

MARCH 2020

The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy in collaboration with NWCTA	SUBJECT CODE NUMBER 0715	PAPER NUMBER 2
GENERAL CERTIFICATE OF EDUCATION REGIONAL MOCK EXAMINATION	SUBJECT TITLE CHEMISTRY	
ADVANCED LEVEL	DATE Tuesday 17 th March 2020 AFTERNOON	

Time Allowed: THREE Hours
INSTRUCTIONS TO CANDIDATES

Mobile phones are NOT ALLOWED in the examination room.

Answer ALL the SIX questions in this booklet.

The mark allocation is indicated for each question. Each question carries 20 marks.

Verify that this booklet contains six questions, no questions are repeated and there are no blank pages. Inform the invigilator in case this booklet contains less than six questions, questions are repeated or there are blank pages so that the booklet should be changed.

Blank spaces in this question booklet may be used for rough work.

In calculations you are advised to show all the steps in your working, giving your answer at each stage.

All necessary working must be shown. No marks will be awarded for answers without brief statements showing how the answers have been obtained.

Calculators may be used.

Useful Data

Relative atomic masses (RAM)

C = 12.0, O = 16.0, H = 1.0, Al = 27.0, S = 32.0 Na = 23.0 N = 14

SECTION A: GENERAL AND PHYSICAL CHEMISTRY

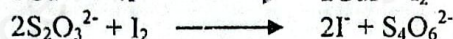
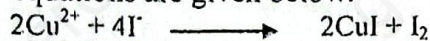
1) a) Define the terms

i) Relative molecular mass _____

ii) Mole _____

(2marks)

b) In a redox titration 20cm³ of 0.1M copper(II) sulphate solution was reacted with an excess of potassium iodide solution. The iodine produced reacted with exactly 40cm³ of sodium thiosulphate solution. The relevant ionic equations are given below.



i) How many moles of iodine were produced in the above reaction _____

ii) Calculate the concentration (mol dm⁻³) of the sodium thiosulphate solution _____

iii) State a suitable indicator for the titrating iodine with sodium thiosulphate _____

(5marks)

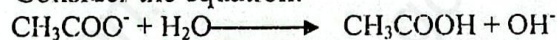
c) A radioactive substance R producing alpha, beta and gamma particles has a half-life of 15 days.

i) Draw a well labelled diagram to show the paths of the three particles passing through an electric field _____

ii) Briefly describe the experiment which led to the discovery of the nucleus stating the observations that were made _____

(5marks)

d) Consider the equation:

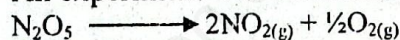


i) Identify the acid base conjugate pair _____

ii) Calculate the PH of 0.02M bariumhydroxide solution _____

(3marks)

e) An experiment was conducted on the rate of decomposition of dinitrogen pentoxide at constant volume.



The following data was obtained.

Exp't number	[N ₂ O ₅]/mol dm ⁻³	Rate/mol dm ⁻³
1	2.4 x 10 ⁻³	4.02 x 10 ⁻⁵
2	7.20 x 10 ⁻³	1.21 x 10 ⁻⁴
3	1.44 x 10 ⁻²	2.401 x 10 ⁻⁴

i) Suggest any suitable method that could be used to follow the rate of this reaction _____

ii) Determine the order of the reaction _____

iii) Give two reasons why the rate of reaction will increase when temperature is raised _____

(5marks)

TOTAL = (20 marks)

B) Draw the optical isomers of compound X.

(9marks)

b) i) On the space provided below sketch the apparatus for heating under reflux

ii) Give a reason for heating under reflux

(3marks)

c) i) Give the name and structural formula of an example in each case of:

A, a primary aliphatic amine

B, a primary aromatic amine

C, a primary aliphatic amide

D, a nitrile

ii) Write equation stating reagents and reaction conditions how you would prepare
Compound A from a nitrile

Compound B from a parent hydrocarbon

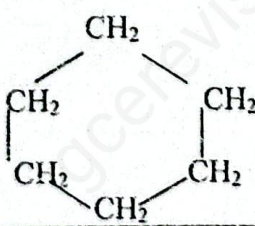
Compound C from a parent acid

Compound D from the amide

(8marks)

TOTAL = (20marks)

6) a) The following table gives some hydrocarbons and their boiling points.

Sample	Compound	Boiling Point/ $^{\circ}\text{C}$
A	$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{CH}_3$	60.3
B	$\text{CH}_3(\text{CH}_2)_4\text{CH}_3$	68.9
C	$\text{CH}_3\text{CH}=\text{CHCH}_3$	-6.2
D		81.0
E		-12.1

i) Give the systematic names of:

Compound A _____

Compound B _____

ii) From the list of hydrocarbons choose one compound which is an isomer of:

Compound A _____

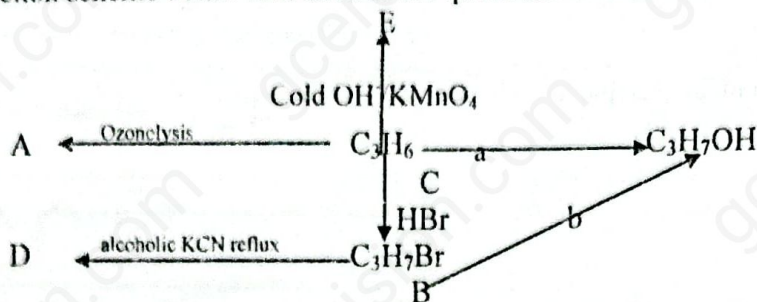
Compound C _____

iii) Explain why the boiling point of compounds A and B are different.

b) State Markovnikov's rule

(7marks)

c) Study the reaction scheme below and answer the questions which follow



i) Give possible structure for :

D _____

E _____

ii) Give reagent and reaction conditions for steps a and b.

a _____

b _____

iii) Give the structure and names of the products formed on the ozonolysis of A.

(8marks)

d) The carboxylic acid, CH_3COOH , and the aldehyde, CH_3CHO , both undergo condensation reactions.

i) What is a condensation reaction

ii) Write an equation to illustrate the condensation reaction for each of them

(2marks)

e) The acylation of benzene is an electrophilic substitution reaction

i) Identify the electrophile in the reaction

ii) Write out the equation, giving reagents and reaction conditions, for the acylation of benzene to produce phenylethanone $C_6H_5COCH_3$.

iii) Outline the mechanism of the reaction.

(3marks)

TOTAL = (20marks)

THE END