

Candidate Name _____

Centre Number _____

Candidate Number _____

**ZIMBABWE SCHOOL EXAMINATIONS COUNCIL**

General Certificate of Education Advanced Level

CHEMISTRY

PAPER 2

6031/2**JUNE 2023 SESSION****1 hour 30 minutes**

Candidates answer on the question paper.

Additional materials:

Data Booklet

Electronic Calculator

TIME 1 hour 30 minutes**INSTRUCTIONS TO CANDIDATES**

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

FOR EXAMINER'S USE

1	
2	
3	
4	
5	
6	
TOTAL	

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[Turn over

Answer all questions

- 1 (a) (i) State any two assumptions of the Kinetic theory of gases.

1. _____

2. _____

- (ii) A volume of 46.00 cm^3 of vapour was produced when 0.16 g of a liquid, Y, was vapourised at a temperature of 100°C and a pressure of $1.02 \times 10^5 \text{ Pa}$.

Calculate the relative molecular mass of Y.

- (iii) Describe the arrangement of particles in Y.

[5]



- (b) Hydrogen bromide decomposes according to the equation:

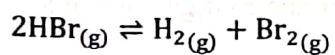


Table 1 shows results of the decomposition of HBr.

Table 1

substance	mole fraction
HBr	0.40
Br ₂	0.03
H ₂	0.03

- (i) Write the K_p expression for the equilibrium reaction.

- (ii) Calculate K_p for decomposition of hydrogen bromide.

- (iii) Deduce the effect of increasing temperature on the position of the equilibrium.

[5]

[Total:10]

[Turn over]



2

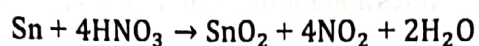
- (a) (i) Give the electronic configuration of S^{2-} .

- (ii) Describe the shapes of the s and p orbitals.

s _____

p _____

- (iii) The chemical equation for the reaction of tin and nitric acid is shown:



Explain using changes in oxidation states the reaction occurring in nitrogen.

[5]

- (b) A standard cell was set up using sodium iodide and hydrogen peroxide.

- (i) State the type of electrodes appropriate for the reaction.

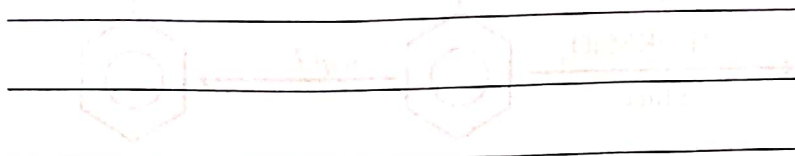
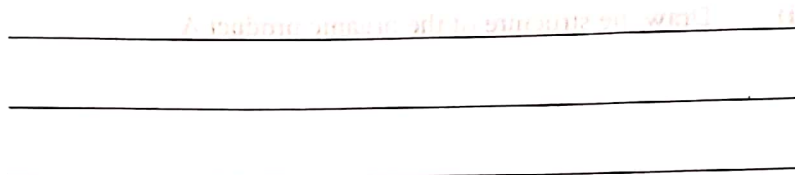
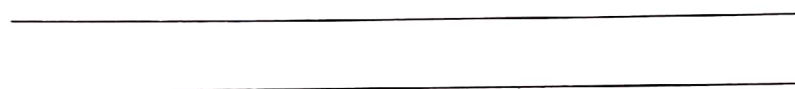
- (ii) Write the half equations and the overall equation for the cell.

- (iii) Predict the feasibility of the reaction.

[5]

[Total:10]

3 (a) Explain why

(i) NaCl is a solid whereas SCL_2 is a liquid at room temperature,(ii) first ionisation energy of Mg is higher than that of Al ,(iii) SiO_2 is insoluble in water.

[6]

(b) Write balanced chemical equations for the **four** steps of the contact process.

1. _____

2. _____

3. _____

4. _____

[4]

[Total:10]



- (a) Methylbenzene reacts as shown in Figure 4.1.

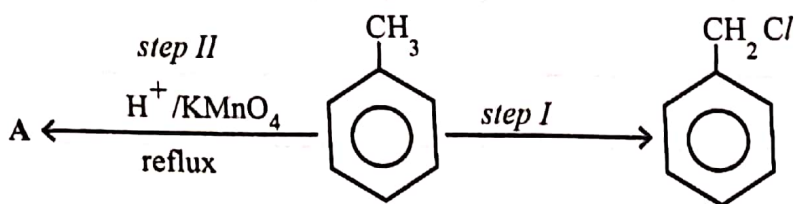


Fig. 4.1

- (i) Draw the structure of the organic product A.

