

MARKING SCHEME CHEM FORM 4

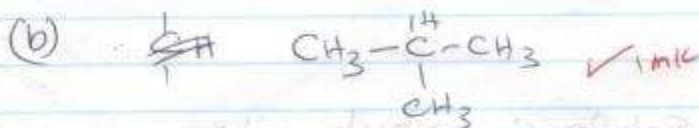
PP1

Chemistry Paper 1.

MARKING SCHEME.

- (a) Allotropy is the existence of an element in different forms but same physical state while isomerism is existence of a compound with same molecular formula but different structural formula.

2 marks Both must be correct.



2 methyl propane. ✓ 1mk.

- 2(a) The Volume of a fixed given mass of gas is directly proportional to its absolute temperature at constant pressure.

- 2(a) The rate of diffusion of a gas is inversely proportional to the square root of its density. ✓ 1mk.

$$\frac{50}{T_1} = \frac{\sqrt{32}}{\sqrt{64}}$$

$$\frac{2500}{T_1^2} = \frac{32}{64}$$

$$T_1^2 = 2500 \times \frac{64}{32} = 5000$$

$$T_1 = 70.7 \text{ seconds}$$

- 3(a) Halogens. ✓ 1mk

- (b) Astatine has a higher atomic radius than Iodine. Astatine has a higher larger atomic radius than Iodine. Hence forces of attraction. ✓ 1mk.

(4) Heat the mixture Iron(III) chloride sublimes and collect on cooler parts of apparatus.
Add water to the remaining mixture Potassium chloride dissolves. Filter off Zinc(II) oxide as residue. Evaporate filtrate to obtain Potassium chloride.

(5) A fuel is any substance which when heated produces heat energy.

(b) Availability, ease of storage, environmental pollution
2 marks (any two)

(6) Finely divided Iron/Platinum.

(ii) Vanadium(V) oxide. (1mk)

(b) Cracking of alkanes / passing steam over heated coke. (1mk)

(c) $(\text{NH}_4)_2\text{SO}_4$ (1mk)

(7) Take a sample of water add Barium nitrate followed by a few drops of dilute HCl.
A white ppt that persists on addition of HCl indicates presence of SO_4^{2-} in the water. (2 marks)

(b) Ca^{2+} ions are good for teeth and bone formation.
- Good for brewing. (1mk)

(13)

$$\textcircled{8} \quad \Delta T = 27 - 21 \quad (1 \text{ mark}) \quad = 6 \text{ K}$$

$$\Delta H = \frac{100}{1000} \times 4.2 \times 6. \quad (1 \text{ mark})$$

$$= 2.52 \text{ KJ}$$

$$1000 \text{ cm}^3 \text{ of HCl} \rightarrow 2 \text{ M}$$

$$50 \text{ cm}^3 \text{ of HCl} = \frac{2}{1000} \times 50$$

$$= 0.1 \text{ moles} \quad (1 \text{ mark})$$

$$0.1 \text{ moles} \rightarrow 2.52 \text{ KJ}$$

$$1 \text{ mole} \rightarrow \frac{2.52}{0.1} \times 1$$

$$= 25.2 \text{ KJ/mole} \quad (1 \text{ mark})$$

$$\textcircled{9} \quad R.A.M = \frac{62.93 \times 69.09 + 64.93 \times 30.91}{100} \quad (1 \text{ mark})$$

$$= \frac{4347.83 + 2006.99}{100} \quad (1 \text{ mark})$$

$$= 63.55 \quad (1 \text{ mark})$$

- $\textcircled{10}$ (a) N_2O (1 mark)
 (b) Na_2O (1 mark)
 (c) ZnO (1 mark)

$\textcircled{11}$ The volume of a fixed mass of gas is directly proportional to the absolute temperature at constant pressure. (1 mark)
 (10 marks)

$$(b) \frac{2 \times 4.2}{300} = \frac{P_2 \times 2.1}{450} \quad (1 \text{ mark})$$

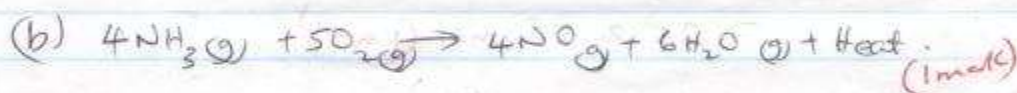
$$P_2 = \frac{2 \times 4.2 \times 450}{300 \times 2.1} \quad (1 \text{ mark})$$

$$= 5.33 \text{ atmospheres} \quad (1 \text{ mark})$$

(12) X - Platinum-Rhodium catalyst. air (1 mark)

Y - ~~Water~~ Water (1 mark)

Z - NO_2 (1 mark)



(c) - Manufacture of nitrogenous fertilizers.

- dyes

- Explosive (1 mark)

- Pickling of metals

(13) Add ^(1 mark) dilute nitric acid to form Calcium nitrate. Add aqueous Sodium ^(1 mark) carbonate/Potassium carbonate to precipitate Calcium carbonate. Filter off calcium carbonate and dry it between ^(1 mark) filter papers.

