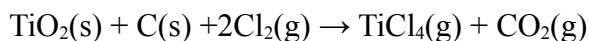


CHM 110
Stoichiometry Set

SOLUTIONS

Solve the following problems Write the answer in the answer blank, and show work in the space provided.

1) What mass of TiO_2 would (given enough carbon and chlorine) be required to produce 45.0 g of TiCl_4 in the following reaction?

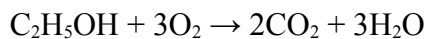


Answer: 18.9 g TiO_2

$$\begin{aligned} \text{TiO}_2: 79.87 \text{ g TiO}_2 &= \text{mol TiO}_2 \\ \text{TiCl}_4: 189.67 \text{ g TiCl}_4 &= \text{mol TiCl}_4 \\ \text{mol TiO}_2 &= \text{mol TiCl}_4 \end{aligned}$$

$$45.0 \text{ g TiCl}_4 \times \frac{\text{mol TiCl}_4}{189.67 \text{ g TiCl}_4} \times \frac{\text{mol TiO}_2}{\text{mol TiCl}_4} \times \frac{79.87 \text{ g TiO}_2}{\text{mol TiO}_2} =$$

2) $\text{C}_2\text{H}_5\text{OH}$ burns in air to form CO_2 and H_2O . What mass of water can be produced when 75.0 grams of $\text{C}_2\text{H}_5\text{OH}$ burns in sufficient oxygen?

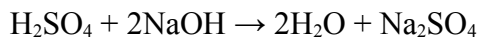


Answer: 88.0 g H_2O

$$\begin{aligned} \text{C}_2\text{H}_5\text{OH}: 46.068 \text{ g C}_2\text{H}_5\text{OH} &= \text{mol C}_2\text{H}_5\text{OH} \\ \text{H}_2\text{O}: 18.016 \text{ g H}_2\text{O} &= \text{mol H}_2\text{O} \\ \text{mol C}_2\text{H}_5\text{OH} &= 3 \text{ mol H}_2\text{O} \end{aligned}$$

$$75.0 \text{ g C}_2\text{H}_5\text{OH} \times \frac{\text{mol C}_2\text{H}_5\text{OH}}{46.068 \text{ g C}_2\text{H}_5\text{OH}} \times \frac{3 \text{ mol H}_2\text{O}}{\text{mol C}_2\text{H}_5\text{OH}} \times \frac{18.016 \text{ g H}_2\text{O}}{\text{mol H}_2\text{O}} =$$

3) How many mL of 6.00 M H_2SO_4 is needed to react with 50.0 mL of 2.00 M NaOH ?



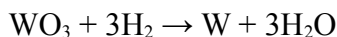
Answer: 8.33 mL 6.00 M H_2SO_4

$6.00 \text{ mol H}_2\text{SO}_4 = \text{L}$
 $2.00 \text{ mol NaOH} = \text{L}$
 $\text{mol H}_2\text{SO}_4 = 2 \text{ mol NaOH}$

$$50.0 \text{ mL} \times \frac{2.00 \text{ mol NaOH}}{\text{L}} \times \frac{\text{mol H}_2\text{SO}_4}{2 \text{ mol NaOH}} \times \frac{\text{L}}{6.00 \text{ mol H}_2\text{SO}_4} =$$

(since "m" isn't canceled, final answer is in mL)

4) What is the maximum mass of tungsten (W) that could be produced by reacting 150.0 g of WO_3 with 50. g of H_2 in the following reaction?



Answer: 118.9 g W

$\text{W} : 183.84 \text{ g W} = \text{mol W}$
 $\text{WO}_3 : 231.84 \text{ g WO}_3 = \text{mol WO}_3$
 $\text{H}_2 : 2.016 \text{ g H}_2 = \text{mol H}_2$
 $\text{mol WO}_3 = \text{mol W}$
 $3 \text{ mol H}_2 = \text{mol W}$

$$150.0 \text{ g WO}_3 \times \frac{\text{mol WO}_3}{231.84 \text{ g WO}_3} \times \frac{\text{mol W}}{\text{mol WO}_3} \times \frac{183.84 \text{ g W}}{\text{mol W}} = 118.9 \text{ g W}$$

$$50. \text{ g H}_2 \times \frac{\text{mol H}_2}{2.016 \text{ g H}_2} \times \frac{\text{mol W}}{3 \text{ mol H}_2} \times \frac{183.84 \text{ g W}}{\text{mol W}} = 1500 \text{ g W}$$