MARKING SCHEME

SAMPLE PAPER 3

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PAPER 1

- Penalise if the equations are not balanced and have no states
- Penalise for wrong units or missing units
- Award mark for exhaustive explanations

1. i) L✓ This is because its's components ✓ correspond the illegal drug N

   ii) The line where the wet solvent creeps up the paper✓

2. $KOH_{(aq)} + HNO_{3(q)} \longrightarrow KNO_{3(aq)} + H_2O_{(l)}$ ✓ ½

   Mole ration is 1 : 1

   Moles of HNO3(aq) $= \frac{100 \times 2}{1000}$

   $= 0.2$ moles✓ ½

   Moles of $KOH_{(aq)}$ in $100cm^3$

   $= 0.2$ moles ✓½

   Moles of $KOH_{(aq)}$ in $200cm^3$

   $= 0.4$ moles✓ ½

   ∴ Mass y $= 0.4 \times 56$

   $= 22.4$ g✓ ½

   The value of y = 22.4 g ✓ ½

3. H_2O✓ it's proton donor . It donates an electron to $NH_{3(g)}$

4. a) i) Concentrated hydrochloric acid ✓ ½

   ii) Concentrated sulphuric (VI) acid ✓ ½

   b) i) The tubes in the wash bottles with the drying agent are arranged the other way round (opposite) ✓

   ii) Chlorine should be collected by downward delivery method✓

   iii) The tube taking the gas from the conical flask dips into the reactants✓

iv)

5. Hydrogen Chloride does not dissociate into ions in methylbenzene. ✓ On addition of water, HCl dissociates✓ and $H^+_{(aq)}$ reacts with carbonates evolving Carbon (IV) Oxide gas ($CO_{2\,(g)}$)

6. i) Y is a metal ✓

   ii) x is a non – metal ✓

   iii) x is insoluble in water ✓

7. a) i) Upward displacement of air or (accept any) downward delivery ✓

   ii) Downward displacement of air or ✓
   upward delivery

   b) P is more denser than Q✓ because it's collected by downward delivery ✓

8. Stage 1

   Process: Oxidation of carbon (coke) to carbon (II) oxide✓

   Stage 2

   Process :- Reduction of Zinc oxide✓

   Stage 3 :-

   Process Recycling of carbon (IV) oxide to regenerate ✓ ½ carbon (II) oxide ✓ ½

9. i) The structure of copper and graphite, have delocalized electrons. Copper metallic structure
   has a cubic structure is which every atom is surrounded by twelve✓ ½ other equidistant atoms of copper. Similary graphite have free electrons which makes graphite a good conductor✓ ½

   ii) All the outer electrons of carbon atoms in diamond are used to form strong covalent bonds. This makes it the hardest known substance✓

10. Place a few drops of CH_3CH_2OH on a water✓ glass and light it. It burns with a blue flame to produce $CO_{2(g)}$. No effect on $CH_3CH_2\,COOH$ acide . or CH_3CH_2OH also react with Pcl_5 to $Hcl_{(g)}$ ✓ (Award marks for any answer which distinguishes the two Substance)

11. $CxHy_{(g)} + O_{2(g)} \longrightarrow CO_{2(g)} + H_2O_{(l)}$ ✓ ½

	10 cm3	60cm3	40cm3 ✓ ½
Volume	1 vol	6 vols	4 vols ✓ ½ ***(Guy lussacs law of combing volumes)***
ratio	1 mole	6 moles	4 moles
No of moles			

$\therefore$ $Cx\ Hy_{(g)} + 6O_{2(g)} \longrightarrow 4\ Co_{2(g)} + 4\ H_2O_{(l)}$ ✓ ½

