**P530/2**

**CHEMISTRY**

**Paper 1**

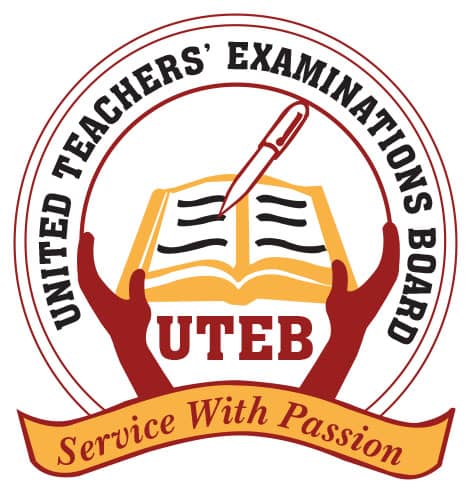
**Jul./Aug. 2019**

**2**¾ **Hours**

Name of School:……………………………………………………..............................…….

Name of Student:………………………………………………..............................…...……

Signature:……………………….....….......……**Personal No**.……............…………………

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**UTEB JOINT MOCK EXAMINATIONS, 2019**

**Uganda Advanced Certificate of Education**

**CHEMISTRY**

**Paper 1**

2 hours 45 minutes

**INSTRUCTIONS TO CANDIDATES**

* Answer **all** questions in Section **A** and any **six** questions from Section **B**.
* All questions must be answered in the spaces provided.
* Molar gas constant R = 8.31JK – 1 mol– 1.
* Molar gas volume at s.t.p = 22.4 dm3.

**Turn Over**

**SECTION A**

Answer **all** questions from this section.

1. Potassium manganate (**VII**) is often used in volumetric analysis.
2. Write equation for the reaction between potassium manganate (VII) and

hydrogen peroxide in solution.  **(01 ½ marks)**

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1. Explain why potassium manganate (VII) is not used as a primary standard in

volume in analysis. **(02 marks)**

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1. Name one compound that is used to standardize potassium manganate (VII).

**(½ mark)**

……………………………………………………………………………………………………

1. Complete the following equations and in each case name the main organic product

**(01 ½ marks each)**

CONH2

Br2/KOH (aq)



Warm

Name of product ……………………………………………………………



ConcHCl/Cucl

1000C

N2Cl–

Name of product …………………………………………………………………

Br2(aq)

1. (CH3)2C = CH2

Name of product …………………………………………………….……………

(d)

Al2O3

OH

Heat

Name of product ……………………………………………….…………………

1. (a) Explain what is meant by the term solvent extraction. **(01 mark)**

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(b) A crude sample of lead contained 2% of Silver by mass. Calculate the mass of silver left in 1 kg of lead if it was thoroughly agitates with 1 kg of zinc at 8000c. The solubility of silver in a given mass of zinc is 300 times its solubility in an equal mass of lead at 8000C. **(03 marks)**

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1. State what would be observed and write equation for the reaction that takes

place when the following compounds are reacted.

1. Acidified potassium dichromate solution with tin (II) chloride solution.

**(02 marks each)**

Observation

……………………………………………………………………………………………………

Equation

…………………………………………………………………………………………………………………………………………………………………………………………………………

**Turn Over**

1. Aqueous aluminium chloride with sodium sulphite crystals.

Observation

…………………………………………………………………………………………………………………………………………………………………………………………………………

Equation

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1. Red lead oxide with dilute nitric acid.

Observation

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Equation

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1. (a) What is meant by the term rate constant? **(01 ½ marks)**

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(b) The following results were obtained for two compounds A and B reacting to give product C.

A + B C

|  |  |  |
| --- | --- | --- |
| **Initial concentration**  **(moldm – 3)** | **Initial concentration [B] (moldm – 3)** | **Initial rate**  **[moldm– 3 S – ]** |
| 0.2 | 0.24 | 2.0 x 10 – 4 |
| 0.4 | 0.24 | 8.0 x 10 – 4 |
| 0.6 | 0.48 | 3.63 x 10 – 2 |

1. Deduce the rate equation.  **(01 mark)**

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1. Calculate the rate constant and give units.  **(01 ½ marks)**

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1. In the extraction of aluminium from its ores, the ores is first roasted in air,

crushed into a powder and mixed with concentrated sodium hydroxide solution

and finally filtered.

1. (i) Explain what is meant by the term ore. **(01 mark)**

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(ii) Write the name and formula of one ore from which aluminium can be extracted. **(01 mark)**

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1. State why the powdered ore is reacted with sodium hydroxide solution and filtered. **(01 mark)**

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1. Write equation for the reaction between the powdered ore and sodium

hydroxide solution. **(02 marks)**

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1. 4.1 g of bromo alkane B was reacted with excess sodium hydroxide solution.

The resulting solution was acidified with excess nitric acid and dilute to exactly 250 cm3 in a volumetric flask. 25.0 cm3 of this solution required 33.25 cm3 of 0.1 M silver nitrate solution for complete reaction.

1. Determine the molecular formula of B. **(03marks)**

**Turn Over**

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(b) Write the structural formulae and names of the possible isomers of B.

(02 marks)

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1. Draw diagrams to show the approximate change in pH for each of the following and

explain why the resulting solution is not neutral in both cases.

1. 0.1 M sodium hydroxide solution is added in portions to 25 cm3 of

0.1 M ethanoic acid. **(03 marks)**

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1. 0.1 M hydrochloric acid is added in portions to 20 cm3 of 0.1 M ammonia solution

**(03 marks)**

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1. Name a reagent that can be used to distinguish the following pairs of

compounds. State what is observed when each member of the pair is separately treated with the reagent.

1. Sodium ethanedioate solution and sodium ethanoate.  **(02 marks)**

**Reagent**

………………………………………………………………………………….………………………………………………………………………………………………………………….

**Observation**

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1. Tin (II) solution and zinc chloride solution.  **(02 marks)**

**Reagent**

………………………………………………………………………………….…………………………………………………………………………………………….…………………….**Observation**

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**SECTION B**

*Answer any* ***six*** *questions from this section.*

1. (a) State three reasons as to why fluorine differs in properties from other

elements in group VII of the periodic table. **(01 ½ marks)**

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**Turn Over**

(b) Write equations for the reactions between

1. Fluorine and cold dilute potassium hydroxide.  **(01 ½ marks)**

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1. Bromine and hot concentrated potassium hydroxide. **(01 ½ marks)**

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1. Fluorine and water. **(01 ½ marks)**

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1. The values of the lattice energies of potassium halides are given in the

table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Compound |  |  |  |
| Lattice energy KJmol– 1 |  |  |  |

Explain the trend in these values for potassium halides.  **(03 marks)**

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1. (a) Liquid P (bp 92.50C) and liquid Q (bp 90.80C) from an azeotropic

mixture of boiling point 730C.

1. What is meant by azeotropic mixture? **(01 mark)**

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1. Draw a boiling point – composition diagram for the P – Q mixture.  **(04 marks)**

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(b) A solution containing 60 g of RCOOH and 50 g of water was boiled.

(i) Calculate the boiling point of the solution. **(03 marks)**

(R = 43, H = 1, C = 12, O = 16, Kb of water = 0.54 Kmol– 1 kg – 1 )

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**Turn Over**

(ii) State any assumption you made in the calculation. **(01 mark)**

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1. Complete the following equations and in each case write the accepted mechanism for

the reaction.

1. CHO Conc. NaOH (aq) **(03 marks each)**

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1. BrCH2CH2CH2CH2Br Conc. KOH/EtoH

Heat

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H+

+ (CH3)2C = CH2

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1. Ethyl bromide reacts with aqueous sodium hydroxide as in the equation.

CH3CH2Br + NaOH CH3CH2OH + NaBr

1. Name the reaction. **(01 mark)**

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1. (i) Write the rate equation for the reaction between the hydroxide and

ethyl bromide. **(01 mark)**

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(ii) Outline a mechanism for reaction involved. **(02 marks)**

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1. Sketch a labelled diagram to show an energy profile for the reaction. **(03 marks)**

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1. Write equation to show how CH3CH2Br can be converted to HOCH2CH2Br. **(02 marks)**

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1. (a) A compound K contains 63.7% lead, 14.8% carbon, 1.8% of hydrogen and the

rest being oxygen. When vapourised, 0.225g of K occupies 15.5 cm3 at 760

mmHg and 273k.

1. Calculate the empirical formula of K. **(02 marks)**

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1. Deduce the molecular formula of K. **(03 marks)**

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(b) Compound K decomposed on heating forming yellow residue on cooling and a colourless vapour that turned limewater milky and formed yellow precipitate with 2, 4 – dinitrophenyl hydrazine in presence of sulphuric acid.

1. Write the name and structural formula of compound K. **(01 mark)**

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1. Write equation leading to the formation of the yellow precipitate. **(01 ½ marks)**

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1. Water boiled at 1000 at a pressure of 760 mmHg.
2. When atmospheric pressure is reduced to 660 mmHg, water boiled at

960C. explain why the boiling point is reduced. **(03 marks)**

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1. When 0.746g of potassium chloride is dissolved in 100 g of water, the solution boiled at 100.110C at a pressure of 760 mmHg.
2. Explain why the boiling point changes on adding potassium chloride.

**(03 marks)**

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1. From the information given, calculate the boiling point constant, Kb. **(03 marks)**

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1. The table below shows the decomposition temperature of carbonates of elements of

group (II) in the periodic table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Carbonate | BeC3 | MgCO3 | CaCO3 | BaCO3 |
| Decomposition temperature (00) | 100 | 350 | 900 | 1350 |

1. (i) State how the thermal stability of carbonates of the element vary in the

group. **(01 mark)**

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(ii) Explain your answer in (a) (i) above. **(03 marks)**

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1. State three properties in which magnesium resembles lithium in group (I). **(03 marks)**

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1. Name a reagent(s) can be used to distinguish between Ca2+ and Ba2+ and

state what would be observed if each of the ions is treated with the reagents you have named.

**Reagent(s)**

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**Observation**

………………………………………………………………………………….………………………………………………………………………………….………………………………………………………………………………………………………………………………….

1. Write equations to show how the following compounds can be synthesized. In each

case indicate the conditions and reagents for the reaction.

1. **(02 ½ marks)**

**NH2** from cyclohexene

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1. CH3CH2OCH2CH3 from ethane. **(02 marks)**

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1. N = N from benzene. **(04 ½ marks)**

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**End**