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

Sign .....

*545/2*
*Chemistry*
*Paper 2*
*July/August 2019*
*2 hours*

# ACEITEKA JOINT MOCK EXAMINATIONS 2019

## UGANDA CERTIFICATE OF EDUCATION

## CHEMISTRY

## PAPER 2

## TIME: 2 HOURS

**INSTRUCTIONS TO CANDIDATES:**

- *This paper consists of two Sections **A** and **B**.*
- ***Section A** consists of **10** structured questions. Attempt all questions in this section. Answers to these questions must be written in the spaces provided **ONLY**.*
- ***Section B** consists of **4** semi-structured questions. Attempt **ONLY TWO** questions. from this section. Answers to the questions must be written in the answer booklets provided.*
- *In both sections all working must be shown clearly.*

| FOR EXAMINER'S USE ONLY | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | TOTAL |
| | | | | | | | | | | | | | | |

## SECTION A (50 MARKS)

**All questions are compulsory**

1. (a) State the principle on which each of the following methods of separating mixtures works.

(i) Chromatography (1 mark)

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(ii) Fractional crystallization (1 mark)

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(b) State what would be observed and give a reason for your observation if a mixture of water and the following substance was shaken, then allowed to stand for some time.

(i) Ethanol

- Observation (½ mark)

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- Reason (½ mark)

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(ii) Edible oil

- Observation (1 mark)

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- Reason (½ mark)

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(c) A separating funnel was used to separate a mixture of kerosene and water.

(i) Name the component that came off first. (½ mark)

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(ii) Give a reason for your answer in ( c) (i) (1 mark)

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2. When a mixture of sodium chloride and liquid, **L**, was heated, hydrogen chloride was evolved.

(a) Identify **L**. (1 mark)

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(b) Write equation:

(i) For the reaction leading to the formation of hydrogen chloride (1½ marks)

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(ii) To show how an aqueous solution of hydrogen chloride would react with iron. (1½ marks)

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(c) (i) Write an ionic equation to show the reaction that would take place; if hydrogen chloride was bubbled into aqueous silver nitrate solution. (½ mark)

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(ii) State the application of the reaction in ( c) (i) in analytical chemistry. ( ½ mark)

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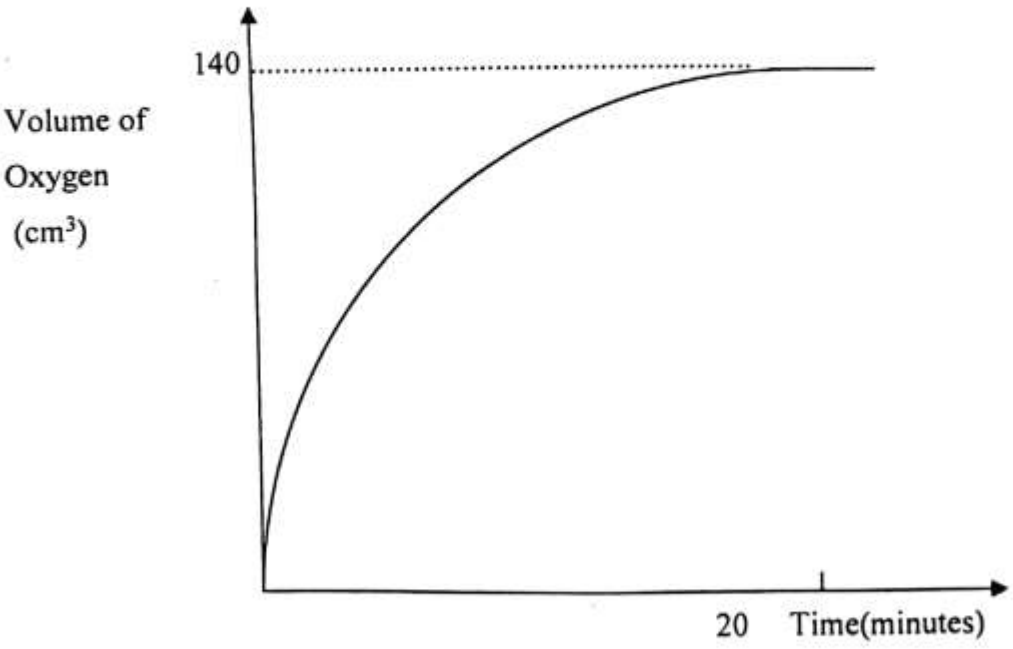
3. Name one reagent which could be used to distinguish between members of each of the following pairs of ions and in each state what would be observed if the reagent you have named was treated separately with each member of the pair.

