MARKING SCHEME
SAMPLE PAPER 6
233 / 1

1. Smoky ✓1 Accept sooty
   - Not hot enough ✓1

2. $2NaOH_{(aq)} + H_2X_{(aq)} \longrightarrow Na_2x_{(aq)} + H_2O_{(l)}$ ✓ ½

   $1000cm^3$ of NaOH ⟶ 0.2 moles

   $40cm^3$ " " ⟶ $\frac{40 \times 0.2}{1000} = 0.008$ moles ✓ ½

   R.M.M = g ÷ No of moles

   = 0.2 ÷ 0.008 ✓ ½

   ⟶ $\frac{0.2}{0.008} = 25$ ✓ ½

3. Observations – solution turns pink ✓1
   Explanation OH^- ions from NaOH combines
   With H^+ reducing concentration ✓ ½ of H^+
   Equilibrium shifts to the right to increase its concentration ✓ ½

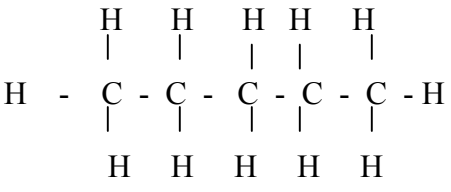
4. a) i) I – giant metallic reject metallic ✓1

   K – giant Ionic Reject Ionic ✓1
   b) K is a compound while I is an element ✓1

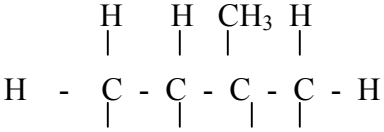
5. $No_2\ x + (-(2x\ 2) = 0$
   $x - 4 = 0$
   $x = +4$ ✓1 Charge must be present

   $No_3^-\ \ x - (^-2 \times 3) = {}^-1$
   $x - 6 = {}^-1$
   $x = {}^-1 + 6$ ✓1
   $x = +5$

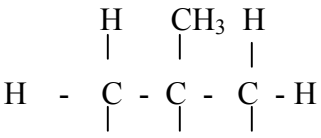
   $NH_3\ x + (1x3) = 0$ ✓1
   $x + 3 = 0$
   $x = -3$

6.


   Pentane



H H H H 2 – methyl butane



H CH_3 H 2,2- Dimethyl propane

½ mk for structure

½ mark for name

7. 1 mole of CO_2 = 44g

44g of CO_2 ⟶ 12 g of C

1.32g " ⟶ $\frac{12 \times 1.32}{44}$ = 0.36 of C ✓ ½

1 mole of H_2O = 18g

18g of H_2O ⟶ 2g of H

0.54g $\frac{2 \times 0.54}{18}$ = 0.06g of H ✓ ½

Element	C	H
Mass	0.36	0.06
Ram	12	1
Moles	$\frac{0.36}{12}$ = 0.03	$\frac{0.06}{1}$ = 0.06✓ ½
S.M.R	= $\frac{0.03}{0.03}$ = 1	$\frac{0.06}{0.03}$ 2 ✓ ½

E.F = CH_2

8. a) A = Manganese (iv) oxide ✓ ½

B = Hydrogen peroxide ✓ ½

b) i) Platinum wire glows ✓ ½

Explanation – reaction is exorthermic ✓ ½

ii) Brown gas produced ✓1

Explanation nitrogen (II) oxide produced is oxidized to nitrogen (IV) oxide ✓ ½

9. X : 2 33 – 4 = 229 ✓ ½

Y = 91 – 2 = 89✓ ½

b) **Nuclear reaction**	**Chemical reaction**
- Not affected by environmental / external factors. - Release large amounts of heat energy - Involves p+ n(in the nucleus)	- Affected by external factors - Heat energy released is much less - Involve electrons

Any 2 ½ mk each

10. React $PbCO_3$ with HNO_3; ✓ ½ $Pb(NO_3)_{2(aq)}$✓ ½ is formed

React $Pb(NO_3)_2$ with a soluble ✓ ½ chloride or dilute HCL; $PbCl_2$ ✓ ½ + a soluble NO_3^- formed Filter; ✓ ½ $PbCl_{2\,(s)}$ collected as a Residue; dry between✓ ½ filter papers or in the oven

11. i) Brown ring✓ 1

ii) $FeSO_4$. NO

$\frac{T1}{T2} = \frac{M1}{\sqrt{M2}}$ ✓ ½ $O_2 = 16 \times 2 = 32$

$\frac{20.3}{30.3} = \sqrt{\frac{32}{M_2}}$ ✓ ½

$\left\{\frac{20.3}{30.3}\right\}^2 = \frac{32}{M_2}$

$M_2 = \frac{32 \times 30.3^2}{20.3^2}$ ✓ ½

$= 71.292$ ✓ ½

12. ΔH_1 = Heat of solution of NaBr / Sodium Bromide✓1

ΔH_3 = lattice energy of NaBr / Sodium Bromide✓ 1

b) $\Delta H_{latt} = \Delta H_{soln} - \Delta H_{hyd}$

$= + 2 - {}^{-}741$ ✓ ½]

