

Name: ..... Index No: .....

Candidate's signature.....

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**Muongano KCSE Trial Exam**

*233/1*  
**CHEMISTRY**  
**PAPER 1**  
**July 2017**  
**2 Hours**

**INSTRUCTIONS TO CANDIDATES**

- Write your name and index number in the space provided
- Answer **All** the questions in the space provided
- Mathematical tables and electronic calculators may be used
- All working **must** be clearly shown where necessary.

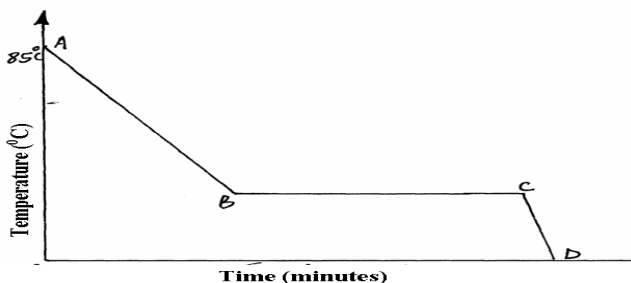
**For Examiner's Use Only**

Section	Question	Maximum Score	Candidates Score
A	1 – 28	80	

*This paper consists of 10 printed Pages*

*Candidates should check the question paper to ensure that all the pages are printed as indicated  
and no questions are missing*

1. A Student in form four placed a thermometer in molten naphthalene at  $85^{\circ}\text{C}$  and recorded the temperature and time until the naphthalene solidified. From the values obtained, the figure below was drawn.



- (a) **What name** is given to such a figure? ..... (1mk)
- (b) **Which part** of the figure represents the change of state of naphthalene? ..... (1mk)
- (c) In terms of kinetic theory. **Explain** what happens to molecules along **AB**. (1mk)

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2. In a certain reaction,  $18.7\text{cm}^3$  of a dibasic acid  $\text{H}_2\text{X}$  required  $25\text{cm}^3$  of  $0.1\text{M}$  NaOH for complete neutralization.

- (i) **How many moles** of Sodium hydroxide are contained in  $25\text{cm}^3$ ? (1mk)

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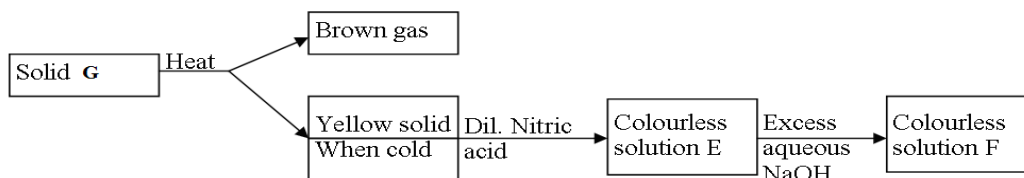
- (ii) **Calculate** the molarity of the dibasic acid. (2mks)

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3. Study the flow chart below and answer the questions that follow.



- (a) **Identify** solid **G**..... (1mk)

- (b) **Write** a balanced *chemical equation* between the yellow solid and dilute nitric acid. (1mk)

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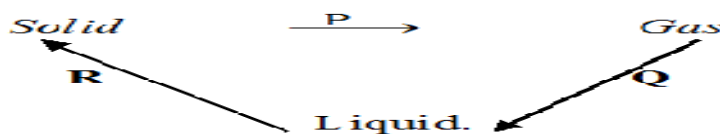
- (c) **Write** the formula of the complex ion in solution *F* and **explain** this observation. (1mk)

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4. **Explain** why when hydrogen chloride gas is dissolved in water, the solution conducts electricity while a solution of hydrogen chloride gas in methyl benzene does not conduct electricity. (3mks)

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5. Matter exists in three states which can be related as shown in the diagram below.



Name processes: *P*: ..... (1mk)

*R*: ..... (1mk)

**Explain** whether process *Q* is exothermic or endothermic (1mk)

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6. (a) **What is** meant by allotropy? (1mk)

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- (b) **Name two** allotropes of carbon. (1mk)

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- (c) **Give one** use of charcoal in the sugar refinery industry. (1mk)

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7. (a) **State** Graham's Law of Diffusion (1mk)

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- (b) A given volume of ozone ( $O_3$ ) diffused from a certain apparatus in 96 seconds. **Calculate** the time taken by an equal volume of carbon (IV) oxide to diffuse under the same conditions. ( $C=12, O=16$ ) (2mks)

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8. (a) **Name two ores** from which copper is extracted. (1mk)

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- (b) During the extraction of copper metal the ore is subjected to froth floatation. **Give** a reason why this process is necessary. (1mk)

