



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?



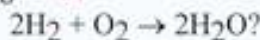
- a) 100%  
b) 27.4%  
c) 54.3%  
d) 85.6%

$$\% = \frac{21.4}{39.4} \times 100 = 54.3\%$$

THEORETICAL:

$$25.0 \text{ g } C_6H_6 \times \frac{1 \text{ mol } C_6H_6}{78.0 \text{ g } C_6H_6} \times \frac{1 \text{ mol } C_6H_5NO_2}{1 \text{ mol } C_6H_6} \times \frac{123 \text{ g } C_6H_5NO_2}{1 \text{ mol } C_6H_5NO_2} = 39.4 \text{ g } C_6H_5NO_2$$

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  
b) 144 g  
c) 9.00 g  
d) 32.0 g

$$16.0 \text{ g } O_2 \times \frac{1 \text{ mol } O_2}{32.0 \text{ g } O_2} \times \frac{2 \text{ mol } H_2O}{1 \text{ mol } O_2} \times \frac{18.0 \text{ g } H_2O}{1 \text{ mol } H_2O} = 18.0 \text{ g } H_2O$$

Estimate:  $\frac{(16)(2)}{(32)} = 1 \times 18$

14  $1 \text{ mol } CO_2 \approx 1 \text{ mol } O$   
 $1.481 \text{ g } CO_2 \times \frac{1 \text{ mol } CO_2}{44 \text{ g } CO_2} = 0.03366 \text{ mol } C$

$0.303 \text{ g } H_2O \times \frac{1 \text{ mol } H_2O}{18.0 \text{ g } H_2O} \times \frac{2 \text{ mol } H}{1 \text{ mol } H_2O} = 0.03367 \text{ mol } H$   
 $C : H = 1 : 1$

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

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



from above

$4 \text{ mol } H_2$   $1 \text{ mol } O_2$   $\therefore O_2$  is L.R.

no  $O_2$  left over

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  
b) Cu  
c) Zn  
d) Ba

$$0.376 \text{ g } CO_2 \times \frac{1 \text{ mol } CO_2}{44.0 \text{ g } CO_2} = 0.008545 \text{ mol } CO_2 = \text{mol } MCO_3$$

molar mass  $= \frac{1.056 \text{ g}}{0.008545 \text{ mol}} = 123.57 \text{ g } MCO_3$

$$\frac{60}{63.57} = M$$

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

See above right span

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