

MARKING SCHEME

1.
 - a) Luminous flame 1mk
 - b) Produces less heat
or
Blackens the conical flask/ sooty 1mk
2.
 - a) Fractionating column $\frac{1}{2}$ mk
 - b) Fractional distillation $\frac{1}{2}$ mk
 - c) Condensation would not occur 1 mk
 - d) Differences in boiling points 1mk
3.
 - Dissolve the mixture in hot water $\frac{1}{2}$ mk
 - Filter the solution to remove insoluble solid Q as a residue $\frac{1}{2}$ mk
 - Cool the filtrate. R crystallizes and is removed by filtration $\frac{1}{2}$ mk
 - Evaporate the latter filtrate to obtain P $\frac{1}{2}$ mk
4.
 - H_2O has lone pairs of electrons which can be shared with H^+ ion 1mk
5.
 - a) Solution P $\frac{1}{2}$ Weak acid $\frac{1}{2}$ mk
 - b) Solution N $\frac{1}{2}$ Weak base $\frac{1}{2}$ mk
6.
 - a) E 1 mk
 - b) C=8 $\frac{1}{2}$ mk
A=4 $\frac{1}{2}$ mk
7.
 - Helium is inert (unreactive) $\frac{1}{2}$ while hydrogen is reactive $\frac{1}{2}$ mk
8.
 - Moles of zinc = $\frac{1.96}{63.5} = 0.03$ $\frac{1}{2}$ mk
 - Moles of HCL $\frac{100 \times 0.2}{1000} = 0.02$ $\frac{1}{2}$ mk
 - Moles of zinc reacted $\frac{0.02}{2} = 0.01$ $\frac{1}{2}$ mk
 - Zinc is in excess $\frac{1}{2}$ mk
 - Mole ratio of HCL: H_2 2:1

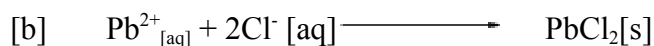
- Moles of H_2 (g) produced = $\frac{0.02}{2} = 0.01$ moles ½ mk
- Volume of H_2 g at S.T.P = 0.01×22.4
 $= 0.224 \text{ dm}^3$
or 224 cm^3 ½ mk
9. I 2, methyl pentane 1 mk
- II 1- chloro propene 1 mk
- a) To prevent oxidation of magnesium ribbon 1 mk
To generate steam 1 mk
- b) $\text{Mg}_s + \text{H}_2\text{O}_{(l)} \longrightarrow \text{MgO}_{(s)} + \text{H}_{2(g)}$ 1 mk
Should be balanced with state symbols
10. i) $\text{K}_2\text{CO}_{3(s)} + 2\text{HCl}_{(aq)} \longrightarrow 2\text{KCl}_{(aq)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(l)}$ 1 mk
Should be balanced with state symbols
- ii) Moles of acid $\frac{25 \times 0.2}{1000}$
 $= 0.005$ moles ½ mk
- Moles of $\text{K}_2\text{CO}_3 = \frac{0.005}{2}$
 $= 0.0025$ moles ½ mk
- iii) RFM of $\text{K}_2\text{CO}_3 = 138$ ½ mk
Mass of K_2CO_3 in the mixture
 $138 \times 0.0025 = 0.345 \text{ g}$ ½ mk
Mass of KCL in the mixture
 $0.9 - 0.345$
 $= 0.555 \text{ g}$ ½ mk
11. i) Zinc 1 mk
- ii) Hydrogen 1mk
- iii) $\text{Zn}^{2+} + 2\text{OH}^-_{(aq)} \longrightarrow \text{Zn}(\text{OH})_{2(s)}$ 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 of H^+ ions hence equilibrium shifts to the left

1mk

13. [a] White precipitate was formed

1mk



1mk

14.

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

Empirical formula = $C_2H_2O \sqrt{1/2}$

$$n = \frac{126}{42} = 3 \sqrt{1/2}$$

Molecular formula = $(C_2H_2O)_3 = C_6H_6O_3 \sqrt{1/2}$

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

(ii) $35 - 28 \sqrt{1/2} = 7g \sqrt{1/2}$

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 $\sqrt{1}$ while in methybenze it remain in molecular form. $\sqrt{1}$

17. i) Sublimation $\sqrt{1}$
ii) Oxidation $\sqrt{1}$
iii) Dehydration $\sqrt{1}$

18. a) Filtration $\sqrt{1}$



c) Carbon(IV) oxide// Ammonia $\sqrt{1}$

19. a) Metallic bond $\sqrt{1}$

- 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) $2\text{Na}_{(s)} + \text{H}_2\text{O}_{(l)} \longrightarrow 2\text{NaOH}_{(aq)} + \text{H}_{2(g)} \checkmark 1$
21. a) Permanent hardness is caused by the presence of $\text{MgSO}_4/\text{CaSO}_4/\text{CaCl}_2 \checkmark 1$ which do not decompose on heating ✓ 1
- b) Addition of Sodium Carbonate ✓ 1/2/ammonium hydroxide ✓ 1/2/ Ion exchange (any two)
22. 1 (I) $2\text{KNO}_{3(s)} \longrightarrow 2\text{KNO}_{2(s)} + \text{O}_{2(g)} \checkmark 1$
- (ii) $2\text{AgNO}_{3(s)} \longrightarrow 2\text{Ag}_{(s)} + 2\text{NO}_{2(g)} + \text{O}_{2(g)} \checkmark 1$
23. a) A brown solid is formed  1
- b) $\text{CuO}_{(s)} + \text{C}_{(s)} \longrightarrow \text{Cu}_{(s)} + \text{CO}_{(g)} \checkmark 1$
- 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.

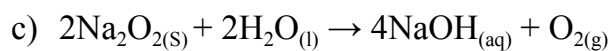
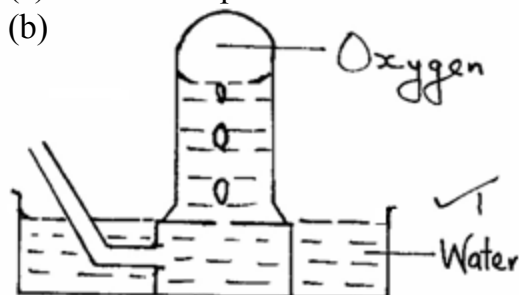
14.

Bond breaking	Bond formation
$4 \text{ C-H} - 4 \times 410 = 1640$	$6 \text{ C-H} \quad 6 \times 410$
$\text{C}=\text{C} - 1 \times 610 = 610$	$= 2460$
$\text{H-H} - 1 \times 436 = 436$	$\text{C-C} - \quad 345$
+2686 ✓	-2805 ✓
$\Delta H = +2686 - 2805$	
$= -119 \text{ kJ/Mol} \checkmark$	

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



29. (a) $2\text{KMnO}_{4(s)} + 16\text{HCl}_{(aq)} \rightarrow 2\text{KCl}_{(aq)} + 2\text{MnCl}_{2(aq)} + 8\text{H}_2\text{O}_{(l)} + 5\text{Cl}_{2(g)}$ ✓ 1
- (b) MnO_2 ✓ 1
- (c) $\text{Cl}_{2(g)} + \text{dye} + \text{H}_2\text{O}_{(l)} \rightarrow 2\text{HCl}_{(aq)} + (\text{dye} - \text{O})$ ✓ 2