

Announcements – Lecture V – Friday, May 22th

1. Add/Drop: Today, Friday, May 22th
2. No Class: Monday, May 25th , Memorial Day
3. First Lab: Tuesday, May 26th , ISB 155
4. Exam I Friday, May 29th – In Class



Quiz 3

Last Name: _____

Name:

a) Na_2S

Sodium sulfide

b) $\text{Mg}(\text{NO}_3)_2$

Magnesium nitrate

c) $\text{Cu}_3(\text{PO}_4)_2$

Copper(II) phosphate

d) NH_4Br

Ammonium bromide

Formula:

e) Calcium hydroxide

$\text{Ca}(\text{OH})_2$

f) Aluminum oxide

Al_2O_3

g) Chromium(II) sulfide

CrS

h) Potassium sulfite

K_2SO_3



3.1 The Mole and Molar Mass

b) Molar Mass

What is the mass in grams of 1 mole of Li. $Av. No = 6.023 \times 10^{23}$

${}^6\text{Li}$: 6.015 amu 7.42%

${}^7\text{Li}$: 7.016 amu 92.58%

{ 1 amu = $1.6605 \times 10^{-24} \text{g}$ }

$$0.0742(6.015) + 0.9258(7.016) = \boxed{6.942 \text{ amu}}$$

$$\frac{6.942 \text{ amu}}{1 \text{ amu}} \times 1.6605 \times 10^{-24} \text{g} = 1.153 \times 10^{-23} \text{g per atom}$$

$$1.153 \times 10^{-23} \text{g} (6.023 \times 10^{23}) = \boxed{6.942 \text{ g per mol}} \quad (6.942 \text{ g} \cdot \text{mol}^{-1})$$

3.1 The Mole and Molar Mass

b) Molar Mass

$$N = 6.023 \times 10^{23} \text{ mol}^{-1}$$

3.1b Molar Mass – Example_1a

- a) How many **moles** of **Cs** are there in a sample that contains **6.21×10^{22} cesium atoms**?
- b) How many **cesium atoms** are there in a sample that contains **4.33 moles of Cs**?

$$a) \quad \frac{6.21 \times 10^{22} \text{ atoms Cs}}{6.023 \times 10^{23} \text{ atoms}} \times \frac{1 \text{ mol}}{1} = 0.103 \text{ mol Cs}$$

$$b) \quad \frac{4.33 \text{ mol Cs}}{1 \text{ mol}} \times \frac{6.023 \times 10^{23} \text{ atoms}}{1} = 2.61 \times 10^{24} \text{ atoms Cs}$$

3.1 The Mole and Molar Mass

b) Molar Mass

$$N = 6.023 \times 10^{23} \text{ mol}^{-1}$$

3.1b Molar Mass – Example 1b

- a) How many **atoms** of **boron** are present in **3.30** moles of **boron trifluoride**? BF_3
- b) How many **moles** of **fluorine** are present in 3.09×10^{22} molecules of **boron trifluoride**

$$\text{a) } \frac{3.30 \text{ mol BF}_3}{1 \text{ BF}_3} \left| \frac{1 \text{ B}}{1 \text{ BF}_3} \right. = 3.30 \text{ mol B}$$

$$\frac{3.30 \text{ mol B}}{1 \text{ mol}^{-1}} \left| \frac{6.023 \times 10^{23} \text{ atoms}}{1 \text{ mol}^{-1}} \right. = 1.99 \times 10^{24} \text{ atoms B}$$

$$\text{b) } \frac{3.09 \times 10^{22} \text{ molecules BF}_3}{6.023 \times 10^{23} \text{ molecules}} \left| \frac{1 \text{ mol}}{1 \text{ BF}_3} \right. = 0.0513 \text{ mol BF}_3$$

$$\frac{0.0513 \text{ mol BF}_3}{1 \text{ BF}_3} \left| \frac{3 \text{ F}}{1 \text{ BF}_3} \right. = 0.154 \text{ mol F}$$

3.1 The Mole and Molar Mass

b) Molar Mass

3.1b Molar Mass – Example 2

How many Grams of bromine are present in 1.02 moles of carbon tetrabromide? CBr_4

$$\frac{1.02 \text{ mol CBr}_4}{1 \text{ CBr}_4} \times \frac{4 \text{ Br}}{1 \text{ CBr}_4} = 4.08 \text{ mol Br}$$

$$\frac{4.08 \text{ mol Br}}{1 \text{ mol}} \times \frac{79.90 \text{ g}}{1 \text{ mol}} = 326 \text{ g}$$

Where? ... Periodic Table

3.1 The Mole and Molar Mass

b) Molar Mass

H: 1.01

O: 16.00

3.1b Molar Mass – Example_3

How many **MOLES** of water are present in 5.41 grams of this compound?

- a) 0.1 b) 0.2 c) 0.3 ✓ d) 0.4 e) Help

Molar Mass H_2O : $2(\text{H}) + \text{O}$
 $2(1.01) + 16.00 = 18.02 \text{ g} \cdot \text{mol}^{-1}$
MOLAR MASS

$$\frac{5.41 \text{ g H}_2\text{O}}{18.02 \text{ g}} \left| \frac{1 \text{ mol}}{18.02 \text{ g}} \right. = 3.00 \times 10^{-1} \text{ mol H}_2\text{O}$$