higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

CHEMISTRY N5

(15040015)

10 August 2021 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 6 pages and 1 periodic table.

245Q1G2110

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
CHEMISTRY N5
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Only use a black or blue pen.
5. Write neatly and legibly.

QUESTION 1

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 A heterolytic bond breaking occurs in radical reaction where each fragment leaves with one unpaired electron.

1.2 A 5% solution of acetic acid in water is called vinegar.

1.3 Esters and carboxylic acids have pleasant fruity odours.

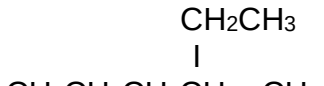
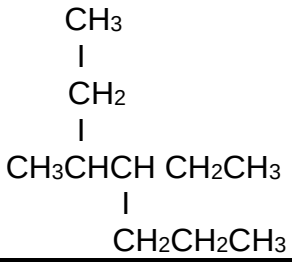
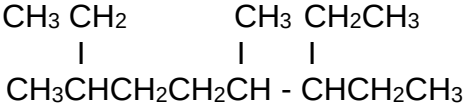
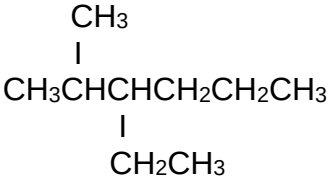
1.4 Methanol is the alcohol that is found in beer.

1.5 Dehydration is a reaction that involves a loss of hydrogen.

(5 × 1) **[5]**

QUESTION 2

2.1 Consider the following compounds:

A 	**B** 
C 	**D** 

2.1.1 Write the IUPAC names of compounds C and B. (6)

2.1.2 Draw the structure of a straight-chain isomer of compound A. (2)

2.1.3 Which compounds are structural isomers? (1)

2.1.4 Write the molecular formula of compound D. (2)

2.1.5 What is the general formula of the compounds? (1)

2.1.6 Which compounds are soluble in water?

Explain your answer. (2)

2.1.7 Write a balanced reaction equation for the combustion of compound B in oxygen. (4)

2.1.8 List FOUR properties of alkanes. (4)

2.2 Draw the structure of 1,3,5-trimethylcyclohexane. (3)

[25]

QUESTION 3

3.1 An alkene compound has the IUPAC name 2-Ethyl-1-pentene.

3.1.1 Draw the structure of the compound. (3)

3.1.2 Write the molecular formula of the compound. (1)

3.1.3 What is the homologous series of the compound? (1)

3.1.4 An aldehyde and a ketone are formed when the alkene is reacted with ozone.

Write their names. (4)

3.1.5 Suppose the alkene is reacted with hydrogen.

Write an equation for the reaction. (3)

3.2 Write a brief description of a Lindlar catalyst. (4)

3.3 Draw the structures of the following compounds:

3.3.1 Conjugate polyene with four carbon atoms

3.3.2 3-Hexyne

(2 × 2) (4)

[20]

QUESTION 4

4.1

$$CH_3CH_2CH_2\overset{\overset{O}{\|}}{C}CH_3 + CH_3MgBr \xrightarrow[2.\ H_3O^+]{1.\ \text{Ether}}$$

4.1.1 Draw and name the structure of the product of the reaction. (4)

4.1.2 Classify the product as primary, secondary or tertiary alcohol. (1)

4.1.3 What is the name of the reagent CH_3MgBr? (1)

4.1.4 Use a reaction equation to indicate how the reagent in QUESTION 4.1.2 is prepared. (3)

4.1.5 List THREE properties of alcohols. (3)

4.2 Write a brief description about the following:

4.2.1 Fermentation process (3)

4.2.2 Hydrogen bonding in alcohols (4)

4.3 The following esters are responsible for the fruity odours of bananas, pineapples and oranges.

Name the esters.

4.3.1

$$CH_3COCH_2CH_2CH_2CH_2CH_3$$

4.3.2

$$CH_3CH_2CH_2COCH_2CH_3$$

4.3.3

$$CH_3CO(CH_2)_7CH_3$$

(3 × 2) (6)

[25]

QUESTION 5

5.1 A certain alcohol is used to prepare propanone on an industrial scale by the dehydrogenation of the alcohol.

5.1.1 Define the term *dehydrogenation*. (2)

5.1.2 Classify the alcohol as primary, secondary or tertiary alcohol.

Substantiate your answer. (2)

5.1.3 Write the IUPAC name of the alcohol. (3)

5.1.4 Name TWO reagents that are used for the laboratory preparation of propanone. (2)

5.1.5 Write a reaction for the industrial preparation of propanone. (3)

5.1.6 Briefly explain how to distinguish aldehydes form ketones. (3)

5.2 Give ONE word for each of the following descriptions by writing it next to the question number (5.2.1–5.2.5) in the ANSWER BOOK.

5.2.1 An aromatic amine.

5.2.2 Common name of ethanamide.

5.2.3 An amide and important fertilizer that contains up to 46% of nitrogen by mass.

5.2.4 Primary amine with one carbon atom.

5.2.5 A 40% aqueous solution use to preserve biological specimens.

(5 × 2) (10)
[25]

TOTAL: 100

(15040015)

PERIODIC TABLE