

Chemical Reactions

Set 18

1. a) $V(\text{CO}_2) = 6.50 \times 22.4$
 $= 146 \text{ L}$

b) $V(\text{H}_2) = 0.850 \times 22.4$
 $= 19.0 \text{ L}$
2. $n(\text{CH}_4) = \frac{4.50}{22.4}$
 $= 0.201 \text{ mol}$
 $n(\text{O}_2) = \frac{0.025}{22.4}$
 $= 1.12 \times 10^{-3} \text{ mol}$
3. a) $n(\text{C}_3\text{H}_8) = \frac{100.0}{44.094}$
 $= 2.27 \text{ mol}$
 $V(\text{C}_3\text{H}_8) = 2.27 \times 22.4$
 $= 50.8 \text{ L}$

b) $n(\text{CO}_2) = \frac{1000.0}{44.01}$
 $= 22.7 \text{ mol}$
 $V(\text{CO}_2) = 22.7 \times 22.4$
 $= 5.09 \times 10^2 \text{ L}$
4. 1.34 g in 1.00 L at STP
22.4 x 1.34 g in 22.4 L at STP
 $= 30.016 \text{ g mol}^{-1}$
 $m(\text{CH}_4) = 16.04 \text{ g mol}^{-1}$
 $m(\text{C}_2\text{H}_6) = 30.058 \text{ g mol}^{-1}$
 \therefore gas is C_2H_6 .
5. $m(\text{in } 22.4 \text{ L}) = 4.18 \times 22.4$
 $= 93.63 \text{ g}$
 $m(\text{gas}) = 93.6 \text{ g mol}^{-1}$.
6. $m(\text{in } 22.4\text{L}) = 3.29 \times 22.4$
 $= 78.2 \text{ g}$
Empirical formula mass (EFM) = 13.018
Ratio = $\frac{78.2}{13.018}$
 $= 6$
Molecular formula = 6 x EF
 $= \text{C}_6\text{H}_6$

7. 32.00 g in 22.4 L

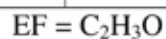
$$\rho = \frac{m}{V} = \frac{32.00}{22.4} \\ = 1.43 \text{ g L}^{-1}$$

8. $M(\text{CH}_4) = 16.04 \text{ g mol}^{-1}$

$$\rho = \frac{16.04}{22.4} \\ = 0.714 \text{ g L}^{-1}$$

9.

	C	H	O
m in 100 g	55.8	7.00	37.2
n	$\frac{55.8}{12.01}$	$\frac{7.00}{1.008}$	$\frac{37.2}{16.00}$
	4.65	6.94	2.325
Ratio	$\frac{4.64}{2.325}$	$\frac{6.94}{2.325}$	$\frac{2.325}{2.325}$
	2	3	1



b) 4.50 g in 1.17 L

x in 22.4 L

$$x = \frac{22.4}{1.17} \times 4.50 \\ = 86.2 \text{ g}$$

$$\text{Ratio} = \frac{86.2}{43.034} \\ = 2$$

$$\text{MF} = 2 \times \text{EF} \\ = \text{C}_4\text{H}_6\text{O}_2$$