

Mole Problems #1 - Answer Key

$$1.a) \frac{2.30 \times 10^{-1} \text{ mol NaCl} \mid 6.02 \times 10^{23} \text{ molecules NaCl}}{1 \text{ mol NaCl}} = \boxed{1.38 \times 10^{23} \text{ molec. NaCl}}$$

$$b) \frac{5.6 \text{ mol K}_2\text{S} \mid 6.02 \times 10^{23} \text{ molec. K}_2\text{S}}{1 \text{ mol K}_2\text{S}} = \boxed{3.4 \times 10^{24} \text{ molec. K}_2\text{S}}$$

$$c) \frac{3.42 \times 10^2 \text{ mol MgO} \mid 6.02 \times 10^{23} \text{ molec. MgO}}{1 \text{ mol MgO}} = \boxed{2.06 \times 10^{26} \text{ molec. MgO}}$$

$$d) \frac{0.450 \text{ mol CaI}_2 \mid 6.02 \times 10^{23} \text{ molec. CaI}_2}{1 \text{ mol CaI}_2} = \boxed{2.71 \times 10^{23} \text{ molec. CaI}_2}$$

$$2.a) \frac{0.250 \text{ moles CaSO}_4 \mid 6.02 \times 10^{23} \text{ molec. CaSO}_4 \mid 4 \text{ atoms O}}{1 \text{ mol CaSO}_4 \mid 1 \text{ molecule CaSO}_4} = \boxed{6.02 \times 10^{23} \text{ atoms O}}$$

$$b) \frac{1.20 \times 10^{-2} \text{ mol Na}_3\text{PO}_4 \mid 6.02 \times 10^{23} \text{ molec. Na}_3\text{PO}_4 \mid 3 \text{ atoms Na}}{1 \text{ mol Na}_3\text{PO}_4 \mid 1 \text{ molec. Na}_3\text{PO}_4} = \boxed{2.17 \times 10^{22} \text{ atoms Na}}$$

$$c) \frac{3.20 \text{ mol Fe(NO}_3)_3 \mid 6.02 \times 10^{23} \text{ molec. Fe(NO}_3)_3 \mid 13 \text{ atoms}}{1 \text{ mol Fe(NO}_3)_3 \mid 1 \text{ molec. Fe(NO}_3)_3} = \boxed{2.50 \times 10^{25} \text{ atoms}}$$

$$d) \frac{6.30 \times 10^{-1} \text{ mol (NH}_4)_2\text{CO}_3 \mid 6.02 \times 10^{23} \text{ molec. (NH}_4)_2\text{CO}_3 \mid 8 \text{ atoms H}}{1 \text{ mol (NH}_4)_2\text{CO}_3 \mid 1 \text{ molec. (NH}_4)_2\text{CO}_3} = \boxed{3.03 \times 10^{24} \text{ atoms H}}$$

$$3) a) \frac{2.50 \text{ g NO}_2 \mid 1 \text{ mol NO}_2 \mid 6.02 \times 10^{23} \text{ molec. NO}_2}{46.0 \text{ g NO}_2 \mid 1 \text{ mol NO}_2} = \boxed{3.27 \times 10^{22} \text{ molec. NO}_2}$$

$$b) \frac{1.0 \times 10^2 \text{ g CuO} \mid 1 \text{ mol CuO} \mid 6.02 \times 10^{23} \text{ molec. CuO}}{79.5 \text{ g CuO} \mid 1 \text{ mol CuO}} = \boxed{7.6 \times 10^{23} \text{ molec. CuO}}$$

$$c) \frac{0.358 \text{ mg BaBr}_2 \mid 1 \text{ g} \mid 1 \text{ mol BaBr}_2 \mid 6.02 \times 10^{23} \text{ molec. BaBr}_2}{1000 \text{ mg} \mid 297.1 \text{ g BaBr}_2 \mid 1 \text{ mol BaBr}_2} = \boxed{7.25 \times 10^{17} \text{ molec. BaBr}_2}$$

