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545/1
Chemistry
Paper 1
(Theory)
March, 2023
2hours

CHEMISTRY DEPARTMENT

Uganda Certificate for Lower Secondary Education

CHEMISTRY

Paper 1 (Theory)

2 HOURS

INSTRUCTIONS TO CANDIDATES:

Section **A** *consists of 10 short answer structured questions. Answer* **all** *the questions in this section. Answers to these questions* **must** *be written in the spaces provided.*

Section **B** *consists of* **6** *essay type or semi-structured questions. Answer any* **four** *questions from this section. Answers to the questions* **must** *be written in the answer booklet(s) provided.*

In both sections **all** *working* **must** *be clearly shown and* **must** *be in* **blue** *or* **black** *ink.*

Any work done in **pencil** *will* **not** *be marked* ***except*** *drawings.*

Mathematical tables and silent non-programmable calculators may be used.

For Examiners' Use Only																
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**Total**

SECTION A (*40 MARKS*)

Attempt **all** *questions in this section*

1. Students were asked to identify examples of changes that can take place using the same component (s) of air in the atmosphere. A student called Solomon mentioned combustion of charcoal and the rusting of iron.

   a) Identify which component (s) of air that is/are necessary for the combustion of charcoal and rusting of iron. (*01 mark*)

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   b) What is the similarity between the above two chemical changes? (*01 mark*)

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   c) What makes rusting of iron different from combustion of charcoal? (*01 mark*)

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   d) State any one effect of incomplete combustion of charcoal to the environment. (*01 mark*)

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2. A wasp sting having a pH of above 7 causes sharp pain, itching and swelling. Use of fresh lemon juice is one of the effective remedies for wasp stings. Fresh lemon juice soaked in cotton wool is bandaged on the affected area as a remedy.
   Explain why the sharp pain, itching and swelling caused by wasp sting are reduced with application of fresh lemon juice. (*04 marks*)

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3. A student added dilute hydrochloric acid into a test tube containing calcium carbonate. The gas produced was bubbled into a solution of calcium hydroxide (limewater).

a) Name the gas that was produced in the test tube (*01 mark*)

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b) Write a word equation that led to the production of the gas in the test tube. (*01 mark*)

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c) State what was observed in the limewater (*01 mark*)

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d) Mention any one use of the gas produced in the test tube (*01 mark*)

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4. Using the kinetic theory of matter, explain the following observations.

a) The air pressure in the tubes within a car tyre increases after a very long journey drive on a hotter day (*02 marks*)

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a) When you apply a sanitizer on your hand, you feel cold as the sanitizer evaporates (*02 marks*)

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5. Food cooked without common salt is tasteless to Aubrey students. Only people suffering from hypertension (high blood pressure) and other heart related illnesses are advised to eat food without salt. This is because the ions of the chemical elements in salt can worsen their health conditions.
    a) Identify the chemical elements present in the common salt. (*01 mark*)

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    b) Write the formula of the ions of the elements in the common salt (*01 mark*)

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    c) Apart from adding flavour to food, state any other two uses of common salt (*02 marks*)

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6. A group of students from Kampala went for a field study in one of the largest limestone quarries in Tororo, Eastern Uganda. Limestone is used in the production of cement. Cement is one of the components of concrete.
    a) Write the chemical formula of the main component of limestone used for manufacture of cement. (*01 mark*)

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    b) Other than cement, name any other three materials that can be used for making concrete (*1½ marks*)

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c) Explain why it is advisable to pour cold water on cemented floor for a period of two weeks after screeding the floor (*1½ marks*)

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7. Okware took two beakers **A** and **B**, in **A**, he added hot water while in **B**, he added cold water. He then added potassium permanganate crystals to each beaker at the same time. He observed that hot water in **A** turned purple faster than the cold one in **B**.

b) Identify the property of matter responsible for the colour change in the beakers (*01 mark*)

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c) Explain why hot water turned purple faster than the cold one (*03 marks*)

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8. Senior two students found out that different metals react differently.
They observed this when some metals were made to react with cold water and steam. Their observations were summarized in the table below.

Metal	**Reaction with cold water**	**Reaction with steam**
Calcium	Slow reaction	Fast reaction
Potassium	Reacts rapidly	Reacts violently
Copper	No reaction	No reaction
Magnesium	Very slowly	Relatively fast
Iron	Too slow	Slow

a) Use the information in the table to arrange the given metals starting with the least reactive to the most reactive (*01 mark*)

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b) Explain if calcium could be possible for making roofing sheets (*02 marks*)

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c) State with a reason, which of the metals above would be suitable for use when making water pipes (*01 mark*)

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9. Kamakoin a senior two student of Aubrey made juice that he sold to students during the inter-house sports competition to quencher their thirst by mixing passion fruit, water and sugar. He then separates the passion fruit seeds from the mixtures and adds sugar to sweeten the juice.
   a) Name the method by which passion fruit seeds are separated from the mixture (*01 mark*)

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b) Give a reason for your answer in (a) above (*01 mark*)

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c) Name one other pair of a mixture that can be separated by the method in (a) (*01 mark*)