(6 marks each)

| Pair of ions | Reagent | Observation |
|---|---|---|
| (a) $SO_4^{2-}{}_{(aq)}$ and $SO_3^{2-}{}_{(aq)}$ | | |
| (b) $Al^{3+}{}_{(aq)}$ and $Pb^{2+}{}_{(aq)}$ | | |
| (c) $I^-{}_{(aq)}$ and $Cl^-{}_{(aq)}$ | | |

4. In an experiment to investigate the decomposition of $50cm^3$ of 0.2M hydrogen peroxide, the following graph was obtained.



(a) Write equation for the decomposition of hydrogen peroxide. (1½ marks)

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(b) Name one compound that can be used to speed up the rate of this reaction.

(½ mark)

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(c) On the same axes above, sketch the graph for the decomposition of the hydrogen peroxide if the compound you have named in (b) was used. (1 mark)

(d) Calculate the rate of the reaction in the first 20 minutes. (1 mark)

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(e) (i) Determine the rate of the reaction after 20 minutes. (½ mark)

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(ii) Give a reason for your answer in ( e) (i) (½ mark)

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5. (a) Distinguish between the terms "atomic number" and "atomic mass. (1 mark)

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(b) The full symbols of three atoms of a certain element are: $^{39}_{19}X$, $^{40}_{19}X$ and $^{41}_{19}Z$

(i) Suggest a reason for the difference in the atomic masses of the atoms. (1 mark)

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(ii) State one word, which means the existence of **X, Y** and **Z.** (½ mark)

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(c) Briefly give a reason why an atom of an element is neutral. (2 marks)

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6. (a) An iron panga, which was left in the garden for some weeks was found coated with deposits of solid **Q.**

(i) State the colour of **Q** (½ mark)

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(ii) Write the chemical name of **Q** (1 mark)

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.....

(b) State;

(i) What is meant by the term "*galvanized iron*" (1 mark)

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(ii) Why is it important to galvanize iron. (1 mark)

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(c) Iron can react with oxygen in the absence of water.

Write equation for the reaction of oxygen and iron. (1 mark)

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7. When 7.17g of an oxide **W**, of lead was completely reduced by heating in a stream of carbon monoxide, 6.21g of lead was produced.

(a) Determine the percentage composition of **W.** (2 marks)

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(b) Calculate the molecular formula of **W**. (O=16, Pb = 2017, W = 239)

(2 ½marks)

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(c) Write the name of W. (½ mark)

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8. When carbon dioxide was passed over strongly heated charcoal, gas **B** was formed, which reacted with heated copper (II) oxide to produce a brown solid residue and carbon dioxide.

(a) Name

(i) Gas **B**. (½ mark)

.....

(ii) The brown solid. (½ mark)

.....

(b) Write equation to show

(i) the reaction that led to the formation of **B**. (1 mark)

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(ii) The effect of **B** on copper (II) oxide. (1½ marks)

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(c) (i) Name one reagent that can be used to distinguish between carbon dioxide and gas **B**. (½ mark)

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(ii) State what would be observed if carbon dioxide and gas **B** were separately treated with the reagent you have named in (c) (i). (1 mark)

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9. Combustion and fermentation are some of the reactions that increase the amount of carbon dioxide in the atmosphere.

