Announcements

Wednesday, February 25, 2009

Ch 6 MC is up - it's due Monday, Mar 9.

Quiz 2 is on Monday, March 9, covering the last bit of chapter 5 and chapter 6 (6.1-6.7 assigned).

Exp 14 is next week.

Discussion assignment 1 will be posted in D2L discussion boards Thursday.

Chapter 6: Chemical composition

Chemical composition questions involve <u>amounts</u> of substances...

How many grams Na are in 10 g NaCl? (It's not 5 g Na!)

<u>The mole</u>: convenient way of counting very large numbers of atoms or molecules

1 pair = 2 objects
1 dozen = 12 objects
1 mole = 6.022 x 10²³ objects (measurement)

Avogadros number

How many dozen candy bars are 173 candy bars?

How many moles of Al are in 1.24 x 10¹⁵ Al atoms?

How many H₂O molecules are in 4.8 mol H₂O?

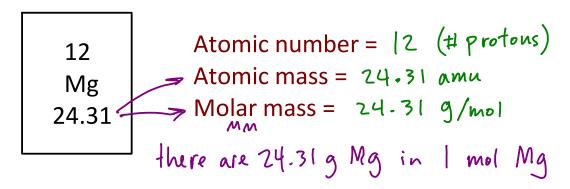
<u>Counting by mass</u> is a way to count a large number of objects by measuring their mass.

If there are 80 nails per pound, how many nails are in 4.5 lb nails?

Relationship of mass and moles:

By definition, 1 mol of carbon-12 atoms has a mass of exactly 12 g

1 carbon-12 atom has a mass of 12 amu 1 mol carbon-12 atoms has a mass of 12 g



What is the mass of 17.0 mol Al? MM Al = 26.989/md

How many moles Si are in 248.36 g Si? (MM Si 78.09 g/md)

number
$$A_{V}$$
. # Molar mass

of \longleftrightarrow moles \longleftrightarrow mass (g)

particles $\frac{6.022 \times 10^{23}}{\text{particles/mol}}$ $9/\text{mol}$

How many S atoms are in 8.32 g S? g S
$$\rightarrow mol S \rightarrow s_{atoms}$$

8.32 g S x $\frac{1 \text{ mot S}}{32.07g8} \times \frac{6.022 \times 10^{23} \text{ S atoms}}{1 \text{ mot S}} = 1.56 \times 10^{23} \text{ S atoms}$

What is the average mass (in g) of 1 iron atom?

Molar mass of compounds

What is the mass in g of 12.0 mol H₂O?

You must first calculate the molar mass of H₂O:

$$2 H = 2 (1.008 g/mol)$$

$$1 O = 1 (16.00 g/mol)$$

$$18.016 g/mol$$

$$12.0 mol H20 x 18.016 gH20 = 216 g H20
$$1 mol H20 = 216 g H20$$$$

How many mol O_2 are in 82.3 g oxygen? diatomic elements Molar mass of O_2 : Z(16.00g/md) exist as molecules (pair of atoms) 82.3g $O_2 \times \frac{1 \text{ mol } O_2}{32.00 \text{ q } O_2} = \frac{2.57 \text{ mol } O_2}{2.57 \text{ mol } O_2}$ Converting to elements in a formula

First, make a conversion factor from the chemical formula itself (called a **mole ratio**):

(when making a mole ratio from a formula, always consider 1 mole of the complete formula, and use the subscripts to find moles of each element)

On your own: