KENYA NATIONAL EXAMINATION COUNCIL

KCSE 2007

CHEMISTRY
PAPER 1
MARKING SCHEME

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Chemistry Paper 1

1. (a) Carbon (IV) oxide. *(1 mark)*

   (b) A blue flame is observed. Carbon (II) oxide burns with a blue flame. *(2 marks)*

2. Mass of acid = 1.05 x 15
   = 15.75 g
   Molar mass of acid = 60
   Moles of acid in 500 cm^3 of solution
   $= \frac{15.75}{60}$
   = 0.2625
   Moles of acid in a litre = 0.2625 x 2
   = 0.525 M *(3 marks)*

3. (a) Elements found in group seven of the periodic table. *(1 mark)*

   (b) Chlorine exists in discrete gaseous molecules with negligible forces of attraction between them while iodine exists in layers held together by strong forces of attraction. *(2 marks)*

4. **C** = Region of unburnt gas (colourless zone).
   D = Yellow Zone (luminous flame). *(2 marks)*

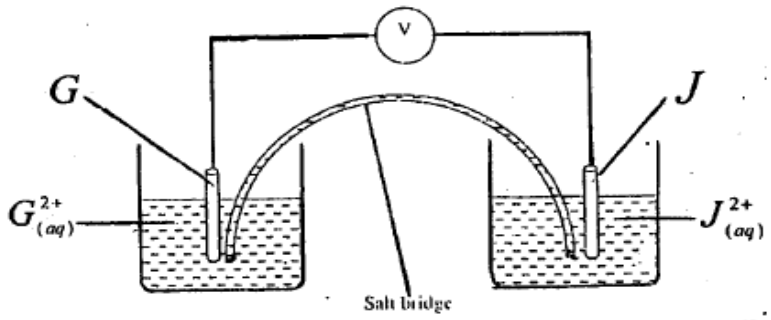
5. The nettle plant contained an acid, which was neutralised by aqueous ammonia. *(2 marks)*

6. (a) (i) The solution changed from pale green to yellow/brown. *(1 mark)*

   (ii) A brown precipitate was formed. *(1 mark)*

   (b) $Fe^{3+}_{(aq)} + 3OH_{(aq)} \rightarrow Fe(OH)_{3(s)}$ *(1 mark)*

7. (a)



   (2 marks)

   (b) - 0.14 + 0.74 = 0.6V *(1 mark)*

8. There is an increase in nuclear charge. The outermost electron is strongly attracted, therefore more energy is required to remove it. *(2 marks)*

9. (a) ***Solution K***: Dilute nitric (V) acid.
(b) ***Solid L***: Silver.
(c) ***Gas M***: Oxygen. ***(3 marks)***

10. $H_2O_{2(l)} \rightarrow H_2O_{2(g)}; \Delta Hf^{\theta} = 55kJmol^{-1}$ ***(2 marks)***

11.
- Carbon (IV) oxide will react with calcium oxide.
- Carbon (IV) oxide is denser than air. ***(2 marks)***

12. (a) The volume of a fixed mass of a gas is directly proportional to the absolute temperature at constant pressure. ***(1 mark)***

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

$$\frac{3.5 \times 10^{-2}}{291} = \frac{2.8 \times 10^{-2}}{T_2}$$

$$T_2 = \frac{291 \times 2.8}{3.5}$$

$$= 232.8\ K$$ ***(2 marks)***

13. (a) (i) Deliquescence. ***(1 mark)***
(ii) Esterification. ***(1 mark)***

(b) Cracking. ***(1 mark)***

14. (a) ***Nuclear fission*** is the splitting of a heavy nuclide when bombarded by a fast moving Neutron, while ***Nuclear fusion*** is the combination of light nuclei when they collide at high speed and a heavier nuclide is formed. ***(2 marks)***

(b) The radioactive substance is put in thick lead blocks and buried underground. ***(1 mark)***

15. (a) Permanent hardness in water is caused by the presence in the water of Ca^{2+}, Mg^{2+} and SO_4^{2-} ions. The sulphate ion is not decomposed by boiling. ***(2 marks)***

(b)
- Used in ion exchange.
- Distillation.
- Precipitation. ***(1 mark)***

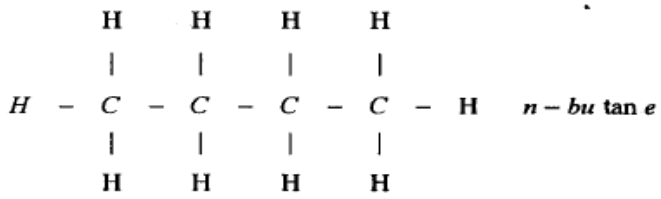
16. (a) O^{2-} ***(1 mark)***

(b) $Zn(OH)_4^{2-}$ ***(1 mark)***

17. $12n + 2n + 2 = 58$

$n = 4$

$\therefore$ Formula = C_4H_{10}



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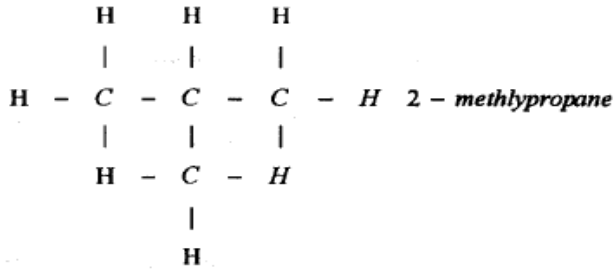


