233/1
CHEMISTRY
PAPER 1

MARKING SCHEME

1. a) Luminous flame — 1mk

   b) Produces less heat
   or
   Blackens the conical flask/ sooty — 1mk

2. a) Fractionating column — ½ mk

   b) Fractional distillation — ½ mk

   c) Condensation would not occur — 1 mk

   d) Differences in boiling points — 1mk

3. - Dissolve the mixture in hot water — ½ mk
   - Filter the solution to remove insoluble solid Q as a residue — ½ mk
   - Cool the filtrate. R crystallizes and is removed by filtration — ½ mk
   - Evaporate the latter filtrate to obtain P — ½ mk

4. - H_2O has lone pairs of electrons which can be shared with H^+ ion — 1mk

5. a) Solution P ½ Weak acid — ½ mk

   b) Solution N ½ Weak base — ½ mk

6. a) E — 1 mk

   b) C=8 — ½ mk
   A=4 — ½ mk

7. - Helium is inert (unreactive) ½ while hydrogen is reactive — ½ mk

8. - Moles of zinc=$\frac{1.96}{63.5}$ =0.03 — ½ mk

   - Moles of HCL $\frac{100x0.2}{1000}$ =0.02 — ½ mk
   - Moles of zinc reacted $\frac{0.02}{2}$ =0.01 — ½ mk

     Zinc is in excess — ½ mk
   - Mole ratio of HCL: H_2 2:1

     Moles of H_2 (g) produced = $\frac{0.02}{}$ = 0.01 moles — ½ mk

- Volume of $H_{2\,g}$ at S.T.P= 0.01x22.4
  = 0.224 dm^3
  or 224cm^3 ½ mk

9. I 2, methyl pentane 1 mk

II 1- chloro propene 1 mk

a) To prevent oxidation of magnesium ribbon 1 mk
To generate steam 1 mk

b) $Mg_s + H_2O_{(l)} \rightarrow MgO_{(s)} + H_{2(g)}$ 1 mk
Should be balanced with state symbols

10. i) $K_2CO_{3\,(s)} + 2HCl_{(aq)} \rightarrow 2KCl_{(aq)} + CO_{2(g)} + H_2O_{(l)}$ 1 mk
Should be balanced with state symbols

ii) Moles of acid $\frac{25x0.2}{1000}$
=0.005 moles ½ mk

Moles of K2 CO3 = $\frac{0.005}{2}$
=0.0025 moles ½ mk

iii) RFM of K_2CO_3 = 138 ½ mk
Mass of K_2CO_3 in the mixture
138x0.0025= 0.345_g ½ mk
Mass of KCL in the mixture
0.9-0.345
= 0.555_g ½ mk

11. i) Zinc 1 mk

ii) Hydrogen 1mk

iii) $Zn^{2+} + 2OH^-_{(aq)} \rightarrow Zn(OH)_{2(s)}$ 1mk

12. a) Dynamic equilibrium is attained when the rate of the forward reaction is equal to that of the reverse reaction 1mk

b) The intensity of the yellow colour in the equilibrium mixture increased 1mk.
Additional of NaOH reduces the concentration ofH+ ions hence equilibrium shifts to the left 1mk

13. [a] White precipitate was formed 1mk

[b] $Pb^{2+}_{[aq]} + 2Cl^{-}$ [aq] $PbCl_2$[s] 1mk

14.

Element	C	H	O
% Composition	57.15	4.76	38.09 √ ½
R.A.M	12	1	16
$\frac{\%}{R.A.M}$	4.7625	4.76	2.380625√ ½
Moles ratio	$\frac{4.7625}{2.380625}$ =2.004 =2	$\frac{4.76}{2.380625}$ =2.00	$\frac{2.380625}{2.380625}$ =1 √ ½

Empirical formula= C_2H_2O√ ½

$n = \frac{126}{42}$ = 3 √ ½

Molecular formula = $(C_2H_2O)_3 = C_6H_6O_3$√ ½

15. (i) Copper(II) sulphate;√ 1 at 40^{0}C ONLY 28gm is soluble leaving the rest undissolved. √ 1
At 40^{0}C, all lead nitrate dissolves.

