

Chemistry CP

Name: _____

Putting It All Together III

Date: _____

Organizing Chemistry

Atomic Structure, Periodic Properties, and Bonding Patterns

Part I: Basic Structure of the Atom (Refer to pp. 65-74, pp. 76-80, and pp. 96-116 in your textbook)

- A. "Most of what I needed to know about the atom I learned from John Dalton"
- B. Getting Inside the Atom (See your notes for the important experiments)
 1. Cathode Ray Tube—How did Thomson prove the existence of electrons?
 2. α scattering—How did Rutherford prove the existence of the nucleus?
 3. Neutrons—What are they and where are they? How do they relate to isotopes?
 4. Oil Drop Experiment—Millikan measured the charge of the electron.
 5. Energy Levels within the atoms—Who suggested them, and what evidence is there to support them? Be sure to review the electromagnetic spectrum.
 6. Quantum Mechanics—Make the leap to a statistical model of the atom.
 - a) Energy Levels: $n = 1$ through 7 (effectively)
 - b) Energy Sublevels: sets of orbitals within each energy level
s, p, d, f

Use the periodic table to remember it all!

1																	18	
1	H																	He
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	Ac	Rf	Ha	Hs	Mt	Uun	Uuu									
Lanthanide Series			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
Actinide Series			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

C. Practice

1. Using arrows and boxes, give the complete electron configuration of : Refer to pp. 105-116.

a) Iron

b) Tellurium

2. Give the outermost electron of:

a. Na _____

d. Mg _____

g. I _____

b. Nd _____

e. P _____

h. Hg _____

c. Cr _____

f. Kr _____

i. Sb _____

Part II: Periodicity

Another look at the periodic table!

Overall, the periodic table is organized by_____.

What do the elements in *columns* of the table have in common, and how does this affect their behavior?

A. Reviewing the Periodic Trends

For each of the following properties, tell *what* trend is exhibited, and *explain* that trend, both as you go from left to right across a row and as you go down a column. Refer to pp. 140-154 in your textbook.

1. atomic radius (size)

2. ionization energy

3. electronegativity

B. Applying the Periodic Trends

1. Sodium and potassium will both undergo a single displacement reaction with water, producing hydrogen gas and a basic solution. (That's why the group I elements are referred to as the alkali metals!) Write a balanced equation for each reaction and explain why potassium reacts so much more easily than sodium.

2. Given the elements Na Si Cl
a) Which has the highest first ionization energy?

b) Which has the smallest radius?

b) Which is most metallic in character?

3. Calcium will undergo a single displacement reaction with water, but magnesium will not. Explain.
4. Gold and silver are sometimes referred to as “noble metals”—neither reacts very easily. Calcium and strontium, however, are quite reactive. Explain.
5. The nonmetallic elements can form covalent bonds with each other, but the metallic elements do not bond with each other. Explain.
6. Cl_2 will displace bromine from a solution of NaBr , but I_2 will not. Explain.