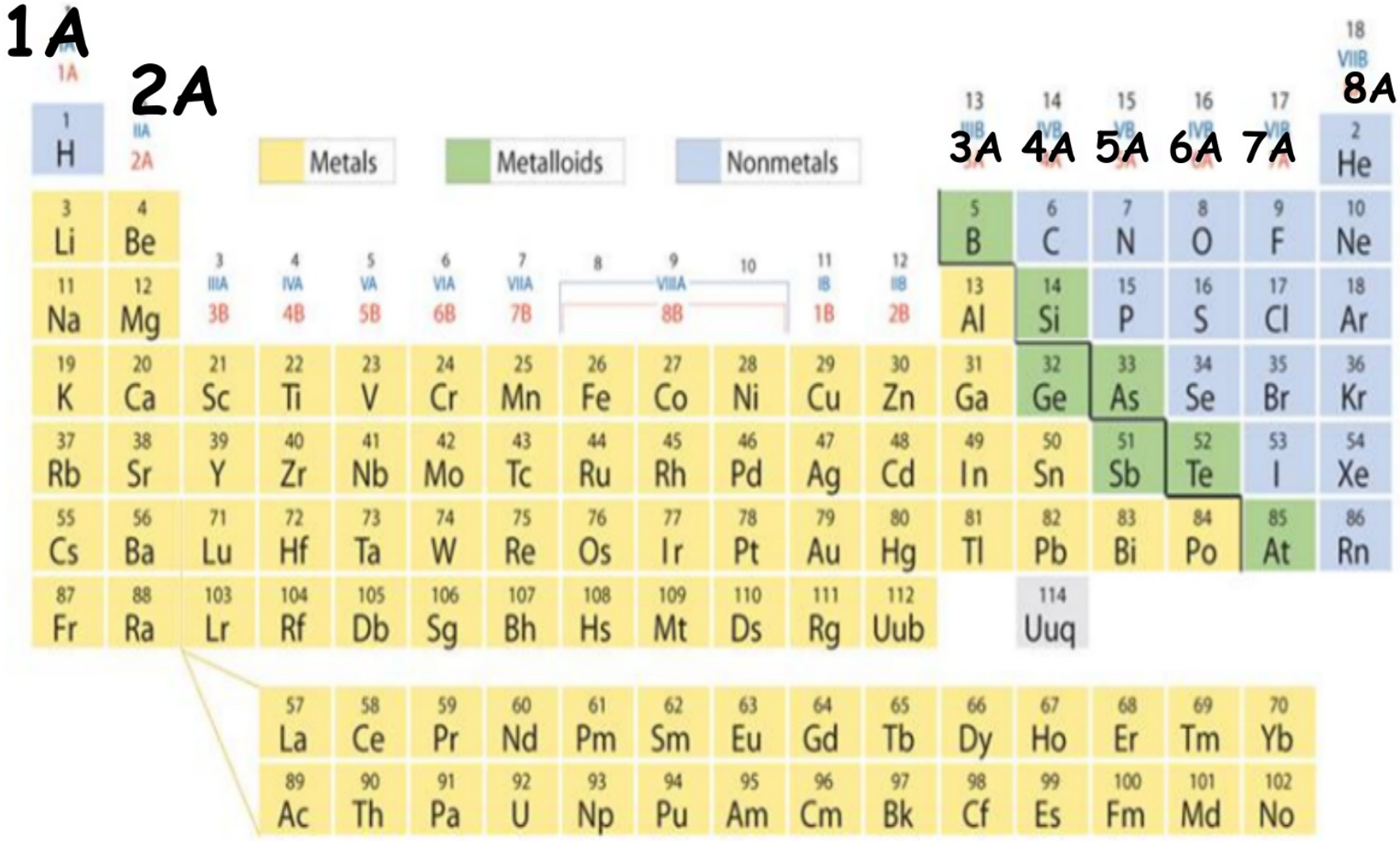
One of the many amazing things about the periodic table:

Def: The periodic law: When elements are arranged in order of increasing atomic number, there is a periodic repetition of their physical and chemical properties.

- The properties of the elements within a period change as you move across a period from left to right.
- The pattern of properties within a period repeats as you move from one period to the next.

For the periodic law to make sense we need to look at the three broad classes of elements:

metals, nonmetals, and metalloids


1A
2A
3A
4A
5A
6A
7A
8A
Metals
Metalloids
Nonmetals
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 Lu Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn
Fr Ra Lr Rf Db Sg Bh Hs Mt Ds Rg Uub Uuq
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

Nonmetals

In general, nonmetals are poor conductors of heat and electric current.

- Most nonmetals are gases at room temperature.
- A few nonmetals are solids, such as sulfur and phosphorus.
- One nonmetal, bromine, is a dark-red liquid.

Metals

Metals are good conductors of heat and electric current.

- 80% of elements are metals.
- Metals have a high luster, are ductile, and are malleable.

Metalloids

A metalloid generally has properties that are similar to those of metals and nonmetals.