1. What volume of nitrogen gas at STP is needed to react with 57.0 mL of hydrogen, also at STP?

$$N_2 \text{ (g)} + 3 \text{ } H_2 \text{ (g)} \rightarrow 2 \text{ } NH_3 \text{ (g)}$$
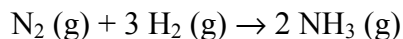
2. What volume of oxygen gas at 20.0°C and 0.953 atm is needed to react with 3.500×10^3 L of CO, also at 20.0°C and 0.953 atm?

$$2 \text{ } CO \text{ (g)} + O_2 \text{ (g)} \rightarrow 2 \text{ } CO_2 \text{ (g)}$$
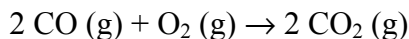
3. What volume of oxygen gas at STP is required to produce 640. L of CO_2, also measured at STP?

$$C_3H_8 \text{ (g)} + 5 \text{ } O_2 \text{ (g)} \rightarrow 3 \text{ } CO_2 \text{ (g)} + 4 \text{ } H_2O \text{ (g)}$$
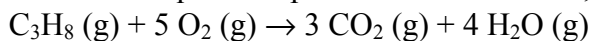
4. What volume of hydrogen gas can be produced at STP by the reaction of 6.28 g of Fe according to the following equation? [hint: where are you starting and ending?]

$$3 \text{ } Fe \text{ (s)} + 4 \text{ } H_2O \text{ (l)} \rightarrow Fe_3O_4 \text{ (s)} + 4 \text{ } H_2 \text{ (g)}$$
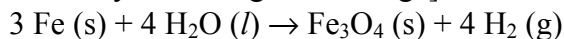
5. How many grams of sodium are needed to react with excess water according to the following equation, in order to produce 35.8 L of H_2 gas at STP?

$$2 \text{ } Na \text{ (s)} + 2 \text{ } H_2O \text{ (l)} \rightarrow 2 \text{ } NaOH \text{ (aq)} + H_2 \text{ (g)}$$
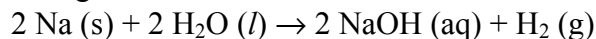
6. What mass of ammonium nitrate, NH_4NO_3, must decompose according to the following equation to produce 25.0 L of N_2O gas at STP?

$$NH_4NO_3 \text{ (s)} \rightarrow N_2O \text{ (g)} + 2 \text{ } H_2O \text{ (l)}$$

Answers: 1) 19.0 mL N_2; 2) 1.750×10^3 L O_2; 3) 1070 L O_2; 4) 3.36 L H_2; 5) 73.5 g Na; 6) 89.3 g NH_4NO_3