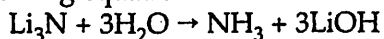


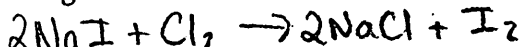
11-2 Practice Problems

1. Determine the mass of lithium hydroxide produced when 0.38 g of lithium nitride reacts with water according to the following equation:



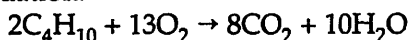
$$\frac{0.38\text{g Li}_3\text{N}}{1} \times \frac{1\text{mol Li}_3\text{N}}{35\text{g Li}_3\text{N}} \times \frac{3\text{mol LiOH}}{1\text{mol Li}_3\text{N}} \times \frac{24\text{g LiOH}}{1\text{mol LiOH}} = \boxed{0.78\text{g LiOH}}$$

2. What mass of sodium chloride is produced when chlorine reacts with 0.29 g of sodium iodide?



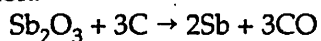
$$\frac{0.29\text{g NaI}}{1} \times \frac{1\text{mol}}{150} \times \frac{2\text{mol NaCl}}{2\text{mol NaI}} \times \frac{58\text{g}}{1\text{mol}} = \boxed{0.112\text{g NaCl}}$$

3. Determine the mass of carbon dioxide produced when 0.85 g of butane reacts with oxygen according to the following equation:



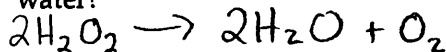
$$\frac{0.85\text{g C}_4\text{H}_{10}}{1} \times \frac{1\text{mol}}{58\text{g}} \times \frac{8\text{mol CO}_2}{2\text{mol C}_4\text{H}_{10}} \times \frac{44\text{g}}{1\text{mol}} = \boxed{2.58\text{g CO}_2}$$

4. Determine the mass of antimony produced when 0.46 g of antimony(III) oxide reacts with carbon according to the following equation:



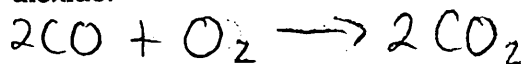
$$\frac{0.46\text{g Sb}_2\text{O}_3}{1} \times \frac{1\text{mol}}{291.52\text{g}} \times \frac{2\text{mol Sb}}{1\text{mol Sb}_2\text{O}_3} \times \frac{121.76\text{g}}{1\text{mol}} = \boxed{0.38\text{g Sb}}$$

5. What mass of hydrogen peroxide (H_2O_2) must decompose to produce 0.77 g of water?



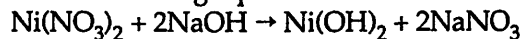
$$\frac{0.77\text{g H}_2\text{O}}{1} \times \frac{1\text{mol}}{18\text{g}} \times \frac{2\text{H}_2\text{O}_2}{2\text{H}_2\text{O}} \times \frac{34\text{g}}{1\text{mol}} = \boxed{1.45\text{g H}_2\text{O}_2}$$

6. What mass of carbon monoxide must react with oxygen to produce 0.69 g of carbon dioxide?



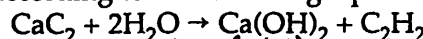
$$\frac{0.69\text{g CO}_2}{1} \times \frac{1\text{mol}}{44\text{g}} \times \frac{2\text{mol CO}}{2\text{mol CO}_2} \times \frac{28\text{g}}{1\text{mol}} = \boxed{0.44\text{g CO}}$$

7. Determine the mass of sodium nitrate produced when 0.73 g of nickel(II) nitrate reacts with sodium hydroxide according to the following equation:



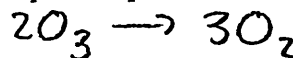
$$\frac{0.73\text{g Ni}(\text{NO}_3)_2}{1} \times \frac{1\text{mol}}{183\text{g}} \times \frac{2\text{mol NaNO}_3}{1\text{mol Ni}(\text{NO}_3)_2} \times \frac{85\text{g}}{1\text{mol}} = \boxed{0.68\text{g NaNO}_3}$$

