

## 4 • Chemical Equations and Stoichiometry

### PRACTICE TEST

- Balance the following equation:  

$$\underline{\hspace{1cm}} \text{NH}_3 + \underline{\hspace{1cm}} \text{O}_2 \rightarrow \underline{\hspace{1cm}} \text{NO}_2 + \underline{\hspace{1cm}} \text{H}_2\text{O}$$
 The balanced equation shows that 1.00 mole of  $\text{NH}_3$  requires      mole(s) of  $\text{O}_2$ .  
 a) 0.57                      c) 1.33  
 b) 1.25                      d) 1.75
- Write a balanced equation for the combustion of acetaldehyde,  $\text{CH}_3\text{CHO}$ .  
 When properly balanced, the equation indicates that      mole(s) of  $\text{O}_2$  are required for each mole of  $\text{CH}_3\text{CHO}$ .  
 a) 1                              c) 2.5  
 b) 2                              d) 3
- Balance the following equation with the **SMALLEST WHOLE NUMBER COEFFICIENTS** possible. Select the number that is the sum of the coefficients in the balanced equation:  

$$\underline{\hspace{1cm}} \text{KClO}_3 \rightarrow \underline{\hspace{1cm}} \text{KCl} + \underline{\hspace{1cm}} \text{O}_2$$
 a) 5            b) 6            c) 7            d) 8
- Write a balanced equation for the combustion of propane,  $\text{C}_3\text{H}_8$ .  
 When properly balanced, the equation indicates that      moles of  $\text{O}_2$  are required for each mole of  $\text{C}_3\text{H}_8$ .  
 a) 3            b) 3.5            c) 5            d) 8
- What is the **total** mass of products formed when 16 grams of  $\text{CH}_4$  is burned with excess oxygen?  
 a) 80 g                      c) 36 g  
 b) 44 g                      d) 32 g
- Calculate the mass of hydrogen formed when 25 g of aluminum reacts with excess hydrochloric acid.  

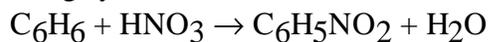
$$2\text{Al} + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2$$
 a) 0.41 g                      c) 1.2 g  
 b) 0.92 g                      d) 2.8 g
- How many grams of the mixed oxide,  $\text{Fe}_3\text{O}_4$ , are formed when 6.00 g of  $\text{O}_2$  react with Fe according to  

$$3\text{Fe} + 2\text{O}_2 \rightarrow \text{Fe}_3\text{O}_4$$
 a) 43.4                      c) 174  
 b) 86.8                      d) 21.7
- For the reaction:  

$$2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 + \text{Cl}_2 \rightarrow 2\text{KMnO}_4 + 2\text{KCl} + 2\text{H}_2\text{O}$$
 there is 100. g of each reactant available. Which reagent is the limiting reagent? [Molar Masses:  $\text{MnO}_2=86.9$ ;  $\text{KOH}=56.1$ ;  $\text{O}_2=32.0$ ;  $\text{Cl}_2=70.9$ ]  
 a)  $\text{MnO}_2$                       c)  $\text{O}_2$   
 b)  $\text{KOH}$                       d)  $\text{Cl}_2$
- How many grams of nitric acid,  $\text{HNO}_3$ , can be prepared from the reaction of 92.0 g of  $\text{NO}_2$  with 36.0 g  $\text{H}_2\text{O}$ ?  

$$3\text{NO}_2 + \text{H}_2\text{O} \rightarrow 2\text{HNO}_3 + \text{NO}$$
 a) 64                              c) 84  
 b) 76                              d) 116

10. The reaction of 25.0 g benzene,  $C_6H_6$ , with excess  $HNO_3$  resulted in 21.4 g  $C_6H_5NO_2$ . What is the percentage yield?

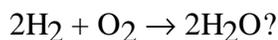


- a) 100%                      c) 54.3%  
b) 27.4%                      d) 85.6%

14. Styrene, the building block of polystyrene, is a hydrocarbon, a compound containing only C and H. A given sample is burned completely and it produces 1.481 g of  $CO_2$  and 0.303 g of  $H_2O$ . Determine the empirical formula of the compound.

- a) CH                              c)  $C_2H_3$   
b)  $CH_2$                               d)  $C_2H_5$

11. How many grams of  $H_2O$  will be formed when 16.0 g  $H_2$  is allowed to react with 16.0 g  $O_2$  according to

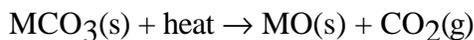


- a) 18.0 g                      c) 9.00 g  
b) 144 g                      d) 32.0 g

12. When 8.00 g of  $H_2$  reacts with 32.0 g of  $O_2$  in an explosion,  $2H_2 + O_2 \rightarrow 2H_2O$ , the final gas mixture will contain:

- a)  $H_2$ ,  $H_2O$ , and  $O_2$     c)  $O_2$  and  $H_2O$  only  
b)  $H_2$  and  $H_2O$  only    d)  $H_2$  and  $O_2$  only

13. 1.056 g of metal carbonate, containing an unknown metal, M, were heated to give the metal oxide and 0.376 g  $CO_2$ .



What is the identity of the metal M?

- a) Mg                              c) Zn  
b) Cu                              d) Ba

**Answers:**

1.	D	8.	B
2.	C	9.	C
3.	C	10.	C
4.	C	11.	A
5.	A	12.	B
6.	D	13.	B
7.	D	14.	A