

CHEMISTRY PAPER 1

MARKING SCHEME

1.
 - a) It absorbed moisture from air
 - b) Used as a drying agent

2.
 - a) $(C_2H_3)_n = 54$ $27n = 54$ $n = 2$
 $(12 \times 2) + (1 \times 3)_n = 54$ MF C_4H_6
 - b) $H - C = C - C - C - H$ But -1

3.
 - i) it decreases as temperature increases
 - ii) Exothermic, as the volume of SO_3 decreases in temperature increases.

4.
 - i) C and D
 - ii) Endothermic
 - iii) heat of solution = lattice energy + hydration energy
 $+ 2493 + -1891 + (-840 \times 2)$
 $+2493 - 3571$
 -1078 kJ/mol

5. diagram

- a) Its explosive if ignited in air
 - b) Reduction
 - c) Manufacture of Ammonia
 Manufacture of Hydrochloric acid.

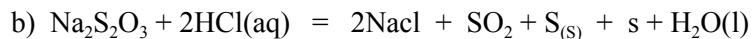
6.
 - a) $2NaOH(aq) + Cl_2(g) \rightarrow NaCl(aq) + NaOCl(aq) + H_2O(l)$
 - b) sodium chlorate (I)
 $NaOCl(aq) + dye \rightarrow NaCl(aq) + (dye + O)$

7. Isomers are compound with the same molecular formula but different structure formula while isotopes are atoms with same atomic no. but different mass number.

8.
 $(NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l))$
 $20 \text{ cm}^3 \quad 15 \text{ cm}^3, 1 \text{ m}$
 Moles of $HCl = \frac{15 \times 1}{1000} = 0.015 \text{ moles}$
 Mole ratio $NaOH; HCl$ 1 : 1
 Mole of $NaOH = 0.015 \text{ moles}$
 $0.015 \text{ moles} = 20 \text{ cm}^3$
 250 cm^3
 $\frac{250 \times 0.015}{20} = 0.1875$
 $2 \text{ fm of } NaOH = 23 + 176 + 1 = 40$
 $\text{Press} = 40 \times 0.1875 = 7.5 \text{ g}$

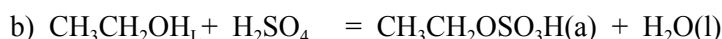
 Percentage $\frac{7.5 \times 100}{10} = 75\%$

9. a) $(+1 \times 2) + 25 + (-2 \times 3) = 0$
 $+ 2 + 25 - 6 = 0$
 $25 = +4$
 $5 = +2$



- d) - Preparation of Cathodesulphur
 - Determining reaction rate

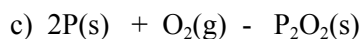
10. a) R - concentrated sulphuric (VI) acid
 T - ethyl hydrogen sulphate



11. a) i) sugar = Dehydrating agent
 ii) Copper metal = Oxidising agent

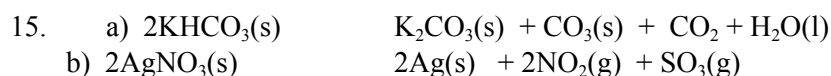


12. a) P 2 : 8 : 1 R 2 : 8 : 3
 Q 2 : 8 : 8 : 1 T 2 : 8 : 6



13. a) is more reactive than E
 Reason.
 D requires less energy to lose electron from the outmost energy level

14. i)
 ii) Max mass of a solute that dissolves in 100g of water at a particular temperature
 iii) Extraction of sodium chloride in Magadi



16. a) Charles Law

The volume of a given mass of a gas is directly proportional to absolute temperature at constant pressure.

b) $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$
 $\frac{98.31 \times 146}{297} = \frac{13.5 \times 101.325}{T_2}$

$T_2 = \frac{297 \times 135 \times 101.325}{98.31 \times 146}$

$T_2 = 283\text{K}$
 Or 10°C

17. The PH of X_2O in water is higher than YO_2 since it forms a basic solution while YO_2 forms an acidic solution.

18. a) Strong acid ionizes completely in solution while concentrated acid contains high number of acid molecules per given volume.
b) Ammonia in water dissociates to produce hydroxide ion while in methybenzene it remains in molecular form.

19.
$$2C_2H_6 + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(l)$$

$$\frac{150cm^3}{60cm^3} \times \frac{60cm^3}{7} = 17.14cm^3 \text{ of ethane required.}$$

Volume of CO_2 formed = $34.28cm^3$

Volume of excess ethane = $132.86cm^3$

20. a) Ammonium ion

$H = 1, N = 7$



b)

21.

22. (a) IV

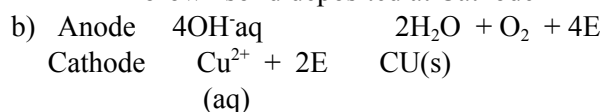
(b) I and IV Al_2O_3 is amphoteric

23.

a) B A C

b) C

24. a) - The blue colour of solution fades
- A brown solid deposited at Cathode



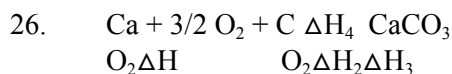
25. (a) The rate of diffusion of a given volume of a gas is inversely proportional to square root of its density at constant temperature and pressure.

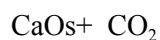
b)
$$\frac{\text{Rate } D}{\text{Rate } O_2} = \frac{\sqrt{(\text{mm}O_2)}}{\text{MMD}} \times \frac{400}{50} = 8, \frac{600}{30} = 20$$

$$\frac{\text{Rate } D}{\text{Rate } O} \times \sqrt{\frac{32}{\text{mm}D}} \times \frac{8}{20} = \sqrt{\frac{32}{\text{mm}D}} \times D = 199.9$$

$$\sqrt{\text{mm}D} = 20/8 \times \sqrt{32}$$

$$\text{JmmD} = 14.14$$





$$\begin{aligned}\Delta H_4 &= \Delta H_1 + \Delta H_2 + \Delta H_3 \\ -1207 &= -635 - 394 + \Delta H_3 \\ -1207 + 635 + 394 &= \Delta H_3 \\ \Delta H_3 &= -178 \text{ kJ/mol}\end{aligned}$$

27. Add excess lead (II) carbonate to dilute nitric (v) acid
Filter the mixture to obtain lead (II) nitrate as filtrate. Add dilute hydrochloric acid to filtrate and filter. Rinse the residue with distilled water and dry between filter paper.

28. $Q = it$
 $Q = 1.5 \times 15 \times 60 = 1350 \text{ C}$

b) $(96500 \times 2) / 1350 \text{ C}$
 $\frac{96500 \times 2 \times 0.26}{1350} = 37.17$

29. $\text{Q(s)} + 2\text{Ag}^+ \leftrightarrow \text{Q}^{2+}(\text{aq}) + 2\text{Ag(s)}$
 $\text{Q(s)} \leftrightarrow \text{Q(aq)} - 2\text{e}^- - 0.13\text{V}$
 $2\text{Ag}^+ + 2\text{e}^- \leftrightarrow 2\text{Ag} + 0.8\text{V}$
 $\text{Q(s)} + 2\text{Ag}^+(\text{aq}) \leftrightarrow \text{Q}^{2+}(\text{aq}) + 2\text{Ag(s)} + 0.67\text{V}$
 The reaction will occur.