MARKING SCHEME CHEMISTRY PAPER 233/1 2008

1. a) Mass increases✓ ½ because oxygen combine with copper metal   (1½
    b) Mass decreases✓ ½. It decomposes lists gases that escape   (1½ ma

2. a) $2H^+ + 2e \rightarrow H_{2(g)}$ ✓   (1 mark)
    b) $Mg_{(s)}$ ✓

3. a) Ammonia gas ✓   (1 mark)

    b) Filtration/precipitation/Crystallization ✓   (1 mark)

    c) $2NaHCO_{3(s)} \rightarrow Na_2CO_{3(s)} + CO_{2(g)} + H_2O_{(g)}$ ✓   (1 mark)

4. a) $Q = It = 1.5 \times 15 \times 60c$
       $= 1350c$ ✓   (1 mark)

    b) **Alternative 1**

    $1350 = 0.6g$ of $M^{(½✓)}$

    3×96500

    $= \dfrac{0.26}{1350} \times 3 \times 96500$ ✓

    $= 55.76^{(½✓)}$

    Alternative 2

    $M = \dfrac{Q \times M}{F \times C}$

    $0.26 = \dfrac{1350 \times M}{96500 \times 3}$ (½✓)

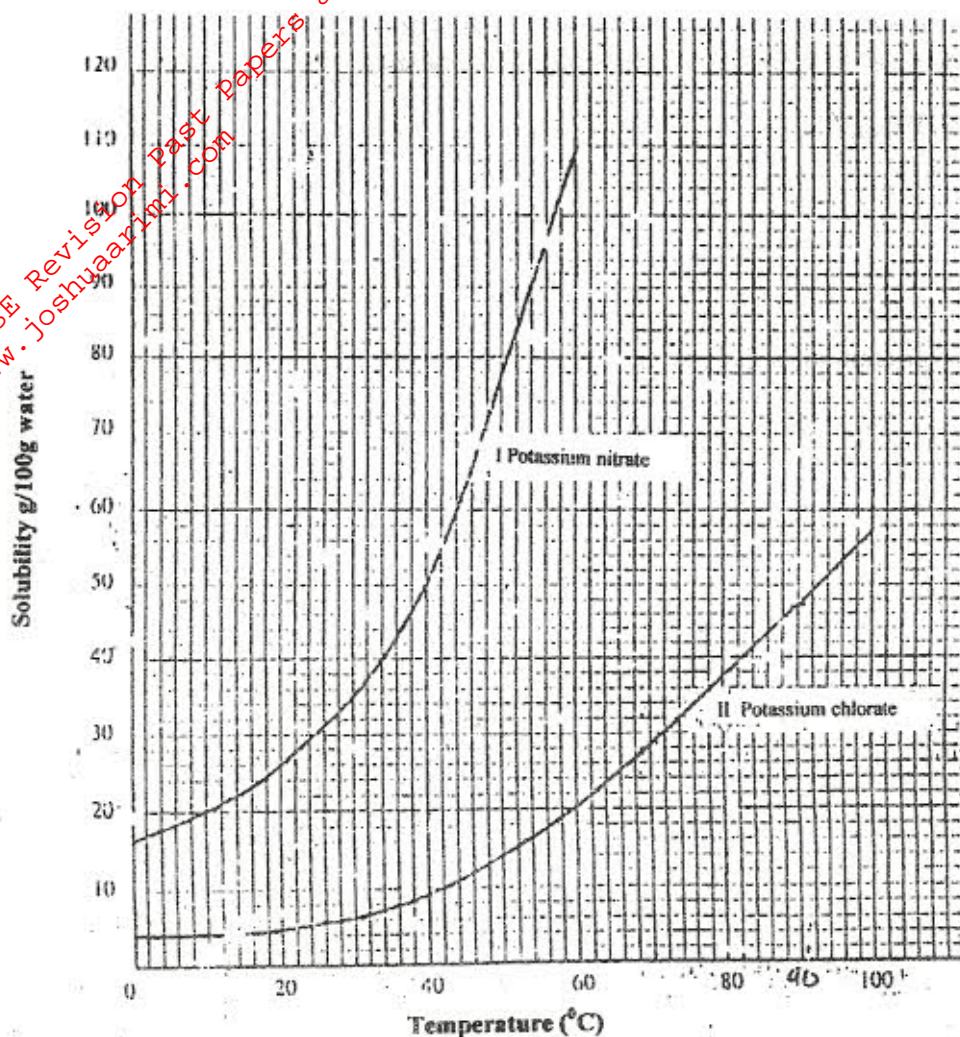 $M = \dfrac{0.26 \times 96500 \times 3}{1350}$ ✓