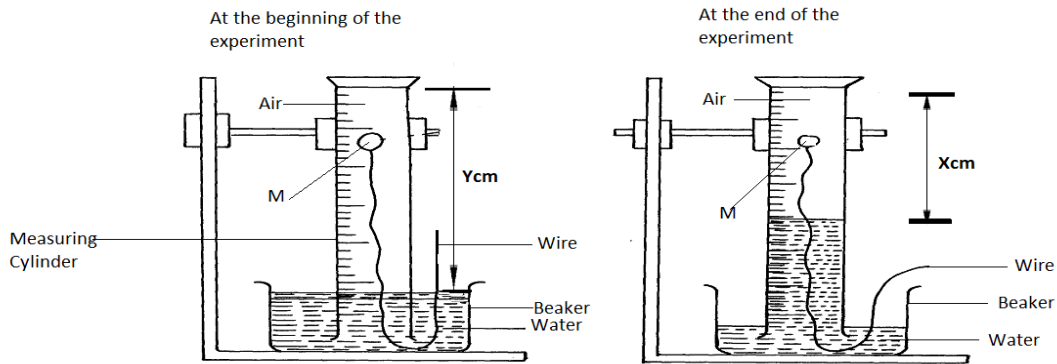
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- (c) One of the alloys of copper is brass. **State** its two uses. (1mk)

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9. **Draw** a dot (●) and cross (X) diagram to show bonding in sulphur (IV) oxide (3mk)

10. A form one class carried out an experiment to determine the active part of air. The diagram below shows the set-up of the experiment and also the observation made.



(i) **Identify** substance **M** ..... (1mk)

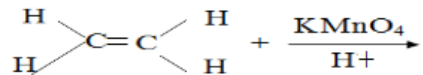
(ii) **State two reasons** for the suitability of substance **M** for this experiment. (2mk)

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(iii) **Write** the equation for the reaction of substance **M** and the active part of air. (1mk)

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11. (a) **Complete** the following equation (1mk)



(b) **Name** the homologous series to which the following compounds belong?

(i)  $\text{CH}_3\text{CCH}$ ..... (1mk)

(ii)  $\text{CH}_3\text{CH}_2\text{OCC}$ ..... (1mk)

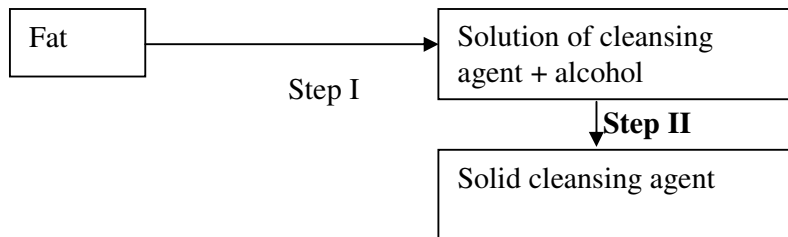
12. The table below shows the pH values of solutions **J** to **N**

Solution	<b>J</b>	<b>K</b>	<b>L</b>	<b>M</b>	<b>N</b>
pH	5	13	2	10	7

(a) Which solution contains the largest concentration of hydroxides ions? ..... (1mk)

(b) Which solution is likely to be a solution of acetic acid? ..... (1mk)

13. The scheme below was used to prepare a cleansing agent. Study it and answer the questions that follow.



(i) **What name** is given to the type of cleansing agent prepared by the method shown in the scheme? ..... (1mk)

(ii) **Name one** chemical substance added in step II (1mk)

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(iii) **What is** the purpose of adding the chemical substance named in (ii) above. (1mk)

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14. a) **Define** half-life of radio isotopes. (1mk)

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b)  $Z$  grams of a radioactive isotope take 100 days to decay to 20gms. If the half-life of the element is 25 days, **calculate** the initial mass of  $Z$  of the radio isotope. (2mks)

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15. Magnesium was burnt in air forming a white residue  $T$ . When put in a boiling tube with water effervescence was noticed and colourless gas  $D$  with a characteristic pungent smell was evolved. The gas turned a wet red litmus paper blue. **Identify**

Residue  $T$  ..... (1mk)

Gas  $D$  ..... (1mk)

**Write** an equation for liberation of gas  $D$ . (1mk)

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16. The table below shows tests that were carried on three portions of a solution and the results obtained. Study it and answer the questions that follow:

	<b>TESTS</b>	<b>OBSERVATION</b>
1	Addition of aqueous ammonia to portion 1	White ppt soluble in excess
2	Addition of a few drops of acidified barium nitrate to portion 2	White precipitate formed
3	Addition of few drops of lead (II) nitrate to portion 3	A white precipitate formed

- a) **Identify** the
- i) Anion present..... (1mk)
- ii) Cation present..... (1mk)
- b) **Write** ionic equation for test 3. (1mk)

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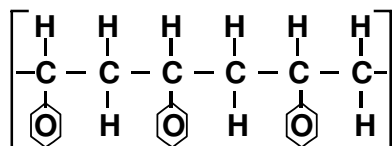
17. 50cm<sup>3</sup> of carbon (IV) oxide diffuses through a porous plate in 15 seconds. **Calculate** the time taken by 75cm<sup>3</sup> of Nitrogen (IV) oxide to diffuse through the same plate under similar conditions. (C = 12, O=16, N=14) (3mks)

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18. The formula given below represents a portion of a polymer.