$= +2 + 741$

$= +743$kJ/ mol✓ ½

13. A strong acid has a high hydrogen ion concentration ✓ ½ per given volume while a concentrated acid has a high acid molecule concentration per given volume / high solute concentration per given volume

b) Acid = H_3O^+ ✓ ½

Reason = donates the H+ / Proton ✓ ½

Base = NH_3 ✓ ½

Reason = Accepts H+ / Proton ✓ ½

15. $Na_2SO_{3(s)} + 2HCl_{(aq)} \longrightarrow 2NaCl_{(aq)} + SO_{2(q)} + H_2O_{(l)}$ ✓ 1

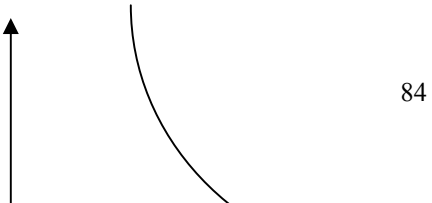
126g✓ ½ ⟶ 1 mole$SO_{2\,(q)}$

126g ⟶ 24000cm^3✓ ½

$\frac{126 \times 960}{24000}$ ✓ ½ = 960 cm^3

= 5.04g of Na_2SO_3✓ ½

16.



Pressure

(atm) ✓1 or volume against pressure

Volume cm^3

17. Add H_2O stir $K_2Cr_2O_7$ dissolves✓ ½ and filter, ✓ ½ then evaporate the filtrate and crystallise to get potassium Dichromate(iv) ✓ ½ .To the remaining mixture add an organic solvent, ✓ ½ and stir, sulphur dissolves then filter and evaporate filtrate to get sulphur✓ ½ $CaCO_3$ remaining as a residue✓ ½ orwtte

18.

½ mk each

Particle	Mass Number	No. of protons	No. of Neutrons	No. of electrons
S^{2-}	32	16	<u>16</u>	<u>18</u>
Li^{+}	<u>7</u>	3	4	<u>2</u>
Cl^{-}	37	<u>17</u>	<u>20</u>	18

19. a) Heat change / or heat envolved
when 1 <u>mole</u> ✓ 1 of substance
is completely burnt is oxygen.

b) $4C_{(s)} + 5H_2 \quad \triangle H + (C_4H10) \quad C_4H_{10(g)}$

(-286×5) ✓1 -2877

$+4O_2 \quad + 2\ ½\ O_2 \quad + 6\ ½\ O_2$

(-393×4)

$4CO_{2\ (g)} + 5H_2O_{(l)}$

$\triangle H_{+(C4H10)} + -2877 = 4 \times (-393) + 5 \times (-286)$ ✓ ½

$\triangle H_{+(C4H10)} = 2877 - 1572 - 1430$

$= 2877 - 3002$

$= -125kJ / mol$ ✓ ½

Or any other suitable method

20. Methyl / benzene is a non-polar ✓1 / molecular / covalent compound so HCl(g) will not ionize✓1 in it.
21. Iron (iii) oxide / Fe_20_3 ✓1
Silica / silicon(iv) oxide / $Si0_2$

b) It is used to dissolved Al2O3 which is amphoteric to precipitate the iron (iii) hydroxide✓ 1

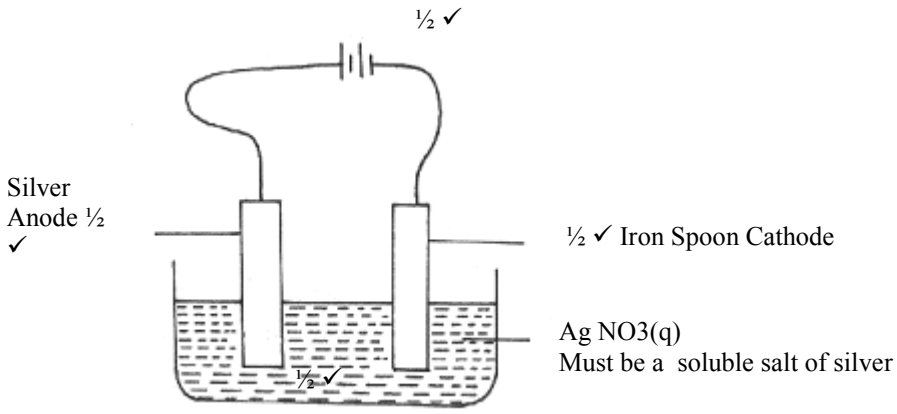
c) $2A1(OH)_{3\ (s)} \longrightarrow Al2\ O3_{(s)} + 3H2O_{(l)}$ ✓1

if not balanced = o states ½

22. a) Colour changes from orange to green ✓ ½
Explain $SO_2(g)$ formed by reduction of concentrated H2SO4 reduced orange $Cr_2O_7^{2-}$ to ✓ 1
Green Cr^{3+}
b) An oxidizing agent✓ ½

