

# KAPSABET RIGA SCHOOL

233/1

CHEMISTRY

PAPER 1

## MARKING SCHEME

- |    |    |  |      |
|----|----|--|------|
| 1. | a) | Luminous flame   | 1mk  |
|    | b) | Produces less heat<br>or<br>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 <sub>2</sub> O has lone pairs of electrons which can be shared with H <sup>+</sup> 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 $\frac{100 \times 0.2}{1000} = 0.02$  | 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 <sub>2</sub> 2:1  |      |

	Moles of H <sub>2</sub> (g) produced = <u>0.02</u> = 0.01 moles 2	½ mk
-	Volume of H <sub>2</sub> g at S.T.P= 0.01x22.4 = 0.224 dm <sup>3</sup> or 224cm <sup>3</sup>	½ mk
9.	I 2, methyl pentane	1 mk
	II 1- chloro propene	1 mk
a)	To prevent oxidation of magnesium ribbon To generate steam	1 mk 1 mk
b)	Mg <sub>s</sub> + H <sub>2</sub> O <sub>(l)</sub> → MgO <sub>(s)</sub> + H <sub>2(g)</sub> Should be balanced with state symbols	1 mk
10. i)	K <sub>2</sub> CO <sub>3(s)</sub> + 2HCl <sub>(aq)</sub> → 2KCl <sub>(aq)</sub> + CO <sub>2(g)</sub> + H <sub>2</sub> O <sub>(l)</sub> Should be balanced with state symbols	1 mk
ii)	Moles of acid <u>25x0.2</u> 1000 =0.005 moles	½ mk
	Moles of K <sub>2</sub> CO <sub>3</sub> = <u>0.005</u> 2 =0.0025 moles	½ mk
iii)	RFM of K <sub>2</sub> CO <sub>3</sub> = 138 Mass of K <sub>2</sub> CO <sub>3</sub> in the mixture 138x0.0025= 0.345 <sub>g</sub> Mass of KCL in the mixture 0.9-0.345 = 0.555 <sub>g</sub>	½ mk ½ mk ½ mk
11. i)	Zinc	1 mk
ii)	Hydrogen	1mk
iii)	Zn <sup>2+</sup> + 2OH <sup>-</sup> <sub>(aq)</sub> → Zn(OH) <sub>2(s)</sub>	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<sup>+</sup> ions hence equilibrium shifts to the left

13. [a] White precipitate was formed 1mk



14.

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

Empirical formula = C<sub>2</sub>H<sub>2</sub>O $\sqrt{\frac{1}{2}}$

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

Molecular formula = (C<sub>2</sub>H<sub>2</sub>O)<sub>3</sub> = C<sub>6</sub>H<sub>6</sub>O<sub>3</sub> $\sqrt{\frac{1}{2}}$

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

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

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  $\sqrt{1}$



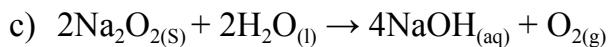
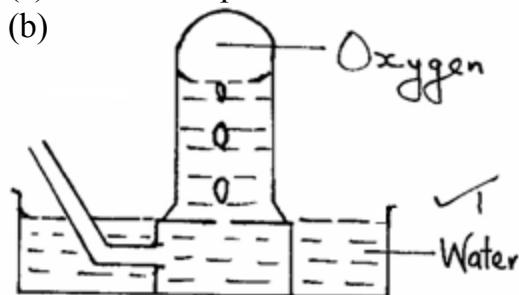
- c) Carbon(IV) oxide// Ammonia  $\sqrt{1}$

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)  $2\text{Na}_{(\text{s})} + \text{H}_2\text{O}_{(\text{l})} \longrightarrow 2\text{NaOH}_{(\text{aq})} + \text{H}_{2(\text{g})}$  ✓ 1
21. a) Permanent hardness is caused by the presence of  $\text{MgSO}_4/\text{CaSO}_4/\text{CaCl}_2$  ✓ 1 which do not decompose on heating ✓ 1  
 b) Addition of Sodium Carbonate ✓ 1/ ammonium hydroxide ✓ 1/ Ion exchange (any two)
- 22.
- 1 (I)  $2\text{KNO}_{3(\text{s})} \longrightarrow 2\text{KNO}_{2(\text{s})} + \text{O}_{2(\text{g})}$  ✓ 1
- (ii)  $2\text{AgNO}_{3(\text{s})} \longrightarrow 2\text{Ag}_{(\text{s})} + 2\text{NO}_{2(\text{g})} + \text{O}_{2(\text{g})}$  ✓ 1
23. a) A brown solid is formed. ✓ 1  
 b)  $\text{CuO}_{(\text{s})} + \text{C}_{(\text{s})} \longrightarrow \text{Cu}_{(\text{s})} + \text{CO}_{(\text{g})}$  ✓ 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.
- |  |  |
|--|--|
| <b>Bond breaking</b><br>$4 \text{ C-H} - 4 \times 410 = 1640$<br>$\text{C} = \text{C} - 1 \times 610 = 610$<br>$\text{H} - \text{H} - 1 \times 436 = \frac{436}{+2686} \checkmark$ | <b>Bond formation</b><br>$6 \text{ C-H} \quad 6 \times 410 = 2460$<br>$\text{C} - \text{C} - \frac{345}{-2805} \checkmark$ |
|--|--|
- $$\Delta H = +2686 - 2805$$
- $$= -119 \text{ kJ/Mol} \checkmark |$$
26. -The bulb lights ✓ 1  
 - Grey solid deposits at the cathode ✓ 1  
 - Brown gas bubbles produced at the anode ✓ 1

- 27.
- Heat to sublime  $\text{NH}_4\text{Cl}$ . ✓½
  - Add water ✓½ to dissolve  $\text{NaCl}$ . ✓½
  - Filter ✓½ the residue is  $\text{PbCl}_2$  ✓½
  - Evaporate ✓½ the filtrate ( $\text{NaCl}$  solution) to obtain  $\text{NaCl}$  solid

28. (a) Sodium peroxide ✓<sup>1</sup>



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