K.C.S.E CHEMISTY PAPER 233/1
MARKING SCHEME 2004

1. Burning involves use of oxygen✓ the products include the mass of candle and oxygen✓.

   OR

   Oxidation✓ increase in mass combined with oxygen✓. (2 marks)

2. (a) Gas A is Nitrogen gas✓. (1 mark)
   (b) Withdraw delivery tube from the water✓. This prevents sucking back✓. (2 marks)

3. The energy required to remove the outermost electron is lower for B than for C✓. therefore B is more reactive than C✓. (2 marks)

4. (a) Sulphure dioxide (1 mark)
   (b) (i) The gas escaped through the thistle funnel✓.
   (ii) The gas delivery tube was immersed in the reagents✓. (2 marks)

5. Moles of $CuSO_4 = \frac{900}{1000} = 0.9$✓½

   Moles of $BaCl_2 = \frac{600 \times 1}{1000} = 0.6$✓½

   Heat change when 0.6 moles of $BaCl_2$ are used = $17.7 \times 0.6 = 10.62kJ$✓½

   $1500 \times 4.2 \times \Delta T = 10.62$ ✓½

   $\Delta T = \frac{10.62}{1500 \times 4.2}$ ✓½

   $= 1.6857^o$ or 1.7✓½ (3 marks)

6. - In diamond each carbon atom is covalently bonded to four other carbon atoms✓½ in a rigid giant atomic structure✓½.
   - In graphite each carbon atom is covalently bonded to three other carbon atoms in layers✓.
   - The layers are held together by weak van der walls forces which are broken quite easily✓.

   (3 marks)

7. (a) Oxidation - is the charge that atoms have in molecules/ions✓.
   (b) $^{-3}$✓ (2 marks)

8. (a) KOH✓
   (b) The ash contains basic oxides✓ these dissolves to form a basic solution✓. (2 marks)
   Plants need potassium on a large scale// macro scale therefore the ash contains mainly K_2O or potassium compounds.

9. Working out the differences between any two consecutive alcohols✓. There is a constant increase in mass✓ caused by constant addition of CH_2✓

   OR

   This is a homologous series✓ therefore a constant increase in mass✓ (3 marks)

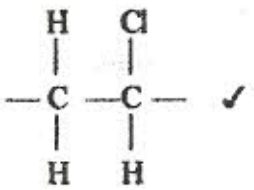
10. - It is required to break the strong N ≡ N bond✓ // N2 is inert/unreactive✓.
    - It is required to break the triple bond (1 mark)

11. (a) Heat✓ // high temperature
    (b) (i) Gas D is Sulphur dioxide // SO_2✓ (1 mark)

(ii) Uses of Zinc
- In batteries✓
- Galvanising of iron✓
- Electroplating✓ (1 mark)

12. Add aqueous ammonia✓ to form $Al(OH)_3$✓ ½ Filter✓ ½ and dry in a des cater or sun✓ (3 marks)

13. (a) Monomer✓ (1 mark)

(b)

✓ (1 mark)

14. (a) $Mg^{2+}_{(aq)} + CO_3^{2-}{}_{(aq)} \rightarrow MgCO_{3(s)}$ ✓ (1 mark)

(b) RFM of $MgCO_3 = 24 + 12 + 48 = 84$ ✓ ½

Moles of $Mg^{2+} = \frac{8.4}{84} = 0.1$ ✓ ½

$\frac{x \times 0.5}{1000} = 0.1$ ✓ ½

$x = \frac{1000 \times 0.1}{0.5} = 200cm^3$ ✓ ½ (2 marks)

15. (a) Test tube 1: There is effervesence/ bubbles/dissolved✓ ½
Test tube 2: No effervesence/No observable change/dissolved ✓ ½ (1 mark)

(b) Ethanoic acid ionises in water✓
H^+ reacts with CO_3^{2-} to form CO_2✓ (2 marks)
In Hexane ethanoic acid exists in form of molecules ✓ ½ therefore no reaction with the carbonate✓ ½ or acid does not ionise in hexane

16. (a) F and J (1 mark)
(b) H, F, J, G (2 marks)

17. Butene / But -1- ene (1 mark)

18. (a) Solid changes from Brown✓ ½ to Grey✓ ½ OR Brown✓ ½ solid to Black✓ ½. (1 mark)
(b) $Fe_2O_{3(s)} + 3CO_{(g)} \rightarrow 2Fe_{(s)} + 3CO_{2(g)}$✓
OR
$Fe_2O_{3(s)} + CO_{(g)} \rightarrow 2FeO_{(s)} + CO_{2(g)}$✓ (1 mark)

19. (a) The colour of the solution fades✓ //disappears and Q disappears/reduces/turns colourless
Brown solid is deposited on the surface of Q✓ (2 marks)

(b) - Metal Q is more reactive than Cu✓ ½ therefore displaces Cu✓ ½ from solution. // Q is more electropositive than Cu // Q is a stronger reducing agent than Cu. (1 mark)

20. Neutron - proton ratio✓
Amount of energy released when protons and neutrons collide✓ (2 marks)

21. (a) Gas syringe or a measuring cylinder ✓ (1 mark)

(b) (2 marks)

The graph must be on the left✓
Leveling at the same point✓

22. $NaClO_3$ ✓ ½
Showing oxidation state of Cl in $NaClO_3$ ✓ - oxidates state at +5
Showing oxidation state of Cl in NaCl ✓ - oxidates state at –1
Oxidation involves loss of electrons therefore the product is $NaClO_3$ ✓ ½/increase in oxidation number from 0 to 5. $NaClO_3$ oxidates state at +5 (3 marks)

23. Water in test tube 1 is harder than in test tube 2 ✓
Soap reacts with Ca^{2+} ions or Mg^{2+} ions in hard water ✓
In test tube 1, there are more Ca^{2+} or Mg^{2+} where lather is smaller ✓ (3 marks)

24. (a) A solution containing H^+ ions ✓ accept a solution that turns blue litmus paper ✓ red//PH less than 7 // Solution that neutralises bases to form salt and water only. (1 mark)
(b) $Pb^{2+}_{(aq)} + CO_3^{2-}{}_{(aq)} \rightarrow PbCO_{3(s)}$ ✓ (1 mark)

25. (a)

(b) Endothermic ✓ products are at a higher energy level than the reactants. ✓ (2 marks)

26. (1) Bulb does not light ✓ ½ No ions present ✓ //non electrolyte
(2) Bulb lights bubbles of gas ✓ ½
Ions are present ✓ // H_2SO_4 is an electrolyte (3 marks)

27. (a) 4 and 5 ✓ // Blue and Green
(b) 2 ✓ ½ and 3 ✓ ½ // Yellow and Red
(c) 2 and 3 ✓ // Yellow and red (1)
(3 marks)