Announcements – 9/11/00

- Demos!
  - -Video demo today
  - -LIVE demo later this week
- Suggested problems for tomorrow's problem/review session?
  - -email me or put suggestions in "The Box"
- Website Update
  - -Old exams
  - -Problem Set solutions

1

Other Business

- Quiz
  - -solutions posted on the web
  - -let's take a look
- Sing-Along (with Tom Lehrer)!
  - (please follow along in your hymnals)
  - -"The Elements"

2

%-Composition from a Formula

Calculate the *%-P, %-O* in P_2O_3:

1) Calculate grams P & O per mol P_2O_3

$$1 \text{ mol } P_2O_3 \times \frac{2 \text{ mol P}}{1 \text{ mol } P_2O_3} \times \frac{30.974 \text{ g P}}{1 \text{ mol P}} = 61.948 \text{ g P}$$

$$1 \text{ mol } P_2O_3 \times \frac{3 \text{ mol O}}{1 \text{ mol } P_2O_3} \times \frac{15.999 \text{ g O}}{1 \text{ mol O}} = 47.997 \text{ g O}$$

3

2) Calc grams per mole P_2O_3

2 P = 2 x 30.974 = 61.948

3 O = 3 x 15.999 = 47.997

109.945 g/mol P_2O_3

3) Divide to get %-composition

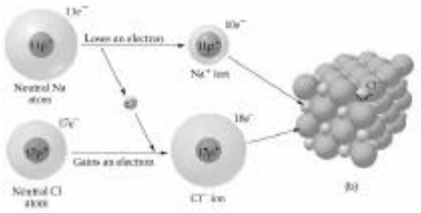
P: $\frac{61.948 \text{ g P}}{109.945 \text{ g } P_2O_3} \times 100 =$ ***56.34 % P***

O: $\frac{47.997 \text{ g O}}{109.945 \text{ g } P_2O_3} \times 100 =$ ***43.66 % O***

4

Not all Compounds are Molecules

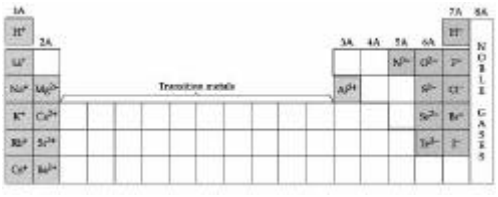
Let's look at the reaction of an *Alkali Metal (Na)* and a *Halogen (Cl)*:



5

Ionic Compounds

Formed by reaction of a metal with a non-metal:



6

Chemical Reactivity

- Why do elements in a *group* have similar reactivity?

  *-have the same # of **valence** electrons*

  -<u>The Octet Rule</u>: elements react so as to attain a Noble Gas configuration (8 e^- in "valence shell"

  HOW? *Share* e^- -> **Covalent Bond**
  Transfer e^- -> **Ionic Bond**

7

Bonding/Reactivity Examples

- <u>NaCl – ionic bond</u>

  Na – Group 1A – 1 valence e^-
  Cl - Group 7A – 7 valence e^-
  Na $Na^+ + e^-$ (gives Na a full shell)
  Cl + e- Cl^- (gives Cl a full shell)

- <u>O_2 – covalent bond</u>

  O – Group 6A – 6 valence e^-
  O + 2e- O^{2-} (oxide anion)
  -> Where will *EACH O* get 2 e^-? **SHARE**

  O + O O=O (double bond – share 4 e^-)

8

Bonding: Ionization Energies

- Ionization Energy (IE)

  -quantifies the tendency of an electron to leave an atom in the gas phase:

  $X\ (g) \rightarrow X^+\ (g) + e^-$ $\quad \Delta E = IE$

  IE: -***always*** positive (energy ADDED)
  -INCR across row
  -DECR down a group

9