8. Determine the mass of calcium hydroxide produced when calcium carbide reacts with 0.64 g of water according to the following equation:



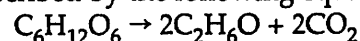
$$\frac{0.64\text{g H}_2\text{O}}{1} \times \frac{1\text{mol}}{18\text{g}} \times \frac{1\text{mol Ca}(\text{OH})_2}{2\text{mol H}_2\text{O}} \times \frac{74\text{g}}{1\text{mol}} = \boxed{1.32\text{g Ca}(\text{OH})_2}$$

9. How many grams of ozone (O_3) must decompose to produce 0.87 g of oxygen?



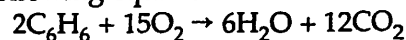
$$\frac{0.87\text{g O}_2}{1} \times \frac{1\text{mol}}{32\text{g O}_2} \times \frac{2\text{mol}}{3\text{mol}} \times \frac{48\text{g O}_3}{1\text{mol}} = \boxed{0.87\text{g O}_3}$$

10. Find the mass of sugar ($\text{C}_6\text{H}_{12}\text{O}_6$) required to produce 1.82 L of carbon dioxide gas at STP from the reaction described by the following equation:



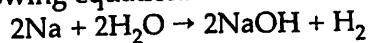
11. How many liters of oxygen are necessary for the combustion of 425 g of sulfur, assuming that the reaction occurs at STP? The balanced equation is $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$.

12. Find the mass of benzene (C_6H_6) required to produce 2.66 L of carbon dioxide gas at STP from the reaction described by the following equation:

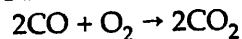


11-2 Practice Problems (continued)

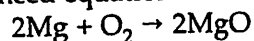
13. Find the mass of sodium required to produce 5.68 L of hydrogen gas at STP from the reaction described by the following equation:



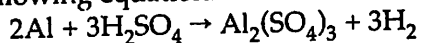
14. How many liters of oxygen are necessary for the combustion of 277 g of carbon monoxide, assuming that the reaction occurs at STP? The balanced equation is



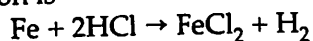
15. How many liters of oxygen are necessary for the combustion of 134 g of magnesium, assuming that the reaction occurs at STP? The balanced equation is



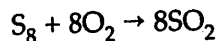
16. Find the mass of aluminum required to produce 4.72 L of hydrogen gas at STP from the reaction described by the following equation:



17. How many liters of hydrogen are produced if 225 g of iron reacts with hydrochloric acid, assuming that the reaction occurs at STP? The balanced equation is

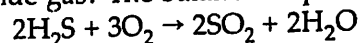


18. Find the mass of S_8 required to produce 2.47 L of sulfur dioxide gas at STP from the reaction described by the following equation:

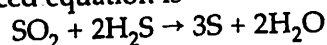


19. Propane (C_3H_8) burns in oxygen to produce carbon dioxide and water vapor. The balanced equation for this reaction is $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 4\text{H}_2\text{O} + 3\text{CO}_2$. What volume of carbon dioxide is produced when 2.8 L of oxygen are consumed?

20. What volumes of H_2S gas and oxygen are necessary to produce 14.2 L of sulfur dioxide gas? The balanced equation is

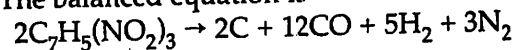


21. What volumes of sulfur dioxide and dihydrogen sulfide gases are necessary to produce 11.4 L of water vapor? The balanced equation is

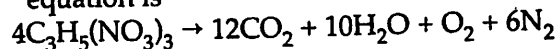


22. Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) burns in oxygen to produce carbon dioxide and water vapor as described in the following equation: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{H}_2\text{O} + 6\text{CO}_2$. What volume of carbon dioxide is produced when 3.7 L of oxygen are consumed?