    $= 55.76^{(½✓)}$ (1 mark)

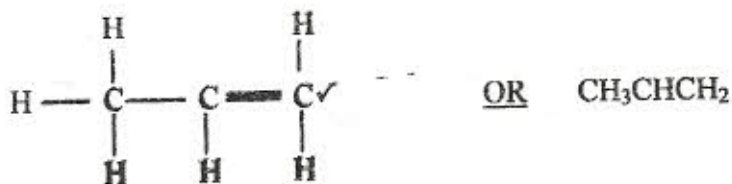5. a) $T_{(s)} + X^{2+}_{(aq)} \rightarrow T^{2+}_{(aq)} + X_{(s)}$ ✓   (1 mark)

    b) SXTU ✓✓   (2 marks)

6. Add excess CU to✓ HNO_3 filter✓ the mixture, add excess soluble carbonate, filter✓ to obtain residue. OR add CU to H_2SO_4 and warm - (not a must), filter✓ the mixture then add soluble✓ carbonate✓, filter the residue. OR Heat CU in oxygen to get CUO, dissolve✓ in an acid, filter, add a soluble carbonate✓ to the solution, filter to get residue✓.   3 marks)

7. - It's light/less dense✓

    - It's inert/noble/unreactive/rare gas/not flammable✓   (2 marks)

8. Study the solubility curves below and answer question that follows

Crystals of $KClO_3$ come out (½✓) because at 83^0C the solution is saturated (½✓) with $KClO_3$. Cooling causes (½✓) crystallization. All KNO_3 remain (½✓) in the solution because at 40^0C the solution is not yet3 saturated with KNO_3 OR $KClO_3$ forms solid $(40 - 9) = 31g✓$. KNO_3 do not form solid.

(3 marks)

9. a)

OR CH_3CHCH_2

(1 mark)

b) Propene or prop-1-ene✓

1 mark)

10. a) H – $CaCO_3$/Calcium carbonate✓/Limestone/Manile chips

(1 mark)

J – CaO/Calcium oxide✓/quick lime

(1 mark)

b) As a fertilizer/for liming/making morten✓/living furnaces/raising soil pH/manufacture of CaC_2/$Ca(HSO_3)_2$/$Ca(OH)_2$/Absolute alcohol

(1 mark)

88

11.

Alternative 1	Alternative 2

Alternative 1

Molarity of NaOH = $\frac{4}{40} \times 0.1\,M^{(½✓)}$

Moles of NaOH = $\frac{20 \times 0.1}{1000}$ = $0.002^{(½✓)}$

Mole ratio = $2 : 1^{(½✓)}$

∴ Moles of $H_2SO_4 = 0.001$ ✓

$8cm^3 = 0.001$

$1000cm^3 = ?$

$\frac{1000}{8} \times 0.001$

$= 0.125M$ ✓

Alternative 2

$H_2SO_{4(aq)} + 2NaOH_{(aq)} \longrightarrow Na_2SO_{4(aq)} + H_2O_{(l)}^{(½✓)}$

Molarity of NaOH = $\frac{4}{40} = 0.1M^{(½✓)}$

$\frac{M_aV_a}{M_bV_b} = \frac{1}{2} \Rightarrow \frac{M_a \times 8}{0.1 \times 20} = \frac{1}{2}^{(½✓)}$

$M_a = \frac{0.1 \times 20}{8 \times 2}^{(½✓)}$

$= 0.125M$ ✓   (3 marks)

12.

13.

14. a) Cation - Al3+ or Mg2+   (1 mark)

  Anion - SO_4^{2-} (1 mark)

  b) $Ba^{2+}_{(aq)} + SO_4^{2-}_{(aq)} \longrightarrow BaSO_{4(s)}$ (1 mark)

15.