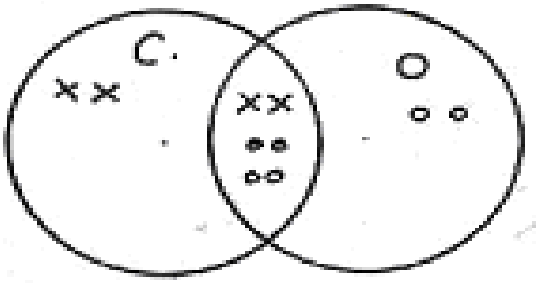
23. i) metals ✓ ½ Explain atomic radius is higher than ionic radius ½ mk
ii) C✓1
It has the leaset I.E 1 ∴electron lost easily / largest atomic radii ;- the outermost e- is far from the nucleus; feels less force of attraction and is easily lost ✓1
24. Zn has a higher tending to release e- ; will protect Fe✓1
Fe has a higher tendency to release electrons the tin ; will rust✓1

25.

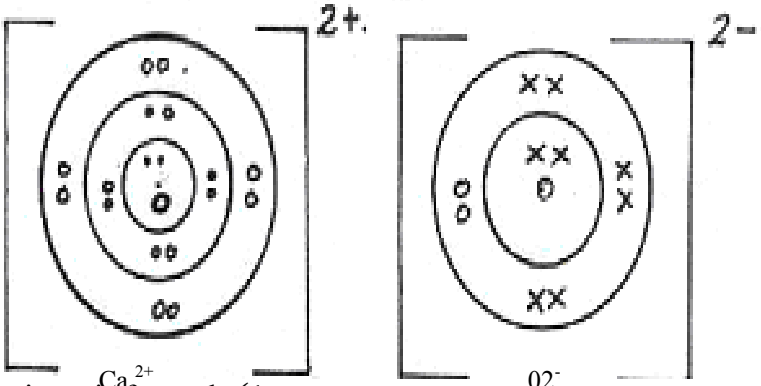


b) – purification of metals
- Anodising Aluminium ✓1 Anyone
- Extraction of metals Any other

26.



✓
✓ 1 ½



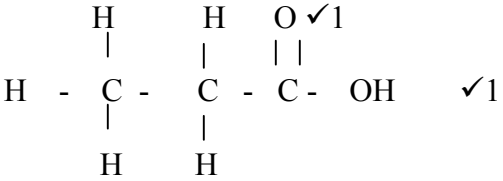
✓
✓ 1 ½

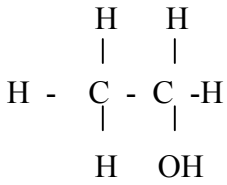
Ca^{2+} $O2^{-}$

27. A black precipate is formed ✓1
    b) $Pb^{2+}_{(aq)}$ $S^{2-}_{(aq)}$ ⟶ $Pbs_{(s)}$ ✓1

28. a) Fractional crystallization ✓1
    b) Observation 10g of potassium $KClO_3$(18 – 8 = 10g) ✓1
    Crystallizes while no KNO3 crystallizer
    Reason. The solubility of one salt has✓1 no effect on the solubility of the other

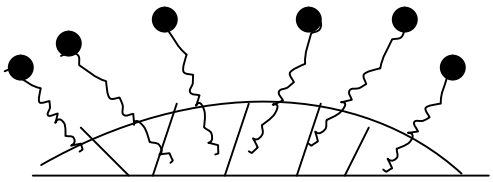
29.





30. a) K+ ✓ ½ Reject names
    Na+ ✓1
    b) K_2CO_3 (s) + $2HCL_{(aq)}$ ⟶ $2KCl_{(aq)}$ + $CO_{2(g)}$ + $H_2O_{(l)}$ ✓1
    or
    $Na_2CO_{3(s)}$ + $2HCl_{(aq)}$ ⟶ $2NaCl_{(aq)}$ + CO_2 + $H_2O_{(l)}$

    Step II
    $Ca(OH)_{2(aq)}$ + $CO_{2(g)}$ ⟶ $CaCO_{3(s)}$ + $H_2O_{(l)}$ ✓1

31.  2 mks