23. The compound TNT (trinitrotoluene) decomposes explosively into carbon, carbon monoxide, hydrogen, and nitrogen. What volumes of hydrogen and nitrogen are produced if 5.8 L of CO is produced? The balanced equation is



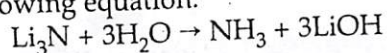
24. Nitroglycerin decomposes explosively to produce carbon dioxide, water, nitrogen, and oxygen. What volumes of nitrogen and oxygen are produced if 4.3 L of carbon dioxide is produced? The balanced equation is



25. Acetylene (C_2H_2) burns in oxygen to produce carbon dioxide and water. The balanced equation for this reaction is $2\text{C}_2\text{H}_2 + 5\text{O}_2 \rightarrow 2\text{H}_2\text{O} + 4\text{CO}_2$. What volume of carbon dioxide is produced when 1.6 L of oxygen are consumed?

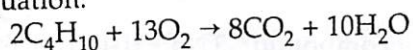
11-2 Practice Problems

1. Determine the mass of lithium hydroxide produced when 0.38 g of lithium nitride reacts with water according to the following equation:

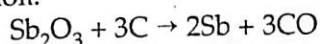


2. What mass of sodium chloride is produced when chlorine reacts with 0.29 g of sodium iodide?

3. Determine the mass of carbon dioxide produced when 0.85 g of butane reacts with oxygen according to the following equation:



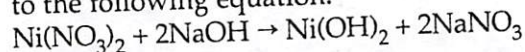
4. Determine the mass of antimony produced when 0.46 g of antimony(III) oxide reacts with carbon according to the following equation:



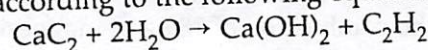
5. What mass of hydrogen peroxide (H_2O_2) must decompose to produce 0.77 g of water?

6. What mass of carbon monoxide must react with oxygen to produce 0.69 g of carbon dioxide?

7. Determine the mass of sodium nitrate produced when 0.73 g of nickel(II) nitrate reacts with sodium hydroxide according to the following equation:

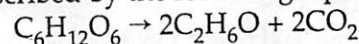


8. Determine the mass of calcium hydroxide produced when calcium carbide reacts with 0.64 g of water according to the following equation:



9. How many grams of ozone (O_3) must decompose to produce 0.87 g of oxygen?

10. Find the mass of sugar ($\text{C}_6\text{H}_{12}\text{O}_6$) required to produce 1.82 L of carbon dioxide gas at STP from the reaction described by the following equation:

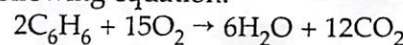


$$\frac{1.82 \text{ L CO}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{1 \text{ mol C}_6\text{H}_{12}\text{O}_6}{2 \text{ mol CO}_2} \times \frac{180 \text{ g}}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} = \boxed{7.31 \text{ g C}_6\text{H}_{12}\text{O}_6}$$

11. How many liters of oxygen are necessary for the combustion of 425 g of sulfur, assuming that the reaction occurs at STP? The balanced equation is $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$.

$$\frac{425 \text{ g S}}{1} \times \frac{1 \text{ mol}}{32 \text{ g S}} \times \frac{1 \text{ mol O}_2}{1 \text{ mol S}} \times \frac{22.4 \text{ L}}{1 \text{ mol O}_2} = \boxed{297.5 \text{ L}}$$

12. Find the mass of benzene (C_6H_6) required to produce 2.66 L of carbon dioxide gas at STP from the reaction described by the following equation:



$$\frac{2.66 \text{ L CO}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{2 \text{ mol C}_6\text{H}_6}{12 \text{ mol CO}_2} \times \frac{78 \text{ g}}{1 \text{ mol C}_6\text{H}_6} = \boxed{1.54 \text{ g C}_6\text{H}_6}$$

