Chemistry 12

Chemistry 11 Review

Name:
Date:
Block:

g / 1 mol

1. Calculate the molar mass of each of the following:
   a) NO — 30.0 g/mol
   b) $Al_2(SO_4)_3$ — (2 × 27.0) + (3 × 32.1) + (12 × 16.0) = 342.3 g/mol
   c) CH_3COOH — (2 × 12.0) + (4 × 1.0) + (2 × 16.0) = 60.0 g/mol

g

2. Calculate the mass of the following:
   a) 1.00 mol of NH_4Cl

$$1.00\ \text{mol} \times \frac{53.5\ \text{g}}{1\ \text{mol}} = 53.5\ \text{g}$$

   b) 0.0125 mol of XeF_3

$$0.0125\ \text{mol} \times \frac{188.3\ \text{g}}{1\ \text{mol}} = 2.35375 = 2.35\ \text{g}$$

mol

3. Calculate the number of moles in the following:
   a) 17.0 g of H_2SO_4

$$17.0\ \text{g} \times \frac{1\ \text{mol}}{98.1\ \text{g}} = 0.17329 = 0.173\ \text{mol}$$

   b) 1.5g of H_2O

$$1.5\ \text{g} \times \frac{1\ \text{mol}}{18.0\ \text{g}} = 0.083\ \text{mol} = 8.3 \times 10^{-2}\ \text{mol}$$

4. The equation for the reaction of aluminum metal with fluorine gas is:

$$Al + F_2 \rightarrow AlF_3$$

   a) What is the balanced chemical equation?

$$2\,Al + 3\,F_2 \rightarrow 2\,AlF_3$$

g

   b) If 116.1 g of Al reacts, how much mass of the product is made?

$$116.1\ \text{g Al} \times \frac{1\ \text{mol Al}}{27.0\ \text{g Al}} \times \frac{2\ \text{mol AlF}_3}{2\ \text{mol Al}} \times \frac{84.0\ \text{g AlF}_3}{1\ \text{mol AlF}_3} = 361.2\ \text{g AlF}_3$$

5. A sample of potassium chloride has 84.0% purity. If 39.8 g of this sample reacts with excess bromine gas, what volume of chlorine gas could be produced under STP conditions? Begin by writing a balanced chemical equation.

$2KCl + Br_2 \rightarrow 1Cl_2 + 2KBr$

84% pure, 39.8g sample

L ?

$\%\ purity = \frac{pure}{sample} \times 100\%$

$84.0\% = \frac{x}{39.8\,g} \times 100\%$

$39.8 \times 0.840 = \frac{x}{39.8}$ (×39.8) $\quad x = 33.4\,g_{pure\ KCl}$

$33.4\,g_{KCl} \times \frac{1\ mol_{KCl}}{74.6\ g_{KCl}} \times \frac{1\ mol_{Cl_2}}{2\ mol_{KCl}} \times \frac{22.4\,L_{Cl_2}}{1\ mol_{Cl_2}}$

$= \boxed{5.01\,L_{Cl_2}}$

g

6. What mass of nickel wire reacts with silver nitrate in 1.25 L of a 0.150M solution?

$\_Ni + 2\,AgNO_3 \rightarrow Ni(NO_3)_2 + 2\,Ag$

$1.25\,L_{AgNO_3} \times \frac{0.150\ mol_{AgNO_3}}{1\ L_{AgNO_3}} \times \frac{1\ mol_{Ni}}{2\ mol_{AgNO_3}} \times \frac{58.7\ g_{Ni}}{1\ mol_{Ni}} = \boxed{5.50\,g\ Ni}$

7. Consider a solution containing 5.12g of $CuSO_4$ in 250.0 mL of solution.

a) What is the molar concentration of the solution?

$\frac{mol}{L} = M$

$\frac{5.12\ g}{250.0\ mL} \times \frac{1\ mol}{159.6\ g} \times \frac{1000\ mL}{1\ L} = \frac{0.128\ mol}{1\ L} = \boxed{0.128M}$

b) If 150.0 mL of water was added to the above solution, what would be the resulting molar concentration?

M

$C_1V_1 = C_2V_2$

$(0.128M)(250.0mL) = C_2(400.0mL)$

$C_2 = \boxed{0.0800M}$

~ or ~

$\frac{5.12\,g_{CuSO_4}}{0.400L} \times \frac{1\ mol}{159.6\,g_{CuSO_4}} = \boxed{0.0802M}$