(a) State:

(i) What is meant by the term *fermentation*. (1 mark)

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(ii) One difference between combustion and fermentation. (1½ marks)

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b) Write equation to show:

(i) Complete combustion of propane. (1½ marks)

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(ii) Fermentation of glucose, $C_6H_{12}O_6$ (1½ marks)

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10. (a) Define the term acid. (1 mark)

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(b) When a mixture of concentrated sulphuric acid and potassium nitrate was heated, nitric acid was produced.

State the property of concentrated sulphuric acid upon which the reaction depended.

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(c) (i) Name the reagent (s) that is or are used to identify a nitrate ion in solution. (1 mark)

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(ii) State what would be observed when aqueous nitrate ion is treated with the reagent (s) you have named in (c) (i).

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## SECTION B (30 MARKS)

**Attempt any <u>two</u> questions from this section.**
**Extra questions answered will <u>not</u> be marked.**

11. (a) Describe the extraction of sulphur using the Frasch pump. (7 marks)
(Diagram **<u>not</u>** required)

(b) Explain the reaction of sulphuric acid with; (7 marks)
(i) Sugar (Sucrose), $C_{12}H_{22}O_{11}$
(ii) iron(ii) sulphide

(c) State any two ways in which the gaseous product in (b) (ii) pollutes air.
(1 mark)

12. (a) Lead (II) oxide was added a little at a time to warm dilute nitric acid in a beaker until no further change.
(i) State what was observed. ( ½ marks)
(ii) Write equation for the reaction that took place. (1½ marks)
(iii) Describe how pure crystals of lead (II) nitrate can be obtained from the reaction mixture in the beaker. (4 marks)

(b) State what would be observed and write equation for the reaction that would take place if lead(II) nitrate was heated strongly. (4 marks)

(c) A few drops of aqueous solution of sodium chloride were added to aqueous lead (II) nitrate solution.
(i) State what was observed. (½ mark)
(ii) Write equation to illustrate your observation in (i). (1½ marks)

(d) The reaction mixture in (c) was heated and then allowed to cool.
(i) State what was observed. (1 mark)
(ii) Give a reason for your observation in (d) (i). (1 mark)

13. (a) (i) Explain how ethene can be prepared starting from ethanol.
(Diagram is not required) (4 marks)

(ii) Name one reagent that would be used to identify ethene and state what would be observed if ethene was treated with the reagent you have named.
(2 marks)

(b) (i) Differentiate between the terms **monomer** and **polymer.** (1 mark)

(ii) Write an equation for the polymerization of ethene; name the product and indicate which one of the substances is the monomer. (2½ marks)

(c) (i) The polymer derived from ethene is **synthetic, a thermo-softening plastic** and **non-biodegradable**. Explain. (3 marks)

(ii) State the disadvantage of the polymer of ethene which is the result of its non-biodegradable property. (1 mark)

14. Sodium hydroxide is manufactured by electrolysis process in a mercury cathode cell, and it is used in manufacture of soap.

(a) State what is meant by the term **"electrolysis"**. (1 mark)

(b) Name the substance used as,

(i) the anode. (½ mark)

(ii) the electrolyte. ( ½ mark)

(c) Outline a process by which sodium hydroxide is manufactured.
(Equations are not required) (4½ marks)

(d) (i) Name one raw material used in the manufacture of soap. (1 mark)

(ii) Describe briefly a process in which soap is produced from sodium hydroxide and the material you have named in (d) (i). (4 marks)

(e) When a mixture of dilute sodium hydroxide and ammonium chloride was heated, gas **T** was evolved.

(i) Identify T (½ mark)

(ii) State the property of sodium hydroxide which made the reaction leading to formation of **T** possible. (1 mark)

(iii) Name a laboratory reagent which is used to identify **T** and state what would be observed when **T** is treated with the reagent you have named.

(2 marks)

**END.**