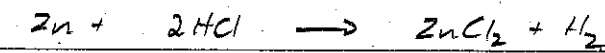


# REVISION SHEET 2 - ANSWERS

1. d)



3.27g                  3.30g

$$n = \frac{3.27}{65.4} \qquad n = \frac{3.30}{36.5}$$

$n = 0.05$

$n = 0.090$

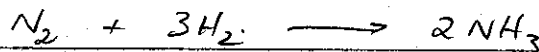
$n_{\text{ZnCl}_2} = \frac{1}{2} \times n_{\text{HCl}} = \frac{1}{2} \times 0.090 = 0.045$

mass  $\text{ZnCl}_2 = n \times \text{MM}$   
 $= 0.045 \times 137.5$   
 $= \boxed{6.19\text{g}}$

limiting reagent = HCl

Zn : 0.05	HCl : 0.090
<del>coeff</del>	<del>coeff</del>
= 0.05	= 0.090
1	2
= 0.05	= 0.045
limiting reagent	is HCl

2. (b)



77.8g                  14.2g

$$n = \frac{77.8}{28} \qquad n = \frac{14.2}{2}$$

$n = 2.76$

$n = 7.1$

$n_{\text{NH}_3} = \frac{2}{3} \times 7.1 = 4.73$

$m = n \times \text{MM}$   
 $= 4.73 \times 17$   
 $= \boxed{80.5}$

limiting reagent = H<sub>2</sub>

N <sub>2</sub> : 2.76	H <sub>2</sub> : 7.1
<del>coeff</del>	<del>coeff</del>
= 2.76	= 2.4
limiting reagent	

3. (d)



100g                  100g

$$n = \frac{100}{53.8} \qquad n = \frac{100}{12}$$

$n = 1.89$

$n = 8.33$

but not close to this value.

1.89 moles of SiO<sub>2</sub> would react with 5.67 (1.89 x 3) moles of C, leaving 2.66 moles of C remaining

L.R part. SiO<sub>2</sub> : 1.89/1      C : 8.33/3

SiO<sub>2</sub> is LR

: 1.89

: 2.8

$$\textcircled{4} \quad n_{\text{NiSO}_4} = \frac{m}{MM} = \frac{40}{154.7} = 0.259$$

$$n_{\text{NiSO}_4} = C \times V \quad \text{or} \quad V = \frac{n}{C} = \frac{0.259}{0.2}$$

$$= 1.293 \text{ litres}$$

$$= 1.3 \text{ litres}$$

$$\textcircled{5} \quad n_{\text{FeSO}_4} = C \times V = 0.90 \times 0.125 = 0.1125 \text{ moles}$$

$$n_{\text{FeSO}_4} = \frac{m}{MM} \quad \text{or} \quad m = n \times MM$$

$$= 0.1125 \times 151.85$$

$$= 17.1 \text{ g.}$$

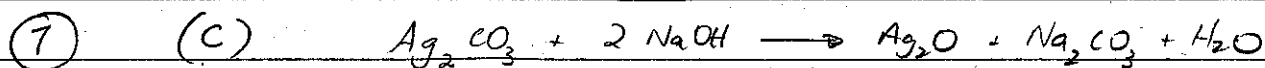
(c)

$$\textcircled{6} \quad n_{\text{NH}_3} = C \times V = 0.25 \text{ M} \times 0.5 \text{ L} = 0.125 \text{ moles}$$

$$\text{and} \quad n_{\text{NH}_3} = C \times V \quad \text{or} \quad V = \frac{n}{C} = \frac{0.125}{12 \text{ M}} = 0.0104 \text{ L}$$

$$= 10.4 \text{ mL}$$

(e)