(ii) 35-28√ ½=7g√ ½

16. a) Strong acid ionizes completely in solution while concentrated acid contain high number of acid molecules per given volume. 1mk

b) Ammonia in water dissociate to produce hydroxide ion √ 1while in methybenze it remain in molecular form. √ 1

17. i) Sublimation √ 1
ii) Oxidation √ 1
iii) Dehydration √ 1

18. a) Filteration√ 1

b) $Ca(OH)_{(s)} + H_2O_{(l)}$ $Ca(OH)_{2(aq)}$ √ 1

c) Carbon(IV) oxide// Ammonia√ 1

19. a) Metallic bond√ 1

b) Group I√ 1; Has one delocalized electron from each atom√ 1

20. a) Melts into a silvery ball√ 1/darts on the surface of water√ 1/Floats on the surface of water/hissing sound (any two)

b) $2Na_{(s)} + H_2O_{(l)}$ $2NaOH(aq) + H_{2(g)}$ √ 1

21. a) Permanent hardness is caused by the presence of $MgSO_4$/ $CaSO_4$/$CaCl_2$ √ 1which do not decompose on heating√ 1

b) Addition of Sodium Carbonate√ ½/ammonium hydroxide√ ½/ Ion exchange (any two)

22.

1 (I) $2KNO_{3(s)} \longrightarrow 2KNO_{2(s)} + O_{2(g)}$ √1

(ii) $2AgNO_{3(s)} \longrightarrow 2Ag_{(s)} + 2NO_{2\,(g)} + O_{2\,(g)}$ √1

23. a) A brown solid is formed ✓1

b) $CuO_{(s)} + C_{(s)} \longrightarrow Cu_{(s)} + CO_{(g)}$ ✓1

c) Carbon (II) Oxide. ✓1

24. a) Rhombic or monoclinic✓1 Sulphur.

b) – For hardening rubber✓1
- Manufacture of sulphuric acid ✓1 Any two correct
- As a fungicide
- In making calcium hydrogen sulphite used in bleaching.

25.

14.

Bond breaking		Bond formation	
4 C-H	4x410 = 1640	6 C – H	6x410 = 2460
C = C	1 x610 = 610		
H – H	1x436 = 436	C – C	345
	+2686✓		-2805✓

$\triangle H = +2686 - 2805$

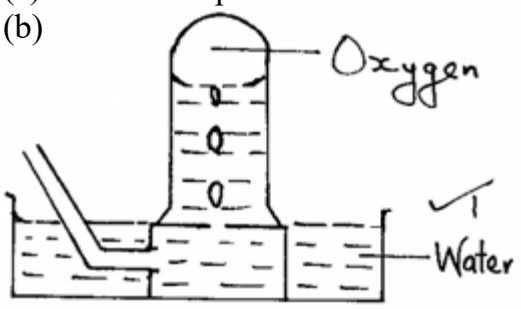
$= -119$ kJ/Mol✓

26. -The bulb lights √ 1
- Grey solid deposits at the cathode √ 1
- Brown gas bubbles produced at the anode √ 1

27. -Heat to sublime NH_4Cl. ✓½
- Add water ✓½ to dissolve NaCl. ✓½
- Filter ✓½ the residue is $PbCl_2$ ✓½
- Evaporate ✓½ the filtrate (NaCl solution) to obtain NaCl solid

28. (a) Sodium peroxide ✓1

(b)



c) $2Na_2O_{2(S)} + 2H_2O_{(l)} \rightarrow 4NaOH_{(aq)} + O_{2(g)}$

29. (a) $2KMnO_{4(S)} + 16HCl_{(aq)} \rightarrow 2KCl_{(aq)} + 2MnCl_{2(aq)} + 8H_2O_{(l)} + 5Cl_{2(g)}$ ✓1

(b) MnO_2 ✓1

(c) $Cl_{2(g)} + dye + H_2O_{(l)} \rightarrow 2HCl_{(aq)} + (dye - O)$ ✓2