$\therefore$ x = 4✓ ½

y = 8✓ ½

The emphirical formula becomes $C_4H_{8(g)}$ ✓ ½

12. a) $Zn^{2+}_{(aq)} + 4\ NH_3(aq) \longrightarrow \left(Zn(NH_3)_4\right)^{2+}_{(aq)}$ ✓

b) Tetraamine Zincate (II) ion ✓

13. $\frac{V1P_1}{T_1} = \frac{P_2\ V_2}{T_2}$ ✓ ½

$\frac{105\ x\ 650}{259} = \frac{15\ x\ 690}{T_2}$ ✓ ½

$T_2 = \frac{15\ x\ 690\ x\ 259}{105\ x\ 650}$ ✓ ½

$= \frac{2680650}{68250}$ ✓ ½

= 39.276923 K ✓

or

= 39.28 k

14. i) Dissolve in concentrated H_2SO_4, $NH_{3(g)}$ and ethane (C_2H_4) will dissolve✓ leaving insoluble

$H_{2\ (g)}$. The gas obtained is $H_{2\ (g)}$ which can be removed✓

ii) $CH_2 = CH_{2\ (g)} + H_2SO_{4(l)} \longrightarrow CH_3CH_2OSO_3H_{\ (aq)}$ ✓

or

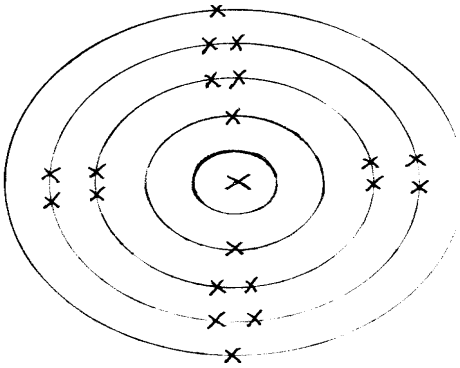
$CH_3CH_2\ HSO_{4\ (aq)}$ ✓ (award any of the two)

15. Burning Mg is accompanied with a lot of heat thus breaking $CO_{2(g)}$ into $c_{\ (s)}$ and $O_{2(aq)}$. O_{2g}

Support burning while zinc✓ is less reactive and accompanied with less energy not able to decompose $CO_{2(q)}$ to $C_{(s)}$ and O_2(g) and✓ as a result it put off

16. i) y ⟶ 2 : 8 : 6✓ ½

z ⟶ 2 : 8 : 8 : 2✓ ½



x – represent the electrons (award marks for dots or crosses)

17. Aqeous sulphuric acid changes anhydrous copper (II) sulphate to blue, since the water in ✓ the acid is used up it✓ becomes blue hydrated copper (II) sulphate.

18. Mass of saturated solution ⟶ 26.86 ✓ ½

- 15.86

11.00g

Mass of dry chlorate ($KClO_3$) 16.86

→ - 15.86 ✓ ½

1.00 g

Mass of water → 26.86

16.86

10.00 g ✓ ½

Therefore 10 g of water contains 1 g of $KCLO_{3(s)}$

It implies that 60g of water contains

→ $\frac{60 \times 1}{10}$ ✓ ½

= 6 g of $KCLO_3$ in 60 g of water at 30° C ✓ ½

The solubility of $KCLO_3$ is 10 g in 100g of water at 30° C✓ ½

19. a) $\left(\frac{x - y}{x} \right)$ X 100 %

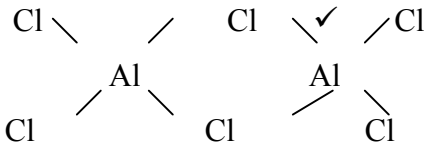
b) No change on red litmus ✓paper , but blue litmus paper changes ✓ to red, because the solution becomes acidic (release of $CO_{2(g)}$)

20. a) i) $AlCl_{3(s)}$ Covalent bond ✓

ii) $MgCl_{2(s)}$ Ionic bond ✓

b) $AlCl_3$ in vapour phase is

Al_2Cl_6 or ✓



(award marks for any)