11-2 Practice Problems (continued)

13. Find the mass of sodium required to produce 5.68 L of hydrogen gas at STP from the reaction described by the following equation:
$$2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$$
14. How many liters of oxygen are necessary for the combustion of 277 g of carbon monoxide, assuming that the reaction occurs at STP? The balanced equation is
$$2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$$
15. How many liters of oxygen are necessary for the combustion of 134 g of magnesium, assuming that the reaction occurs at STP? The balanced equation is
$$2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$$
16. Find the mass of aluminum required to produce 4.72 L of hydrogen gas at STP from the reaction described by the following equation:
$$2\text{Al} + 3\text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 3\text{H}_2$$
17. How many liters of hydrogen are produced if 225 g of iron reacts with hydrochloric acid, assuming that the reaction occurs at STP? The balanced equation is
$$\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$$
18. Find the mass of S_8 required to produce 2.47 L of sulfur dioxide gas at STP from the reaction described by the following equation:
$$\text{S}_8 + 8\text{O}_2 \rightarrow 8\text{SO}_2$$
19. Propane (C_3H_8) burns in oxygen to produce carbon dioxide and water vapor. The balanced equation for this reaction is $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 4\text{H}_2\text{O} + 3\text{CO}_2$. What volume of carbon dioxide is produced when 2.8 L of oxygen are consumed?
20. What volumes of H_2S gas and oxygen are necessary to produce 14.2 L of sulfur dioxide gas? The balanced equation is
$$2\text{H}_2\text{S} + 3\text{O}_2 \rightarrow 2\text{SO}_2 + 2\text{H}_2\text{O}$$
21. What volumes of sulfur dioxide and dihydrogen sulfide gases are necessary to produce 11.4 L of water vapor? The balanced equation is
$$\text{SO}_2 + 2\text{H}_2\text{S} \rightarrow 3\text{S} + 2\text{H}_2\text{O}$$
22. Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) burns in oxygen to produce carbon dioxide and water vapor as described in the following equation: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{H}_2\text{O} + 6\text{CO}_2$. What volume of carbon dioxide is produced when 3.7 L of oxygen are consumed?
23. The compound TNT (trinitrotoluene) decomposes explosively into carbon, carbon monoxide, hydrogen, and nitrogen. What volumes of hydrogen and nitrogen are produced if 5.8 L of CO is produced? The balanced equation is
$$2\text{C}_7\text{H}_5(\text{NO}_2)_3 \rightarrow 2\text{C} + 12\text{CO} + 5\text{H}_2 + 3\text{N}_2$$
24. Nitroglycerin decomposes explosively to produce carbon dioxide, water, nitrogen, and oxygen. What volumes of nitrogen and oxygen are produced if 4.3 L of carbon dioxide is produced? The balanced equation is
$$4\text{C}_3\text{H}_5(\text{NO}_3)_3 \rightarrow 12\text{CO}_2 + 10\text{H}_2\text{O} + \text{O}_2 + 6\text{N}_2$$
25. Acetylene (C_2H_2) burns in oxygen to produce carbon dioxide and water. The balanced equation for this reaction is $2\text{C}_2\text{H}_2 + 5\text{O}_2 \rightarrow 2\text{H}_2\text{O} + 4\text{CO}_2$. What volume of carbon dioxide is produced when 1.6 L of oxygen are consumed?

