

Key

1. Consider the reaction, $2 \overset{119.0 \text{ g/mol}}{\text{KBr}} + \text{Cl}_2 \rightarrow 2 \text{KCl} + \overset{159.8 \text{ g/mol}}{\text{Br}_2}$. If 4.5 g of KBr is reacted in excess chlorine, what mass of Br_2 could be produced?

$$\frac{4.5 \text{ g KBr}}{119.0 \text{ g KBr}} \times \frac{1 \text{ mol KBr}}{2 \text{ mol KBr}} \times \frac{1 \text{ mol Br}_2}{1 \text{ mol Br}_2} \times 159.8 \text{ g Br}_2 = 3.0 \text{ g Br}_2$$

2. Fermentation is a complex chemical process of wine making in which glucose is converted into ethanol and carbon dioxide:

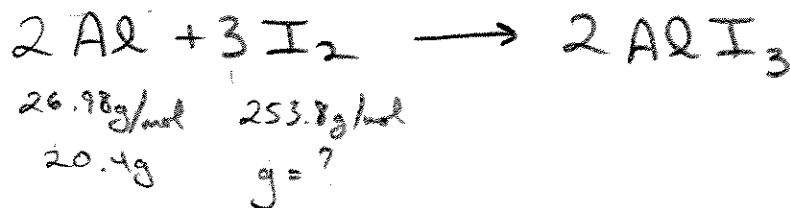


Starting with 500. g of glucose, what is the maximum ~~amount~~^{Volume} of ethanol that can be obtained by this process? (Density of ethanol = 0.789 g/mL.)

$$\frac{500 \text{ g C}_6\text{H}_{12}\text{O}_6}{180.16 \text{ g C}_6\text{H}_{12}\text{O}_6} \times \frac{1 \text{ mol C}_6\text{H}_{12}\text{O}_6}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} \times \frac{2 \text{ mol C}_2\text{H}_5\text{OH}}{1 \text{ mol C}_2\text{H}_5\text{OH}} \times \frac{46.07 \text{ g C}_2\text{H}_5\text{OH}}{1 \text{ mol C}_2\text{H}_5\text{OH}} \times \frac{1 \text{ mL C}_2\text{H}_5\text{OH}}{0.789 \text{ g C}_2\text{H}_5\text{OH}}$$

$$= 324 \text{ mL}$$

3. Calculate the mass in grams of elemental iodine that will react completely with 20.4g of aluminum metal to form aluminum iodide.



$$\frac{20.4 \text{ g Al}}{26.98 \text{ g Al}} \times \frac{1 \text{ mol Al}}{2 \text{ mol Al}} \times \frac{3 \text{ mol I}_2}{1 \text{ mol Al}} \times 253.8 \text{ g I}_2 = \boxed{288 \text{ g I}_2}$$