$$285 \text{ mL } 1.0 \text{ M}$$

$$0.0285 \text{ L}$$

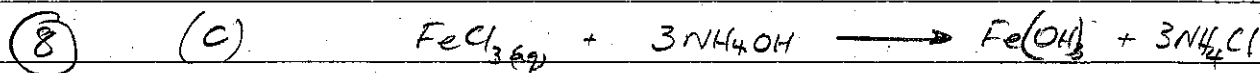
$$m = n \times MM$$

$$= 0.057 \times 275.5$$

$$= 15.7$$

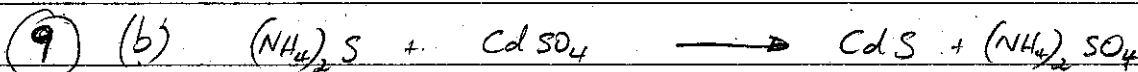
$$n_{\text{Ag}_2\text{CO}_3} = 0.057$$

$$n_{\text{Ag}_2\text{CO}_3} = \frac{2}{7} \times n \quad n = 0.0285$$



34g  
 $n_{\text{FeCl}_3} = \frac{m}{\text{MM}} = \frac{34}{162.2}$   
 $m = n \times \text{MM} = 0.63 \times 35 = 22.1\text{g}$

$n_{\text{FeCl}_3} = 0.21$   $n_{\text{NH}_4\text{OH}} = \frac{3}{1} \times n \rightarrow n_{\text{NH}_4\text{OH}} = \frac{3}{1} \times 0.21 = 0.63$



0.25L, 0.15M      0.12L, 0.053M

$n = C \times V$        $n = C \times V$   
 $n_{(\text{NH}_4)_2\text{S}} = 0.0375$        $n_{\text{CdSO}_4} = 0.0064$  (L.R.)  
 $n_{\text{CdS}} = \frac{1}{1} \times n \rightarrow n_{\text{CdS}} = 0.0064$   
 $m = n \times \text{MM} = 0.0064 \times 144.41 = 0.92\text{g}$

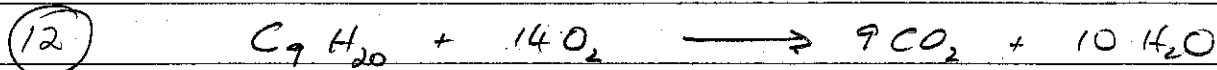
L. Reagent = 1:1 ratio so lowest amount is L.R =  $\text{CdSO}_4$  is L.R

10  $n_{\text{NaCl}} = \frac{m}{\text{M.M}} = \frac{10.0\text{g}}{58.5} = 0.17 \text{ molar}$

conc (Molarity) =  $\frac{n}{V} = \frac{0.17 \text{ moles}}{0.286 \text{ L}} = 0.6 \text{ M}$

(d)

11  $\text{MM} (\text{CaCO}_3) = \text{Ca} + \text{C} + \text{O} + \text{H}$   
 $= 40.1 + 12 + 16 + 1$   
 $= 69.1 \text{ g (or amu)}$



32g  
 $n = \frac{m}{MM}$   
 $= \frac{32}{128}$

$m = n \times MM$   
 $= 2.25 \times 44$   
 $= \boxed{99g}$

$n_{C_9H_{20}} = 0.25$   $\xrightarrow{n_{CO_2} = \frac{9}{1} \times n_{C_9H_{20}}}$   $n_{CO_2} = 2.25$

13 mass of Na in r.d.a. =  $\frac{100\%}{11\%} \times 270mg$   
 $= \underline{2.45g}$

$n_{Na} = \frac{m}{MM} = \frac{2.45}{23} = 0.107$  moles in r.d.a.

14 (a) Least number of molecules is the same as saying the least number of moles. (as the number of molecules is  $6.23 \times 10^{23} \times$  number of moles)  
 as  $n = \frac{m}{MM}$ , apply this to each, a is smallest.

