

$$13) a) \frac{0.020 \text{ mol} \mid 6.02 \times 10^{23} \text{ molecules} \mid 6 \text{ atoms H}}{1 \text{ mol C}_2\text{H}_5\text{OH} \mid 1 \text{ molecule}} = 7.22 \times 10^{23} \text{ atoms H}$$

$$b) \frac{2.5 \text{ mol H}_2\text{O} \mid 6.02 \times 10^{23} \text{ molecules} \mid 2 \text{ atoms H}}{1 \text{ mol H}_2\text{O} \mid 1 \text{ molecule H}_2\text{O}} = 3.01 \times 10^{24} \text{ H atoms}$$

$$c) \frac{0.10 \text{ mol Ca(HCO}_3)_2 \mid 6.02 \times 10^{23} \text{ molecules} \mid 2 \text{ atoms H}}{1 \text{ mol Ca(HCO}_3)_2 \mid 1 \text{ molecule}} = 1.20 \times 10^{23} \text{ H atoms}$$

$$14) 0.20 \text{ mol C} \quad \text{C}_3\text{H}_8 \quad \frac{0.20 \text{ mol C} \mid 8 \text{ mol H}}{3 \text{ mol C}} = 0.533 \text{ mol H}$$

$$15) \text{H}_2\text{SO}_4 = ? \text{ in } 6.02 \times 10^{23} \text{ atoms O}$$

$$\frac{6.02 \times 10^{23} \text{ atoms O} \mid 1 \text{ molecule H}_2\text{SO}_4}{4 \text{ atoms O}} = 1.5 \times 10^{23} \text{ molecules H}_2\text{SO}_4$$

or 0.25 mol H<sub>2</sub>SO<sub>4</sub>

$$16) a) \text{Mg}_3(\text{PO}_4)_2 = 262.79 \text{ g mol}^{-1}$$

$$b) \text{C}_6\text{H}_8\text{O}_6 = 176.14 \text{ g mol}^{-1}$$

$$c) \text{Ca}(\text{NO}_3)_2 = 164.12 \text{ g mol}^{-1}$$

$$d) \text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O} = 248.18 \text{ g mol}^{-1}$$

$$17) \text{Ca}_3(\text{AsO}_4)_2 = 398.3 \text{ g mol}^{-1}$$

$$\frac{0.457 \text{ mol} \mid 398.3 \text{ g}}{1 \text{ mol}} = 189.2 \text{ g Ca}(\text{AsO}_4)_2$$

18)  $\text{CO}_2 = 44.01 \text{ g/mol}$      $66 \text{ g CO}_2$

$$\frac{66 \text{ g CO}_2}{44.01 \text{ g/mol}} = 1.5 \text{ mol CO}_2$$

19)  $0.5 \text{ g CuCl}_2 \rightarrow \text{mol of Cl}^- ?$      $\text{CuCl}_2 = 134.5 \text{ g mol}^{-1}$

$$\frac{0.5 \text{ g CuCl}_2}{134.5 \text{ g CuCl}_2} \times \frac{2 \text{ mol Cl}^-}{1 \text{ mol CuCl}_2} = 0.0074 \text{ mol Cl}^-$$

20)  $36.55 \text{ g}$  how many atoms?

$$\frac{36.55 \text{ g}}{12.01 \text{ g/mol}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 1.83 \times 10^{24} \text{ atoms C}$$

21)  $0.500 \text{ mol of C}_{12}\text{H}_{22}\text{O}_{11} = ? \text{ g}$

$$\text{C}_{12}\text{H}_{22}\text{O}_{11} \approx \frac{342 \text{ g}}{1 \text{ mol}} \times 0.500 \text{ mol} \approx 171 \text{ g sucrose}$$

22)  $\frac{10 \text{ g}}{18.02 \text{ g H}_2\text{O}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol H}_2\text{O}} = 3.34 \times 10^{23} \text{ molecules H}_2\text{O}$

$$\frac{10 \text{ g}}{200 \text{ g Hg}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol Hg}} = 3.01 \times 10^{22} \text{ atoms Hg}$$

23)  $\frac{1 \text{ mol N}_2\text{H}_4}{1 \text{ mol}} = 32.06 \text{ g N}_2\text{H}_4$      $\frac{25.0 \text{ mol H}_2}{1 \text{ mol}} \times 2.02 \text{ g H}_2 = 50.02 \text{ g H}_2$

$$\frac{2 \text{ mol N}_2}{1 \text{ mol}} \times 28.06 \text{ g} = 56.12 \text{ g N}_2$$

$$\frac{3.0 \text{ mol NH}_3}{1 \text{ mol}} \times 17.04 \text{ g} = 51.12 \text{ g NH}_3$$

$\text{N}_2 > \text{H}_2 > \text{NH}_3 > \text{N}_2\text{H}_4$