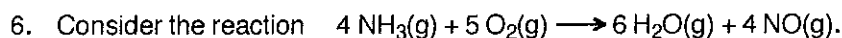
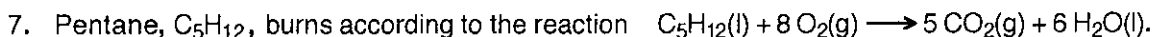


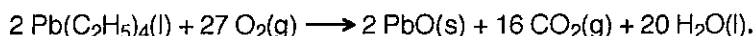
**EXERCISES:**

- What mass of  $\text{NO}(\text{g})$  is produced when 2.00 mol of  $\text{NH}_3(\text{g})$  are reacted with excess  $\text{O}_2(\text{g})$ ?
- What mass of  $\text{H}_2\text{O}(\text{g})$  is produced when 4.00 mol of  $\text{O}_2(\text{g})$  are reacted with excess  $\text{NH}_3(\text{g})$ ?
- What volume of  $\text{NH}_3(\text{g})$  at STP is required to react with 3.00 mol of  $\text{O}_2(\text{g})$ ?
- What volume of  $\text{NH}_3(\text{g})$  at STP is required to produce 0.750 mol of  $\text{H}_2\text{O}(\text{g})$ ?



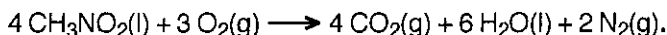
- What mass of  $\text{CO}_2(\text{g})$  is produced when 100.0 g of  $\text{C}_5\text{H}_{12}(\text{l})$  is burned?
- What mass of  $\text{O}_2(\text{g})$  is required to produce 60.0 g of  $\text{H}_2\text{O}(\text{l})$ ?
- What mass of  $\text{C}_5\text{H}_{12}(\text{l})$  is required to produce 90.0 L of  $\text{CO}_2(\text{g})$  at STP?
- What volume of  $\text{O}_2(\text{g})$  at STP is required to produce 70.0 g of  $\text{CO}_2(\text{g})$ ?
- What volume of  $\text{O}_2(\text{g})$  at STP is required to produce 48.0 L of  $\text{CO}_2(\text{g})$  at STP?
- What mass of  $\text{H}_2\text{O}(\text{l})$  is made when the burning of  $\text{C}_5\text{H}_{12}$  gives 106 L of  $\text{CO}_2(\text{g})$  at STP?

8. Tetraethyl lead,  $\text{Pb}(\text{C}_2\text{H}_5)_4$ , is an "antiknock" ingredient which was added to some gasolines. Tetraethyl lead burns according to the equation



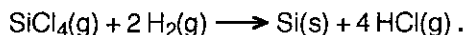
- What volume of  $\text{O}_2(\text{g})$  at STP is consumed when 100.0 g of  $\text{PbO}(\text{s})$  are formed?
- How many molecules of  $\text{CO}_2$  are formed when  $1.00 \times 10^{-6}$  g of tetraethyl lead is burned?
- How many molecules of  $\text{H}_2\text{O}$  are formed when 135 molecules of  $\text{O}_2$  react?
- What volume of  $\text{O}_2(\text{g})$  at STP, in millilitres, is required to react with  $1.00 \times 10^{15}$  molecules of tetraethyl lead?

9. Nitromethane, a fuel occasionally used in some drag racers, burns according to the reaction



- What mass of  $\text{H}_2\text{O}$  is produced when 0.150 g of  $\text{CH}_3\text{NO}_2$  is burned?
- What combined volume of gas at STP is produced if 0.316 g of  $\text{CH}_3\text{NO}_2$  is burned?
- What volume of  $\text{O}_2(\text{g})$  at STP is required to produce 0.250 g of  $\text{CO}_2$ ?
- What mass of  $\text{H}_2\text{O}$  is produced when 0.410 g of  $\text{CO}_2$  is produced?

10. A sample of high purity silicon is prepared by strongly heating a mixture of hydrogen and silicon tetrachloride in a sealed tube:



If exactly 1.00 g of silicon is required, what mass of each of  $\text{SiCl}_4$  and  $\text{H}_2$  must react?

11. Hydrazine,  $\text{N}_2\text{H}_4$ , is a rocket fuel which is prepared according to the reaction



$\text{NaOCl}$  is common "bleach" and  $\text{NH}_3(\text{aq})$  is produced by passing  $\text{NH}_3(\text{g})$  into water. If  $1.25 \times 10^4$  kg of hydrazine is required, how many litres of ammonia gas (at STP) is required in the reaction?

12. One of the most efficient drying agents known is  $\text{P}_4\text{O}_{10}$ . In fact,  $\text{P}_4\text{O}_{10}$  will even remove water from pure  $\text{H}_2\text{SO}_4$  to produce  $\text{SO}_3$ :



Pure  $\text{H}_2\text{SO}_4(\text{l})$  has a density of 1.84 g/mL. If 25.0 mL of  $\text{H}_2\text{SO}_4(\text{l})$  react, what mass of  $\text{P}_4\text{O}_{10}$  also reacts and what volume of  $\text{SO}_3(\text{g})$  at STP is produced?