(14) (a) Anode shows $\downarrow$ mark
Cathode shows $\downarrow$ mark

(b) Solid Lead(II) iodide does not contain mobile ions 1 mark

(c) Cathode $\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb(s)}$ (1 mark)

Anode $2\text{I}^- \rightarrow \text{I}_2\text{(s)} + 2\text{e}^-$ (1 mark)

(15) (a) Method of collection 1 mark - Chlorine is denser than air and should be collected by downward delivery. 1 mark

(b) Drying agent 1 mark - Calcium oxide would react with chlorine. 1 mark

(b) - bleaching powder CaOCl_2 + dil HCl. 1 mark and 1 mark must be correct.
Manganese(IV) oxide + dil HCl. Correct.
- Sodium chloride, Manganese(IV) oxide and Conc Sulfuric(VI) acid.

(16) (a) P and Q. (1 mark)

(b) Q. (1 mark)

(c) Pink/red. (1 mark)

(11)

(17) C ^{1/2 mark} high melting point and boiling point and good conductor of electricity in Liquid form.

(18) A ^{1/2 mark} - high melting point and boiling point Conducts electricity in solid and liquid form.

(19) D ^{1/2 mark} high mpt & bpt but poor conductor in Liquid and solid form.

(20) Y W Z X ^{2 marks}

(19) (a) B ^(1 mark)

(b) Pollutes environment - it is non biodegradable. ^(1 mark)

(20) C H O ^{1/2 mark}

48.7

8.1

43.2

mdes

$\frac{48.7}{12}$

$\frac{8.1}{1}$

$\frac{43.2}{16}$ ^(1/2 mark)

4.058

8.1

2.7

Ratio

1.5

3

1

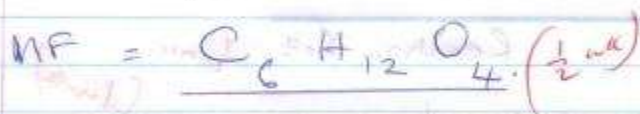
^(1/2 mark)

$$\begin{array}{ccc} \text{Ratio} & \frac{3}{2} & 3 & 1 \\ & 3 & 6 & 2 \end{array}$$



$$EFM = 74$$

$$n = \frac{148}{74} = 2 \quad (1 \text{ mark})$$



(21) A solution that cannot dissolve any more solute at a particular temperature. (1 mark)

(b) Mass of water in solution = 21 gm (1 mark)

$$\begin{array}{l} 21 \text{ gm water} \rightarrow 7 \text{ gm} \\ 100 \text{ gm} \end{array}$$

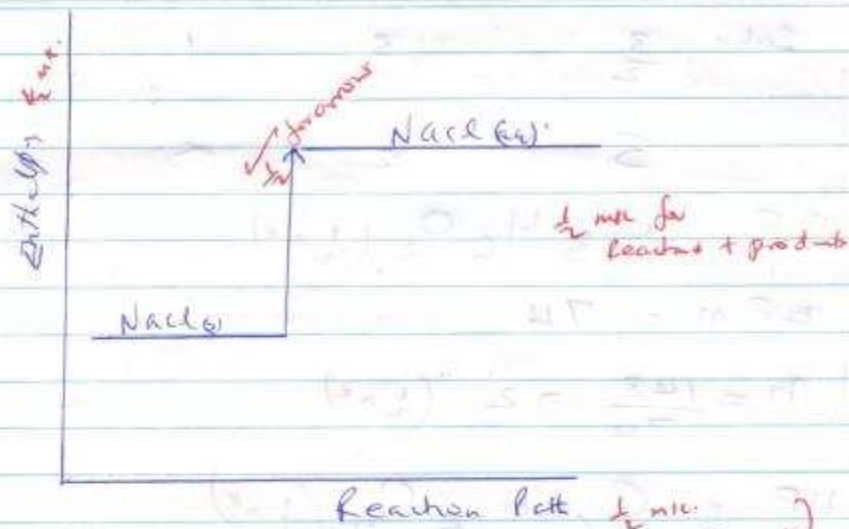
$$\frac{7}{21} \times 100 = 33.33 \text{ gm per 100 g of water} \quad (1 \text{ mark})$$

(22) $\Delta H_{\text{solution}} = \Delta H_{\text{calu}} + \Delta H_{\text{hydration}}$

$$= 781 + -774 \quad (1 \text{ mark})$$

$$= 7 \text{ KJ} \quad (1 \text{ mark})$$

(74)



(23) (a) Conc Sulphuric(VI) acid is hygroscopic and absorbs water causing rise in ~~water~~ level. (1 mark)

(b) It is used as a drying agent. (1 mark)

(24) (i) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ Hydrated Iron(III) oxide (1 mark)

(ii) Moisture, air (1 mark)

(iii) Painting, Oiling, Galvanizing, Anodizing (1 mark)

(8)