$$13) \frac{5.68 \text{ L H}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{2 \text{ mol Na}}{1 \text{ mol H}_2} \times \frac{23 \text{ g}}{1 \text{ mol Na}} = \boxed{11.66 \text{ g Na}}$$

$$14) \frac{277 \text{ g CO}}{1} \times \frac{1 \text{ mol}}{28 \text{ g}} \times \frac{1 \text{ mol}}{2 \text{ mol}} \times \frac{22.4 \text{ L}}{1 \text{ mol O}_2} = \boxed{110.8 \text{ L O}_2}$$

$$15) \frac{134 \text{ g Mg}}{1} \times \frac{1 \text{ mol}}{24 \text{ g}} \times \frac{1 \text{ mol O}_2}{2 \text{ mol Mg}} \times \frac{22.4 \text{ L}}{1 \text{ mol O}_2} = \boxed{62.53 \text{ L O}_2}$$

$$16) \frac{4.72 \text{ L H}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{2 \text{ mol Al}}{3 \text{ mol H}_2} \times \frac{27 \text{ g Al}}{1 \text{ mol Al}} = \boxed{3.79 \text{ g Al}}$$

$$17) \frac{225 \text{ g Fe}}{1} \times \frac{1 \text{ mol}}{56 \text{ g}} \times \frac{1 \text{ mol H}_2}{1 \text{ mol Fe}} \times \frac{22.4 \text{ L}}{1 \text{ mol H}_2} = \boxed{90 \text{ L H}_2}$$

$$18) \frac{2.47 \text{ L SO}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{1 \text{ mol S}_8}{8 \text{ mol SO}_2} \times \frac{256 \text{ g}}{1 \text{ mol}} = \boxed{3.53 \text{ g S}_8}$$

$$19) \frac{2.8 \text{ L O}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{3 \text{ mol CO}_2}{5 \text{ mol O}_2} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{1.68 \text{ L CO}_2}$$

$$20) \frac{14.2 \text{ L SO}_2}{1} \times \frac{1 \text{ mol}}{22.4} \times \frac{2 \text{ mol H}_2\text{S}}{2 \text{ mol SO}_2} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{14.2 \text{ L H}_2\text{S}}$$

$$\frac{14.2 \text{ L SO}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{3 \text{ mol O}_2}{2 \text{ mol SO}_2} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{21.3 \text{ L O}_2}$$

$$21) \frac{11.4 \text{ L H}_2\text{O}}{1} \times \frac{1 \text{ mol}}{22.4} \times \frac{1 \text{ mol SO}_2}{2 \text{ mol H}_2\text{O}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{5.7 \text{ L SO}_2}$$

$$\frac{11.4 \text{ L H}_2\text{O}}{1} \times \frac{1 \text{ mol}}{22.4} \times \frac{2 \text{ mol H}_2\text{S}}{2 \text{ mol}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{11.4 \text{ L H}_2\text{S}}$$

$$22) \frac{3.7 \text{ L O}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{6 \text{ mol CO}_2}{6 \text{ mol O}_2} \times \frac{22.4}{1 \text{ mol}} = \boxed{3.7 \text{ L CO}_2}$$

$$23) \frac{5.8 \text{ L CO}}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{5 \text{ mol H}_2}{12 \text{ mol CO}} \times \frac{22.4}{1 \text{ mol}} = \boxed{2.417 \text{ L H}_2}$$

$$\frac{5.8 \text{ L CO}}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{3 \text{ mol N}_2}{12 \text{ mol CO}} \times \frac{22.4}{1 \text{ mol}} = \boxed{1.45 \text{ L N}_2}$$

$$24) \frac{4.3 \text{ L CO}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{6 \text{ mol}}{12 \text{ mol}} \times \frac{22.4 \text{ L N}_2}{1 \text{ mol}} = \boxed{2.15 \text{ L N}_2}$$

$$\frac{4.3 \text{ L CO}_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{1 \text{ mol}}{12 \text{ mol}} \times \frac{22.4 \text{ L O}_2}{1 \text{ mol}} = \boxed{0.358 \text{ L O}_2}$$

$$25) \frac{1.6 \text{ L O}_2}{1} \times \frac{1 \text{ mol}}{22.4} \times \frac{4 \text{ mol}}{5 \text{ mol}} \times \frac{22.4 \text{ L CO}_2}{1 \text{ mol}} = \boxed{1.28 \text{ L CO}_2}$$