PART F: PERIODIC TABLE TRENDS

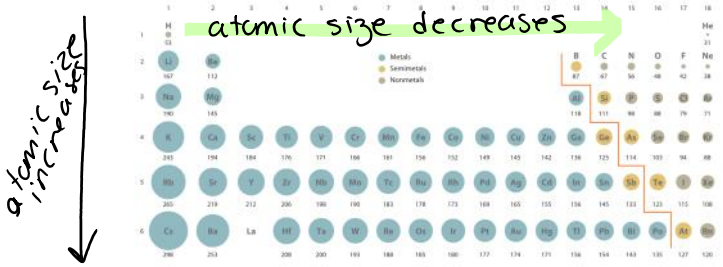
In chemistry the term periodic trend refers to a regular pattern in the properties of elements based on their atomic structure.

This is the pattern that Mendeleev predicted. When the pattern repeated, he began a new row (period)

The periodic table is a powerful tool for analyzing trends in groups and periods.

ATOMIC SIZE TRENDS:

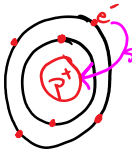
Observe the sizes of the atoms in each group and period shown in the diagram below.
Do you see a pattern?



1. Atomic size INcreases moving DOWN a group/column.

   - as you move ***down*** a group, elements have atoms with MORE energy shells (e⁻ stolen)
   - the greater the number of electron shells, the further away from the nucleus the ***valence electrons*** are
   - if the electrons are farther away, the atom is larger.

2. Atomic size DEcreases moving LEFT to RIGHT across a period/row.



   - elements have more numbers of electrons in their valence shells as you move LEFT to RIGHT. (adding e⁻ in the same shell)
   - as the number of electrons increases, so does the number of protons in the nucleus.
   - the attraction between the negative valence electrons and the positive nucleus is ***very strong***.
   - with each electron added, the outer shell is pulled closer to the nucleus and the atomic size decrease
   - adding e⁻ in the same shell makes the ⊕ ⊖ attraction so strong, the atom "shrinks"

REACTIVITY TRENDS:

Compare what happens when ***potassium (A)*** and ***sodium (B)*** are added to water:

- fast
- BIG
- violent

- slow
- small
- "tame"

size inc.

Group 1

H
Li
Na
K
Rb

You can see that the reaction is MORE vigorous and violent in 'A', water + potassium.

Why is this the case?

What is ***similar*** about potassium and sodium? group 1, alkali metals, 1 valence e⁻

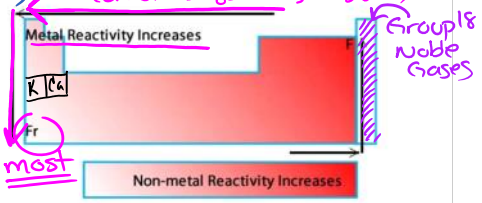
What is ***different*** about potassium and sodium? potassium (K) is larger (1 more e⁻ shell)

- Because potassium's valence electrons are farther away from the nucleus than the electrons in a sodium atom, the attraction to the nucleus is weaker (in "K") ↳ it's bigger
- Electrons further from the nucleus require LESS energy (*are easier*) to remove.
- The adding and removing of electrons is what is involved in chemical reaction.
- This is why we would say that K (e⁻ easier to remove) is ***more reactive*** than Na.

(atoms getting bigger)

This pattern repeats throughout the periodic table with the ***exception of the noble gases.***

- the noble gases have a FULL valence shell, (8e⁻) they are stable and UNreactive (inert)



PRACTICE

1. Explain why atoms get larger down a group on the periodic table: there is a new e⁻ shell added with each new row (period), so the e⁻ are further away from the nucleus.
2. Explain why atoms get smaller from LEFT to RIGHT across a periodic table: e⁻ added in the same shell become MORE attracted to the p⁺ in the nucleus. The ⊕⊖ attraction pulls e⁻ closer "shrink"
3. Why is an alkali metal MORE reactive than an alkaline-earth metal in the same period?

- alkali metals (group 1 = 1 valence e⁻) and alkaline-earth metals (group 2 = 2 valence e⁻)
- 1 valence e⁻ is easier to remove, so more likely to be involved in chemical reactions. (requires less energy)

Thursday Oct 17th Homework:
- Assignment #6 pg 40
- Review Assignment ("practice test")

Chemistry Unit Test TOMORROW (Friday Oct 18th)

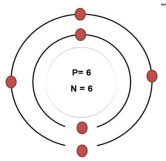
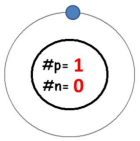
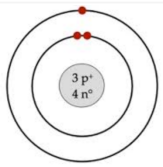
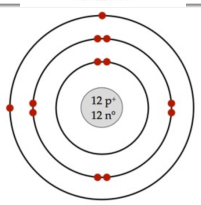
What to Hand In:
- Cover page
- PINK Booklet *(+ all hw assignments done)*
- GREEN Booklet *(+ all hw assignments done)*
- Quiz Corrections *(separate page, explain WHY)*
- Review Assignment/ "practice test" *(yellow book)*

Homework **ASSIGNMENT #6 :Bohr Model Review Worksheet pg 40**
This assignment is to be completed below in the space provided.

Bohr Model Review Worksheet

Use the description sheet and the periodic table to help you complete the following Bohr models.

1. How many electrons can each shell hold?
   a. 1st = 2
   b. 2nd = 8
   c. 3rd = 8

Element	Atomic #	Atomic Mass	Protons	Neutrons	Electrons	Bohr Model
Carbon	6	12	6	6	6	
Hydrogen	1	1	1	0	1	
Lithium	3	7	3	4	3	
Magnesium	12	24	12	12	12	
Boron	5	11	5	6	5