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d) What do you expect to have happened to the sugar crystals when added to the fruit juice? (*01 mark*)

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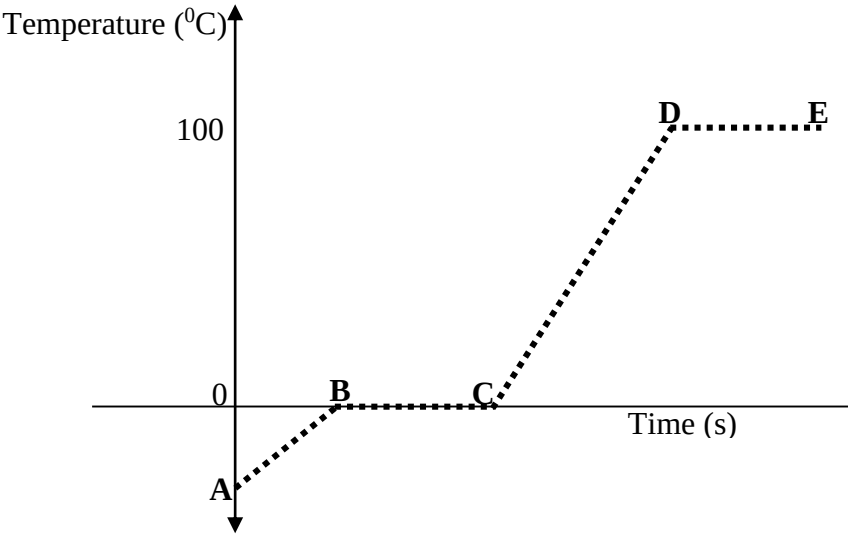
10. The graph below shows heating of ice until boiling starts



Briefly, state what happens in regions; (*04 marks*)

i) AB

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ii) BC

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iii) CD

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iv) DE

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SECTION B (*60 MARKS*)

Answer any **four** *questions in this section.*

11. In the last **30** to **40** years, plastics have taken over as replacement materials for metals, glass, paper and wood as well as for natural fibres such as cotton and wool. However, plastics such as polyethene bags have contributed significantly to household waste problem, up to 10% in some countries, and it is getting worse.
    a) Outline any **three** advantages of using polyethene packaging (*3 marks*)
    b) Explain any **three** ways how polyethene bags are dangerous to our environment (*06 marks*)
    c) Explain any **three** ways of how to prevent the effects of polyethene bags on the environment (*06 marks*)

12. Chemistry has contributed to the society both positively and negatively.
    a) Explain any **three** ways in which chemistry has contributed;
        i) positively to the society (*06 marks*)
        ii) negatively to the society (*06 marks*)
    b) Mention any **three** sectors where chemistry plays an important role in the economy of Uganda (*03 marks*)

13. (a) You are given two solutions **A** and **B**. The pH of solution **A** is 6 and pH of solution **B** is 3.
        i) Which solution has more hydrogen ion concentration (*01 mark*)
        ii) Explain your answer in (a) (i) (*02 marks*)
    b) Explain why sulphuric acid is a strong acid while carbonic acid is a weak acid. Write ionic equations to support your explanation. (*6 marks*)
    c) Outline any four uses of acids in your society (*04 marks*)
    d) Briefly explain why dry carbon dioxide does not change the colour of dry blue litmus paper. (*02 marks*)

14. The National Environment Management Authority (**NEMA**), has organized a two days' students workshop to take place at Rock Classic Hotel – Tororo to discuss key issues concerning about conservation of environment. On day 1, the programme drafted on paper has a key statement to be addressed which reads. ***"Today's society in view of modernization has neglected the mother nature of water, which has ultimately cost us on health. This needs urgent solutions"***.
    Task: Prepare a speech you would deliver at the workshop about the key statement (*15 marks*)

15. (a) In our day to day life at home most of us use carbon compounds such as petroleum products, wood, charcoal and biogas as source of fuel. Research shows that continued use of these fuels has greatly affected our resources from which they are obtained, explain any six (6) ways how we can sustainably use the available resources (*12 marks*)

    b) The main component of biogas is methane (CH_4). Methane is the simplest compound obtained from crude oil which contains a variety of compounds but with similar structures.

        i) Identify the class and write the general molecular formula of the organic compound to which methane belongs. (*02 marks*)

        ii) Name and write the structural formula of the next member of the organic family after methane (*01 mark*)

16. Atoms of elements **P**, **Q**, **R** and **S** have atomic numbers 8, 12, 15 and 19

    a) Write the electronic configuration of the;

        i) atoms of elements P and S (*02 marks*)

        ii) ions of elements Q and R (*02 marks*)

    b) Write the formula of the compound formed when element

        i) P combine with element S (*01 mark*)

        ii) P combine with element R (*01 mark*)

    c) State which of the compound formed in (b) would conduct electricity in molten form. Give a reason for your answer (*02 marks*)

    d) Describe how a pure dry sample of magnesium sulphate crystals can be prepared in the laboratory from dilute sulphuric acid and magnesium oxide. (*07 marks*)

END