$$d) \frac{2.20 \times 10^4 \text{ cg AgCl} \mid 1 \text{ g} \mid 1 \text{ mol AgCl} \mid 6.02 \times 10^{23} \text{ molec. AgCl}}{100 \text{ cg} \mid 143.4 \text{ g AgCl} \mid 1 \text{ mol AgCl}} = \boxed{9.24 \times 10^{23} \text{ molec. AgCl}}$$

$$4. a) \frac{3.5 \text{ g SnCl}_4 \mid 1 \text{ mol SnCl}_4 \mid 6.02 \times 10^{23} \text{ molec. SnCl}_4 \mid 4 \text{ atoms Cl}}{260.7 \text{ g SnCl}_4 \mid 1 \text{ mol SnCl}_4 \mid 1 \text{ molec. SnCl}_4} = \boxed{3.2 \times 10^{22} \text{ atoms Cl}}$$

$$b) \frac{68.5 \text{ mg Ca}_3(\text{PO}_4)_2 \mid 1 \text{ g} \mid 1 \text{ mol Ca}_3(\text{PO}_4)_2 \mid 6.02 \times 10^{23} \text{ molec. Ca}_3(\text{PO}_4)_2 \mid 3 \text{ atoms Ca}}{1000 \text{ mg} \mid 310.3 \text{ g Ca}_3(\text{PO}_4)_2 \mid 1 \text{ mol Ca}_3(\text{PO}_4)_2 \mid 1 \text{ molec. Ca}_3(\text{PO}_4)_2} = \boxed{3.99 \times 10^{20} \text{ atoms Ca}}$$

$$c) \frac{4.50 \times 10^2 \text{ cg NH}_4\text{NO}_3 \mid 1 \text{ g} \mid 1 \text{ mol NH}_4\text{NO}_3 \mid 6.02 \times 10^{23} \text{ molec. NH}_4\text{NO}_3 \mid 2 \text{ atoms N}}{100 \text{ cg} \mid 80 \text{ g NH}_4\text{NO}_3 \mid 1 \text{ mol NH}_4\text{NO}_3 \mid 1 \text{ molec. NH}_4\text{NO}_3} = \boxed{6.77 \times 10^{22} \text{ atoms N}}$$

$$d) \frac{2.64 \times 10^{-3} \text{ kg KOH} \mid 1000 \text{ g} \mid 1 \text{ mol KOH} \mid 6.02 \times 10^{23} \text{ molec. KOH} \mid 3 \text{ atoms total}}{1 \text{ kg} \mid 56.1 \text{ g KOH} \mid 1 \text{ mol KOH} \mid 1 \text{ molec. KOH}} = \boxed{8.50 \times 10^{22} \text{ total atoms}}$$

$$5. a) \frac{1.20 \text{ mol } C_3H_8 \mid 22.4 \text{ L } C_3H_8}{1 \text{ mol } C_3H_8} = \boxed{26.9 \text{ L } C_3H_8}$$

$$b) \frac{4.2 \times 10^{-1} \text{ g } Br_2 \mid 1 \text{ mol } Br_2 \mid 22.4 \text{ L } Br_2}{159.8 \text{ g } Br_2 \mid 1 \text{ mol } Br_2} = \boxed{0.059 \text{ L } Br_2}$$

$$c) \frac{0.345 \text{ dag } NO_2 \mid 10 \text{ g} \mid 1 \text{ mol } NO_2 \mid 22.4 \text{ L } NO_2}{1 \text{ dag} \mid 46.0 \text{ g } NO_2 \mid 1 \text{ mol } NO_2} = \boxed{1.68 \text{ L } NO_2}$$

$$d) \frac{4.50 \times 10^{25} \text{ molec. } SO_3 \mid 1 \text{ mol } SO_3 \mid 22.4 \text{ L } SO_3}{6.02 \times 10^{23} \text{ molec. } SO_3 \mid 1 \text{ mol } SO_3} = \boxed{1.67 \times 10^3 \text{ L } SO_3}$$