21 Sharp boiling and melting points ✓

22. i) x – Ionisation (ionisation) ✓

Y – hydration (Hydration) ✓

ii) 150 + x + (- 2251) = 111

x + (- 2101) = 111✓ ½

x = 111 + 2101

= 2212 kJ mol $^{-1}$✓ ½

(award no mark minus units)

23. i) Soapless detergent✓

ii) It does not form scum (solid) ✓ ½

iii) Non- biodegradable hence cause frothing ✓ ½ in sewage as a result causes pollution

24. i) Observation :- changes the colour from pale yellow to dark – brown✓

Effect :- It absorbs energy thus break-up of dinitrogen tetraoxide to nitrogen (IV) oxide

molecules✓

25. a) i) Brown fumes observed (Brown gas given out) ✓ ½

ii) Black solid deposited✓ ½

iii) Blue colour fades because water of crystallization is given out✓ ½

(award any two correct answer)

b) $NO_{2(g)} + H_2O_{(g)} \longrightarrow HNO_{3(aq)} + HNO_{3(aq)}$

c) Relights a glowing splint

26. a) x – 143 ✓ ½

Y – 50 ✓ ½

b) i) Energy generations ✓ ½

ii) Food preservation ✓ ½

iii) Pest control ✓ ½

iv) Carbon – dating ✓ ½

(any two correct answers award)

27. $M^{2+}_{(aq)} + 2e^- \longrightarrow M_{(s)}$ - 0.44 v ✓ ½

J+(aq) + e- ⟶ J(s) + 0.52 v ✓ ½

∴ E reduced – E oxidised

= 0.52 - (-044) ✓ ½

= 0.96 v ✓ ½

Overall Reaction

$J^{+}_{(aq)} + M_{(s)} \longrightarrow J_{(s)} + M^{2+}_{(aq)} = +0.96V$ ✓ ½

The sulphate J_2SO_4 cannot be kept in container of metal M because it reacts with the container✓

and metal M displaces it (J) from the solution

28. a) $4NO_{2(g)} + 2Ca(OH)_{2(aq)} \longrightarrow Ca(NO_3)_{2(aq)} + Ca(NO_2)_{2\,(aq)} + 2H_2O_{(l)}$ ✓

No mark for unbalanced & no states

b) $3Cu_{\,(s)} + 8\,HNO_{3(aq)} \longrightarrow 3\,CU(NO_3)_{\,2(aq)} + 4\,H_2O_{(l)} + 2NO_{2(\,g)}$ ✓

(award no mark if it's not balanced and no states)

c) $S_{(s)} + 6HNO_{3(aq)} \longrightarrow H_2SO_{4(aq)} + 6NO_{2(g)} + 2H_{2\,(l)}$ ✓

29. i) $Nacl\,(\,s) \xrightarrow{H_20_{(l)}} Na+\,(aq) + Cl^-_{(aq)}$ ✓ ½

Mole ratio 1 : 1

1 mole of Nacl contains 6.023×10^{23} Cl^- ions ✓ ½

∴ 0.5 moles of Nacl will contain

$(6.023 \times 10^{23} \times 0.5)$ ions

$= 3.0115 \times 10^{23}$ ions of Cl^- ✓ ½

ii) $AlCl_{3(s)} \xrightarrow{H_20_{(l)}} Al^{\,3+}_{(aq)} + 3cl^-_{\,(aq)}$

1 mole of $AlCl_3$ contains 3 moles of $cl^-_{\,(aq)}$ ✓ ½

∴ 0.5 moles will contain 3×0.5

$= 1.5$ moles of cl^- ions

But 1 mole of $AlCl_3$ contains $6.023 \times 10^{\,23}$ ions

∴ 1.5 moles will contain✓ ½

$(1.5 \times 6.023 \times 10^{\,23})$ ions of cl^-

$= 9.0345 \times 10^{23}$ ions of $cl^-_{\,(aq)}$

✓ ½

30. Mgo has giant ionic ✓ structure while SiO_2 has giant covalent structure✓ . MgO in molten state contains ions which will conduct the electric current while SiO_2 does✓ not form ions.