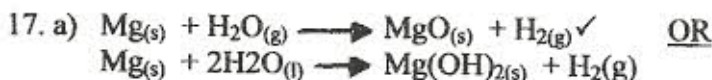| Luminous	Non-luminous
- Its sooty or smokey$^{(½✓)}$	- Not sooty or smokey$^{(½✓)}$
- Not very hot$^{(½✓)}$	- Very hot$^{(½✓)}$
- Not steady	- Steady
- Quite	- Noisy

Any two in order
NB: No other differences   (2 marks)

16. When dissolves ✓ in water or in fused/molten state ✓   (2 marks)

17. a) $Mg_{(s)} + H_2O_{(g)} \longrightarrow MgO_{(s)} + H_{2(g)}$ ✓   **OR**

  $Mg_{(s)} + 2H_2O_{(l)} \longrightarrow Mg(OH)_{2(s)} + H_2(g)$

  b) Insoluble ✓ in water/slightly soluble

    (NB: mention of water is not necessary since the liquid is not labelled)   (1 mark)

18. $tO_3 = \frac{V}{96}$ R.M.M = 48 $tCO_2 = \frac{V}{t}$ R.M.M. = 44

  $\frac{V}{96} \div \frac{V}{t} = \frac{\sqrt{48}}{\sqrt{44}}$ ∴ $\frac{t}{96} = \sqrt{\frac{48}{44}}$ ✓

  $t = 96 \times \frac{\sqrt{48}}{\sqrt{44}}^{(½✓)}$

  $t = 91.9$ **OR** $\approx 92\,Sec^{(½✓)}$

19. I✓ – Manganese IV oxide is a catalyst✓ and increases the rate of decomposition✓ of the hydrogen peroxide. (3 marks)

20. Add water to the mixture✓ in a separating funnel. Ethanol dissolves while pentane does not. Allow the mixture to separate into two layers✓. Open the tap to drain the lower aqueous layer. Distill the water-ethanol mixture to get the ethanol (2 marks)

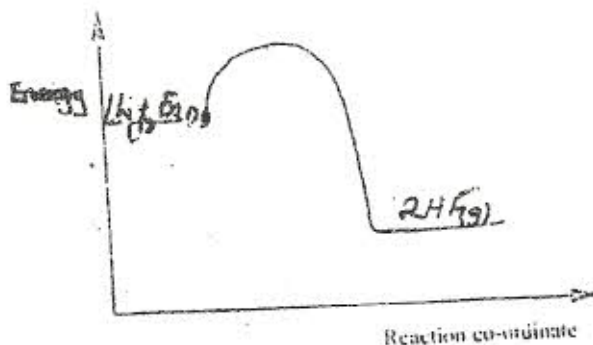21. Acetylene (ethyne) OR Hydrogen ✓ (1 mark)

22. a) C ✓ (1 mark)
    b) A✓ (1 mark)
    c) B✓ (1 mark)

23. Solid sulphur is made of S_8 rings$^{(½✓)}$. It melts into a liquid of S_8 rings$^{(½✓)}$. On further heating the rings open $^{(½✓)}$up to form long chains$^{(½✓)}$ of sulphur atoms which then entangle making it viscous and dark. OR Sulphur melts into S8 molecules. The molecules join up to form long$^{(½✓)}$ chain which entangle$^{(½✓)}$ making it viscous and dark (3 marks)

24. a)

Reaction co-ordinate

b) $\frac{-538}{22}$ = - 69kJmol^{-1}✓ (1 mark)

25. The supply of oxygen in the room will be limited $^{(½✓)}$ leading to formation of CO $^{(½✓)}$ which is poisonous. ✓ (2 marks)

26. NH_4Cl decomposes$^{(½✓)}$ to form $NH_{3(g)}$ and $HCl_{(g)}$. Ammonia diffuses✓ faster than HCl because its lighter. Ammonia$^{(½✓)}$ is basic thus red litmus turns blue while HCl✓ is acid thus blue litmus turns red. (3 marks)

27. It reacts with $NaHCO_3$ to form✓ CO_2 which causes the dough to rise✓ (2 marks)