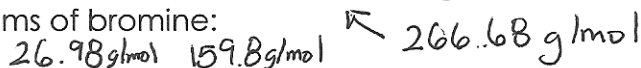


1. For the reaction:  $3\text{C} + 2\text{SO}_2 \rightarrow \text{CS}_2 + \text{CO}_2$ , how many grams of carbon dioxide are formed from the reaction of 4.0 grams of carbon with excess sulfur dioxide?

$$4.0 \text{ g C} \times \frac{1 \text{ mol}}{12.01 \text{ g}} \times \frac{1 \text{ CO}_2}{3 \text{ C}} \times \frac{44.01 \text{ g}}{1 \text{ mol}} = 4.9 \text{ g CO}_2 \quad (2 \text{ s.f.})$$

2. For the reaction:  $2\text{Al} + 3\text{Br}_2 \rightarrow 2\text{AlBr}_3$ , if 8.0 grams of aluminum are combined with 5.0 grams of bromine:



- a. How many grams of aluminum bromide are produced?

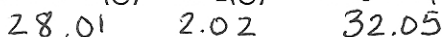
$$8.0 \text{ g Al} \times \frac{1 \text{ mol}}{26.98 \text{ g}} \times \frac{2 \text{ AlBr}_3}{2 \text{ Al}} \times 266.68 \text{ g/mol} =$$

b. Which reactant is the limiting reactant?

$$5.0 \text{ g Br}_2 \times \frac{1 \text{ mol}}{159.8 \text{ g}} \times \frac{2 \text{ AlBr}_3}{3 \text{ Br}_2} \times 266.68 \text{ g/mol} = 5.6 \text{ g AlBr}_3 \quad (2 \text{ s.f.})$$

Bromine is the limiting reactant.

3. For the reaction:  $\text{CO(g)} + 2\text{H}_2\text{(g)} \rightarrow \text{CH}_3\text{OH(l)}$

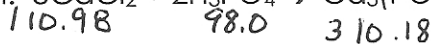


12.0 grams of methanol ( $\text{CH}_3\text{OH}$ ) are produced from 14.0 grams of carbon monoxide reacting with excess hydrogen gas. What is the percent yield for this reaction?

$$14.0 \text{ g CO} \times \frac{1 \text{ mol}}{28.01 \text{ g}} \times \frac{1 \text{ CH}_3\text{OH}}{1 \text{ CO}} \times 32.05 \text{ g/mol} = 16.02 \text{ g CH}_3\text{OH}$$

$$\frac{12.0 \text{ g}}{16.02 \text{ g}} \times 100\% = 75.0\% \quad (3 \text{ s.f.})$$

4. For the reaction:  $3\text{CaCl}_2 + 2\text{H}_3\text{PO}_4 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 6\text{HCl}$



How many grams of calcium phosphate would theoretically be produced from 20.0 g of calcium chloride and 20.0 g of phosphoric acid?

$$\star 20.0 \text{ g CaCl}_2 \times \frac{1 \text{ mol}}{110.98 \text{ g}} \times \frac{1 \text{ Ca}_3(\text{PO}_4)_2}{3 \text{ CaCl}_2} \times 310.18 \text{ g/mol} = 18.6 \text{ g Ca}_3(\text{PO}_4)_2 \quad (3 \text{ s.f.})$$

limiting

$$20.0 \text{ g H}_3\text{PO}_4 \times \frac{1 \text{ mol}}{98.0 \text{ g}} \times \frac{1 \text{ Ca}_3(\text{PO}_4)_2}{2 \text{ H}_3\text{PO}_4} \times 310.18 \text{ g/mol} =$$