- a) **Give**
- i) The **name** of the polymers. (1mk)

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- ii) The **structure** and the **name** of the monomer from which the polymer is formed. (1mk)

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- b) **State** one disadvantage of the continued use of the polymer. (1mk)

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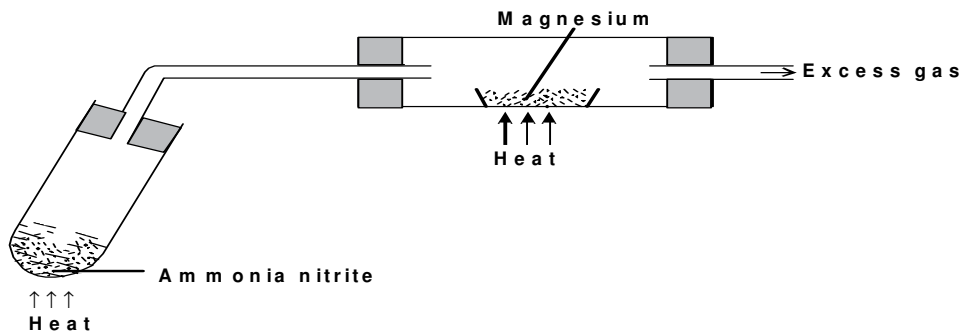
19. During purification of copper by electrolysis, 1.48g of copper was deposited when a current was passed through aqueous copper (II) sulphate for two and half hours. **Calculate** the amount of electricity that was passed. ( $Cu=63.5$ ,  $1 \text{ Faraday} = 96500C$ ) (3mks)

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20. The set-up below shows how gas A was prepared and reacted with heated magnesium



- a) **Give** a reason why it is not advisable to heat magnesium before heating ammonium nitrite. (1mk)

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- b) i) **Identify** gas A ..... (1mk)
- ii) **Write** a chemical equation for the reaction between gas A and magnesium (1mk)

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21. A student burnt magnesium ribbon in a gas jar full of sulphur (IV) oxide gas.

- i) **State two observations** made in the gas jar. (2mks)

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- ii) **Write** an equation for the reaction that took place. (1mk)

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22. Hydrazine gas  $\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{N} - \text{N} \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$  burns in oxygen to form nitrogen gas and steam according to the equation below. *Using* the bond energies given below, *calculate* the enthalpy change for the reaction in the above equation (3mks)

<b>Bond</b>	<b>Bond energy (KJ/mol)</b>
N □ N	944
N - N	163
N - H	388
O = O	496
H - O	463

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23. 5.0g of calcium carbonate were allowed to react with 25cm<sup>3</sup> of 1.0M hydrochloric acid until there was no further reaction. *Calculate* the mass of calcium carbonate that remained unreacted. (3mks)

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24. In the extraction of iron metal, limestone is added at a certain stage.

i) *Explain* the main role of limestone. (1mk)

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ii) *Name* two reducing agents in the extraction of iron. (1mk)

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iii) *State one* way in which impurities affect properties iron. (1mk)

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25. a) The formula for cane sugar is (C<sub>12</sub>H<sub>22</sub>O<sub>11</sub>). Use an equation to *show* what happens when sugar is added to conc. Sulphuric (VI) acid. (1mk)

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b) *What name* is given to the type of reaction above? (1mk)

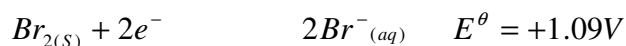
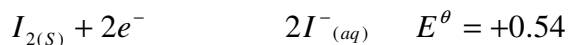
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- c) **Calculate** the oxidation state of sulphur in sodium thiosulphate ( $Na_2S_2O_3$ ) (1mk)

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26. You are given the following half equations.



- a) **Write** an overall equation for the cell reaction. (1mk)

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- b) **Calculate** the  $E^\ominus$  value of the cell. (1mk)

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- c) **Name** the oxidizing agent. (1mk)

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27. A hydrocarbon gas Y in which the percentage of hydrogen by mass is 14.3% occupies a volume of  $2.24\text{dm}^3$  at s.t.p and weighs 7g

- i) **Determine** the empirical formula of Y. (C=12, H=1.0) (2mks)

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- ii) **Give** the structural molecular formula of Y. (1mk)

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28. **State two** application of electrolysis. (2mks)

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29. **Using** reagents provided (Zinc powder, Nitric (V) acid (dilute), Water, Solid sodium carbonate) only, **explain** how you could prepare solid Zinc carbonate. (2mks)

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