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 x 2)
+2493 - 3571
-1078kj/mol

5. diagram

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

6. a) $2NaOH(aq) + Cl_2(g)$ $NaCl(aq) + naOCl(aq) + H_2O(l)$

b) sodium chlorate (l)
$NaOCl(aq)$ + dye $Nacl(aq) + (dye + O)$

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

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

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

9. a) (+1 x 2) + 25 + (-2 x 3) = 0
+ 2 + 25 – 6 = 0
25 = +4
5 = +2

b) $Na_2S_2O_3 + 2HCl(aq) = 2Nacl + SO_2 + S_{(S)} + s + H_2O(l)$

d) - Preparation of Cathodesulphur
- Determining reaction rate

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

b) $CH_3CH_2OH_L + H_2SO_4 = CH_3CH_2OSO_3H(a) + H_2O(l)$

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

b) $Cu + 2H_2SO_4(l)$ $CUSO_4(aq) + SO_2 + 2H_2O(l)$

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

b) Q_2 T

c) $2P(s) + O_2(g) - P_2O_2(s)$

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

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

15. a) $2KHCO_3(s)$ $K_2CO_3(s) + CO_3(s) + CO_2 + H_2O(l)$
b) $2AgNO_3(s)$ $2Ag(s) + 2NO_2(g) + SO_3(g)$

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

b) $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$\frac{98.31 \times 146}{297} = \frac{13.5 \times 101.32J}{T_2}$

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

$T_2 = 283K$

Or 10^0C

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

acidic solution.

18. a) Strong acid ionizes completely in solution while concentrated acid contain high number of acid molecules per given volume.
    b) Ammonia in water dissociate to produce hydroxide ion while in methybenze it remain in molecular form.

19. $2C_2H_6 + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(l)$
    $150cm^3$ $60cm^3$
    $60cm^3$ 7
    $\frac{2 \times 60}{7}$
    $= 17.14cm^3$ of ethane required.

    Volume of CO_2formed $= 34.28cm^3$
    Volume of excess ethane $= 132.86cm^3$

20. a) Ammonium ion
    H = 1, N= 7
    NH_4^+

    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
    b) Anode $4OH^-aq \rightarrow 2H_2O + O_2 + 4E$
    Cathode $Cu^{2+}(aq) + 2E \rightarrow CU(s)$

25. (a) The rate of diffusion of a given volume of a gas is inversely proportional to square not of its density at constant temperature and pressure.

    b) $\frac{Rate\ D}{Rate\ O_2} = \frac{\sqrt{(mmO_2)}}{MMD}\frac{400}{50} = 8, \frac{600}{30} = 20$
    $\frac{Rate\ D}{Rate\ O}$- $\sqrt{\frac{32}{mmD}}\frac{8}{20}$- $\sqrt{\frac{32}{mmD}}$D = 199.9
    $\sqrt{mmD} = 20/8 \times \sqrt{32}$
    JmmD = 14.14

26. $Ca + 3/2\ O_2 + C \triangle H_4 \rightarrow CaCO_3$
    $O_2\triangle H$ $O_2\triangle H_2\triangle H_3$
    CaOs+ CO_2

$\triangle H_4 = \triangle H_1 + \triangle H_2 + \triangle H_3$
$- 1207 = -635 \_ -394 + \triangle H_3$
$-1207 + 635 + 394 = \triangle H_3$
$\triangle H_3 = -178kj/mol$

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 x 15 x 60 = 1350C

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

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