2 – *methlypropane*

(3 marks)

18. Heat sodium metal in oxygen to form sodium oxide. Dissolve the oxide in water to form sodium hydroxide. Bubble excess carbon dioxide into the solution to form sodium hydrogen carbonate. Warm the solution to concentrate. Allow solution to cool and form crystals. Filter and dry the crystals between pieces of filter paper. ***(3 marks)***

19. (a) Froth floatation. ***(1 mark)***

(b) $ZnCO_{3(s)} \rightarrow ZnO_{(s)} + CO_{2(g)}$ ***(1 mark)***

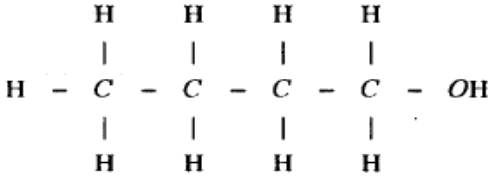
(c)
- Making brass.
- Used in batteries/dry batteries.
- Making paints. ***(1 mark)***

20. (a)

C	H	O
$\frac{64.9}{12} = 5.4$	$\frac{13.5}{1} = 13.5$	$\frac{21.6}{16} = 1.35$
$\frac{5.4}{1.35} = 4$	$\frac{13.5}{1.35} = 10$	$\frac{1.35}{1.35} = 1$

E.F. $C_4H_{10}O$ ***(2 marks)***

(b)



(1 mark)

21. (a) The concentration of the Cl^- ion is very high. The Cl^- ion is therefore discharged in preference to the OH^-. ***(2 marks)***

(b) Hydrogen gas. *(1 mark)*

22. Moles of aluminium sulphate $= \frac{6.84}{342}$
$= 0.02$

Concentration of aluminium sulphate $= \frac{0.02 \times 1000}{150}$
$= 0.133$
∴, Concentration of the Sulphate ion $= 0.133 \times 3$
$= 0.399\ M$ *(3 marks)*

23. Hydrogen bonds exist in propan-1-O1. These require more energy to break than van der waals forces. *(2 marks)*

24. Observation: white fumes.

Ammonia is ignited in / reacts with chlorine to form hydrogen chloride. The hydrogen Chlorid reacts with excess ammonia to form ammonium chloride. *(3 marks)*

25. (a) Volume would be equal in both cases because the moles of HCl are equal and zinc powder is in excess. *(1 mark)*

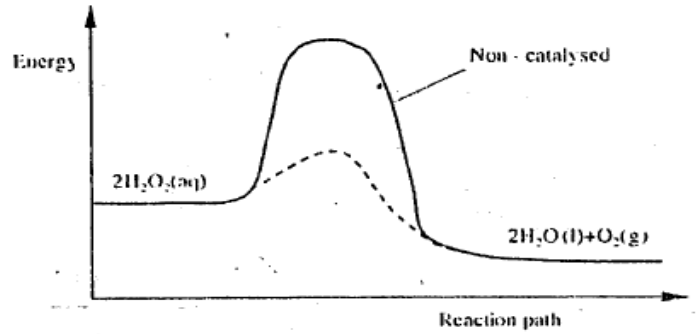
(b) It is inert / does not react. *(1 mark)*

26. (a) Both are metals and react by losing electrons. *(1 mark)*

(b) $RCO_{3(s)} \rightarrow RO_{(s)} + CO_{2(g)}$ *(1 mark)*

(c) Q^{3-} or Q^{+5} *(1 mark)*

27.



(2 marks)

28. (a) $4OH^-_{(aq)} \rightarrow 2H_2O_{(l)} + O_{2(g)} + 4e$ *(1 mark)*

(b)
(c) Quantity of electricity = 5 x 3 x 60 x 60

Moles of electricity $= \frac{5 \times 3 \times 60 \times 60}{96500} = 0.5596$
Moles of Ag $= 0.5596$
Mass of Ag $= 60.4368g$ *(2 marks)*

29. (a) Metallic. ***(1 mark)***

(b) Group 1, because each atom loses a single electron. ***(2 marks)***

30. The S_8 rings are broken down to form S_8 chains. These chains join together to form huge molecules of sulphur which do not flow easily. ***(2 marks)***