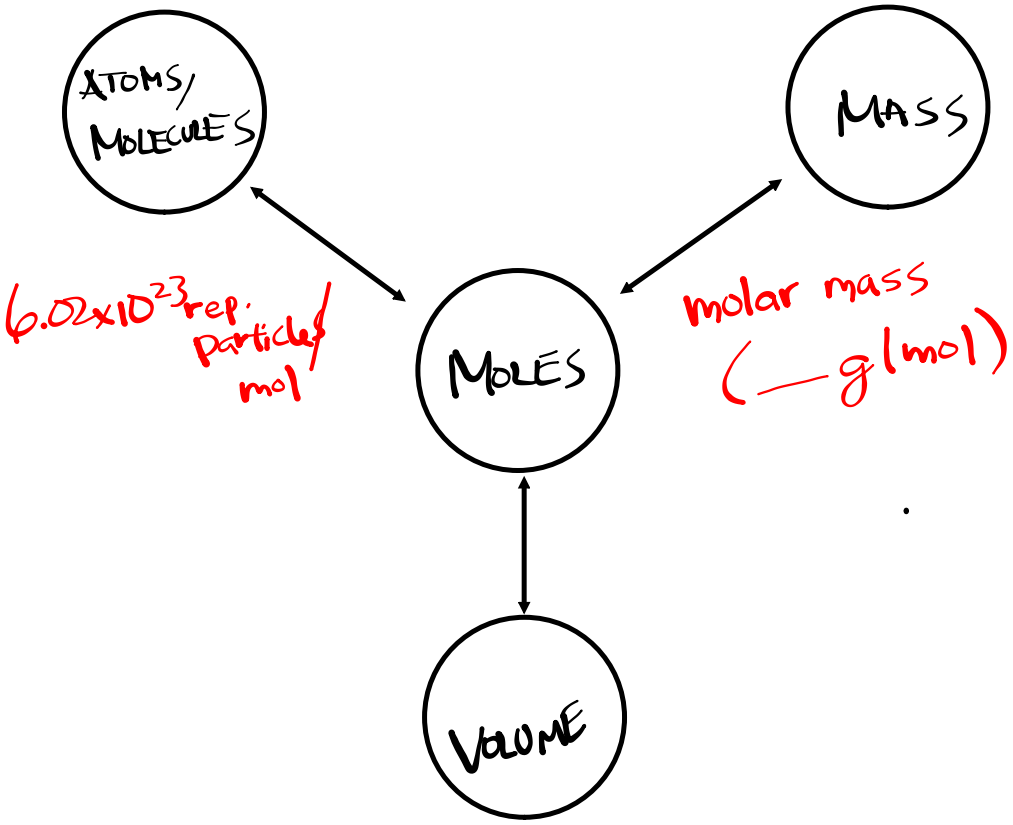
#3-6 p. 291-292 Worksheet

(3) $9.00 \text{ mol } C_6H_{12}O_6 \times \frac{6.02 \times 10^{23} \text{ molecules } C_6H_{12}O_6}{1 \text{ mol } C_6H_{12}O_6} \times$

$\frac{24 \text{ atoms}}{1 \text{ molecules } C_6H_{12}O_6}$

$= 1.30 \times 10^{26} \text{ atoms}$


ATOMS/ MOLECULES
MASS
MOLES
VOLUME
6.02x10^23 rep. particles/ mol
molar mass
(—g/mol)

Molar Mass

- the molar mass of a substance represents the mass of one mole of the substance
  - it is expressed in grams per mol (g/mol)

To determine the molar mass of a substance:

- make sure the formula is written properly
- determine the number of atoms of each element
- use the atomic molar masses of each atom from the periodic table and multiply this by the number of atoms
- add the mass of the atoms together so as to represent the total mass of the substance in grams per mole

Ex. What is the molar mass of $(NH_4)_3PO_4$?

N → 3 x 14.01 = 42.03
H → 12 x 1.01 = 12.12
P → 1 x 30.97 = 30.97
O → 4 x 16.00 = 64.00

149.12 g/mol

Find the molar mass of:

a) H_2O

b) $Ca(NO_3)_2$

c) $C_6H_{12}O_6$

$(6 \times 12.01) + (12 \times 1.01) + (6 \times 16.00)$

$= 180.18 \text{ g/mol}$

Once molar mass is established, a conversion can be made from grams to moles or moles to grams (depending on the measurement of the sample)

$$Mm = \frac{m}{n}$$

m = mass (g)

n = # of moles

Ex. How many moles are found in 100.g of NaCl?

$$100.\text{g NaCl} \times \frac{\text{mol NaCl}}{58.44\ \text{g NaCl}} = 1.71\ \text{mol NaCl}$$

$$\text{NaCl} \rightarrow (1 \times 22.99)_{Na} + (1 \times 35.45)_{Cl} = 58.44\ \text{g/mol}$$

Ex. What is the mass of 5.00 mol of NaCl?

$$5.00\ \text{mol NaCl} \times \frac{58.44\ \text{g NaCl}}{1\ \text{mol NaCl}} = 292\ \text{g NaCl}$$

$$Mm = \frac{m}{n}$$

$$m = Mm \times n$$

$$m = (58.44\ \text{g/mol}) \times (5.00\ \text{mol})$$

$$m = 292\ \text{g}$$

$$Mm = \frac{m}{n}$$

$$58.44\,g/mol = \frac{100.\,g}{n}$$

$$n(58.44\,g/mol) = 100.\,g$$

$$n = \frac{100.\,g}{58.44\,g/mol}$$

$$n = 1.71\,mol$$

Homework

p. 296 #7,8, 13-15

Complete Worksheet