

I. Mole Concept

$$1. \quad 1.25 \times 10^{24} \text{ molecules } \cancel{\text{CH}_4} \times \frac{1 \text{ mole } \text{CH}_4}{6.02 \times 10^{23} \text{ molecules } \cancel{\text{CH}_4}} = \boxed{2.08 \text{ mol } \text{CH}_4}$$

$$2. \quad 7.25 \text{ mol } \cancel{\text{NaCl}} \times \frac{6.02 \times 10^{23} \text{ f. units } \cancel{\text{NaCl}}}{1 \text{ mol } \cancel{\text{NaCl}}} = \boxed{4.34 \times 10^{24} \text{ f. units } \text{NaCl}}$$

II. Molar Mass

1. $(\text{NH}_4)_2\text{S}$

N: $2(14) = 28 \text{ g/mol}$

H: $8(1) = 8 \text{ g/mol}$

S: $1(32) = 32 \text{ g/mol}$

Total: 68 g/mol

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

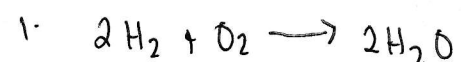
Ca: $1(40) = 40 \text{ g/mol}$

O: $2(16) = 32 \text{ g/mol}$

H: $2(1) = 2 \text{ g/mol}$

Total: 74 g/mol

III. Stoichiometry



$$3.07 \text{ mol } \cancel{\text{O}_2} \times \frac{2 \text{ mol } \text{H}_2}{1 \text{ mol } \cancel{\text{O}_2}} = \boxed{6.14 \text{ mol } \text{H}_2}$$



$$17.3 \text{ mol } \cancel{\text{H}_2\text{O}} \times \frac{1 \text{ mol } \cancel{\text{C}_6\text{H}_{12}\text{O}_4}}{6 \text{ mol } \cancel{\text{H}_2\text{O}}} \times \frac{180 \text{ g } \text{C}_6\text{H}_{12}\text{O}_4}{1 \text{ mol } \cancel{\text{C}_6\text{H}_{12}\text{O}_4}} = \boxed{519 \text{ grams } \text{C}_6\text{H}_{12}\text{O}_4}$$

3.



$$255.0 \text{ g } \cancel{\text{H}_3\text{PO}_4} \times \frac{1 \text{ mol } \cancel{\text{H}_3\text{PO}_4}}{98.0 \text{ g } \cancel{\text{H}_3\text{PO}_4}} \times \frac{3 \text{ mol } \cancel{\text{H}_2\text{O}}}{1 \text{ mol } \cancel{\text{H}_3\text{PO}_4}} \times \frac{18 \text{ g } \text{H}_2\text{O}}{1 \text{ mol } \cancel{\text{H}_2\text{O}}} = \boxed{140.5 \text{ g } \text{H}_2\text{O}}$$