

Chemical Maths : Answers.

1. $\text{Mass} = \text{Moles} \times M_r = 5.82 \times (22.9 + 35.4)$
 $= 339.31 \text{g}$

2. $\text{Moles} = \text{Mass} / M_r$

a) $\text{CO}_2 : 89.2 / (12 + 16 + 16) = 2.03 \text{ mol}$

b) $\text{Cl}_2 : 43.2 / (35.4 + 35.4) = 0.61 \text{ mol}$

c) $\text{Ca(OH)}_2 : 460 / (40.07 + (16+1) \times 2) = 6.21 \text{ mol}$

d) $\text{H}_2\text{O} : 25 \times 10^6 / (16 + 2 \times 1) = 1.4 \times 10^6 \text{ mol}$

3. $\text{Mass} = \text{Mol} \times M_r$

a) $\text{CuO} = 5.46 \times (63.5 + 16) = 434.7 \text{g}$

b) $\text{KMnO}_4 = 0.107 \times (39 + 54.9 + (16 \times 4)) = 16.84 \text{g}$

c) $\text{C}_2\text{H}_5\text{OH} = 2.85 \text{ mmol} = 0.00285 \text{ mol} \times ((12 \times 2) + (1 \times 5) + 16 + 1 \times 1)$
 $= 0.13 \text{g}$

d) $\text{HCN} = 1.45 \text{ } \mu\text{mol} = 1.45 \times 10^{-6} \text{ mol} \times (1 \times 1 + 12 + 14) = 5.29 \times 10^{-5} \text{g}$

4. $M_r (\text{sucrose}) = ((12 \times 12) + (1 \times 22) + (16 \times 11)) = 342.22 \text{ g mol}^{-1}$
 $\text{Moles} = 32 / 342.22 = 0.09 \text{ mol}$

$\text{concentration} = \text{Moles} / (\text{Volume} / 1000) = 0.09 / (500 / 1000) = 0.18 \text{ mol dm}^{-3}$

$$5) \text{Mr}(\text{C}_2\text{H}_5\text{Zn}) = ((12 \times 2) + (5 \times 1.01) + 65.4) = 95.45 \text{ g mol}^{-1}$$

$$\text{Moles} = 41.2 / 95.45 = 0.43 \text{ mol}$$

$$C = \text{Mol} / \text{Vol} = 0.43 / (125 / 1000) = 3.44 \text{ mol dm}^{-3}$$

$$6) \text{Mr}(\text{C}_8\text{H}_{17}\text{OH}) = ((12 \times 8) + (1.01 \times 17) + 16 + 1) = 130.17 \text{ g mol}^{-1}$$

$$\text{Moles} = 59.2 / 130.17 = 0.45 \text{ mol}$$

$$C = 0.45 / (1760 / 1000) = 0.25 \text{ mol dm}^{-3}$$

$$7) \text{Mr}(\text{C}_{12}\text{H}_{25}\text{Al}_2) = ((12 \times 12) + (30 \times 1.01) + (26.9 \times 2)) = 228.1 \text{ g mol}^{-1}$$

$$\text{Moles} = 5.176 / 228.1 = 0.02 \text{ mol}$$

$$C = 0.02 / (657 / 1000) = 0.03 \text{ mol dm}^{-3}$$

$$8) \text{Mr}(\text{CuO}) = 63.5 + 16 = 79.5 \text{ g mol}^{-1}$$

$$\text{Moles} = C \times V / 1000 = 0.2 \times 0.02 = 0.004 \text{ mol}$$

$$\text{Mass} = \text{Moles} \times \text{Mr} = 0.004 \times 79.5 = 0.318 \text{ g}$$

$$9) \text{Mr}(\text{C}_2\text{H}_5\text{CO}) = ((12 \times 2) + (1.01 \times 5) + 35.4) = 64.45 \text{ g mol}^{-1}$$

$$\text{Moles} = 0.04 \times (200 / 1000) = 0.008 \text{ mol}$$

$$\text{Mass} = 0.008 \times 64.45 = 0.515 \text{ g}$$

$$10) \text{Mr}(\text{CH}_2\text{Cl}_2)_3 = 14 + (((12 \times 2) + (1.01 \times 2)) \times 3) = 101.15 \text{ g mol}^{-1}$$

$$\text{Moles} = 1.24 \times (600 / 1000) = 0.744 \text{ mol}$$

$$\text{Mass} = 0.744 \times 101.15 = 75.25 \text{ g}$$

$$11) \text{Mr}(\text{C}_6\text{H}_5\text{COCl}) = ((12 \times 6) + (1.01 \times 5) + 12 + 16 + 35.4) = 140.45$$

$$\text{Moles} = 2.031 \times (10 / 1000) = 0.0203 \text{ mol}$$

$$\text{Mass} = 0.0203 \times 140.45 = 2.852 \text{ g}$$