15 (a)  $K_2CO_3$   $MM = 138.2$   
 $\% K = \frac{2 \times 39.1}{138.2} \times 100$   $\% C = \frac{12}{138.2} \times 100$   $\% O = \frac{3 \times 16}{138.2} \times 100$   
 $= 56.6\%$   $= 8.7\%$   $= 34.7\%$   
 $\checkmark (= 100\%)$

(b)  $(NH_4)_2O$   $MM = 52g$   
 $\% N = \frac{2 \times 14}{52} \times 100$   $\% H = \frac{8 \times 1}{52} \times 100$   $\% O = \frac{16}{52} \times 100$   
 $= 53.8\%$   $= 15.4\%$   $= 30.8\%$

(16)

63.6% C, 12.38% N, 14.14% O

Molar mass of compound is unknown, let =  $x$

number of C atoms in formula, let =  $a$

number of N atoms in formula, let =  $b$

number of O atoms in formula, let =  $c$

} must be whole numbers.

$$\% C = \frac{a \times 12}{x} \times 100 \quad \% N = \frac{b \times 14}{x} \times 100 \quad \% O = \frac{c \times 16}{x} \times 100$$

$$63.68 = \frac{12a}{x} \times 100 \quad 12.38 = \frac{14b}{x} \times 100$$

$$0.6368 = \frac{12a}{x} \quad 0.1238 = \frac{14b}{x}$$

$$\frac{0.6368 \times x}{12} = a \quad \frac{0.1238 \times x}{14} = b$$

$$0.053 \times x = a \quad 0.0088 \times x = b \quad 0.0088 \times x = c$$

OR

$$x = \frac{a}{0.053} \quad x = \frac{b}{0.0088} \quad x = \frac{c}{0.0088}$$

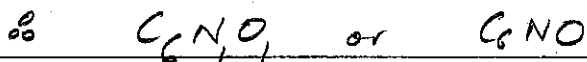
3 formulas for the molar mass, but each has a different variable ( $a, b, c$ ). Let's assume  $b = c = 1$ , as these formulas (for  $b$  &  $c$  are the same)

$$x = \frac{1}{0.0088} = 113.6 \text{ g}$$

$$\therefore \text{ for } a, \quad 113.6 = \frac{a}{0.053}$$

$$113.6 \times 0.053 = a$$

$$6.0 = a$$



(17) 3 key changes

- Volume changes
- Amount (volume and moles) of water has increased
- Ratio of NaCl to water has decreased

1 key "stay the same"

- amount/moles of NaCl remains the same.

(18) • The "same molarity" means they have the same ratio of moles of solute to litres of solvent (moles/L)

(identical) • The two solutions ~~to~~ have the same ratio (same relative amounts) of solute to solvent, measured in moles per litre (molarity)

(different) • They have different amounts of solute and solvent, The 400ml sample has twice the solute and twice the solvent of the 200ml sample.

$$(19) (a) C = \frac{n}{V} = \frac{1.457}{1.5} = \underline{\underline{0.97 M}}$$

$$(b) n = \frac{m}{MM} = \frac{0.515}{98} = 0.0053 \quad C = \frac{n}{V} = \frac{0.0053}{1.0} = \underline{\underline{0.0053 M}}$$

$$(c) n = \frac{m}{MM} = \frac{20.54}{213} = 0.097 \quad C = \frac{n}{V} = \frac{0.097}{1.575} = \underline{\underline{0.061 M}}$$

$$(d) n = \frac{m}{MM} = \frac{2760}{249.55} = 11.06 \quad C = \frac{n}{V} = \frac{11.06}{1.45} = \underline{\underline{7.63 M}}$$

$$(e) C = \frac{n}{V} = \frac{0.005653}{0.010} = \underline{\underline{0.5653 M}}$$

$$(f) n = \frac{m}{MM} = \frac{8.89 \times 10^3}{75} = 1.19 \times 10^4 \quad C = \frac{n}{V} = \frac{1.19 \times 10^4}{0.00105} = \underline{\underline{0.113 M}}$$