- (ii) State the reagents and conditions for step 1.

reagents _____

conditions _____

- (iii) State the observation made when methylbenzene reacts with bromine in the presence of FeBr_3 .



- (iv) Give the structure of the organic product for the reaction in (iii).

[5]

- (b) (i) Outline the formation of butan-2-one from an alcohol.

- (ii) Describe a chemical test for the carbonyl group in butan-2-one.

test _____

observation _____

- (iii) Draw the structure of the product for the reaction in (ii).

[5]

[Total: 10]



(a) Explain why butane

(i) does not react with aqueous bromine,

(ii) is insoluble in water,

(iii) has a lower melting point than hexane.

[3]

(b) Describe any **two** environmental effects of the use of alkanes as fuels.

1.

2.

[2]



- (c) The structures of compounds X and Y are shown in Figure 5.1.

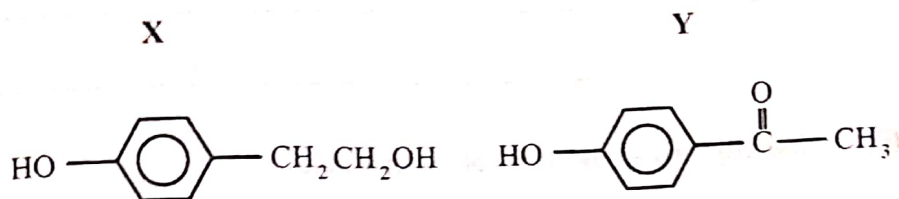


Fig. 5.1

Complete Table 5.1. by

- (i) stating the observable changes that occur,
- (ii) giving the structure(s) of the organic products formed when X and Y react with sodium metal.

Table 5.1.

	X	Y
observation		
structure of organic product		

- (iii) Name **one** reagent that can be used to distinguish between compound X and compound Y.

_____ [5]

[Total:10]



6

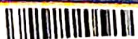
(a) (i) Define a nanoparticle.

(ii) Identify two applications of nanoparticles.

(iii) Give two examples of nanoparticles.

[5]

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- (b) (i) A mixture of three amino acids shown in Figure 6.1 were separated using electrophoresis buffered at pH 7.

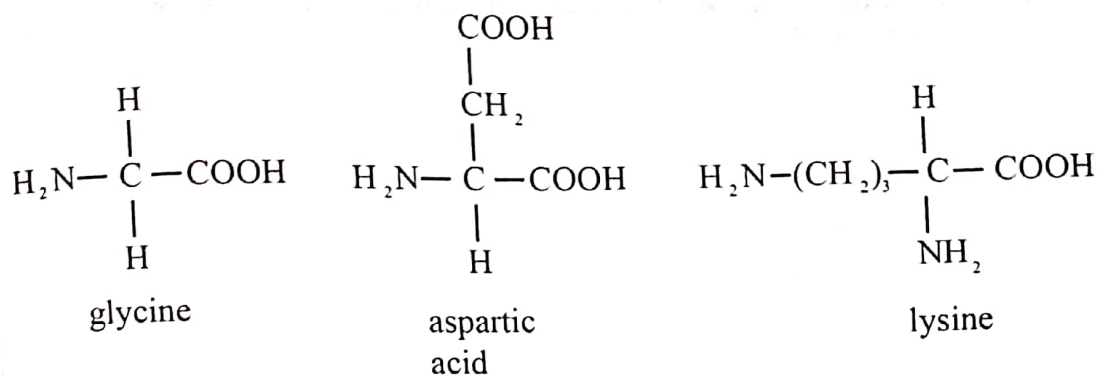


Fig. 6.1

Results obtained with electrophoresis are shown in Fig. 6.2.

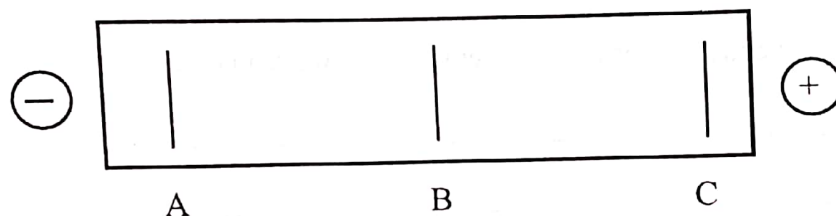


Fig. 6.2

Identify, with reasons, amino acid at A.

1. amino acid _____
2. reason _____

(iii) State the overall charge of a zwitterion.

(iii) Write the formula of the peptide formed when glycine reacts with aspartic acid.

(iv) Name the type of reaction between the two amino acids.

[5]

[Total:10]



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