higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

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NATIONAL CERTIFICATE

CHEMISTRY N5

(15040015)

9 April 2018 (X-Paper)
09:00–12:00

Calculators may be used.

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

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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. Write neatly and legibly.

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QUESTION 1

Write ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1 A saturated hydrocarbon with six hydrogen atoms.

1.2 The homologous series with a functional group R-CO-NH_2.

1.3 Type of a reaction that occurs when C_2H_5OH react with sulphuric acid.

1.4 Product formed when propene react with iodine.

1.5 An alcohol that is used to prepared butylethanoate.

1.6 CH_3CCCH_3

1.7 Branched structural isomer of C_4H_8.

1.8 Smallest carboxylic acid.

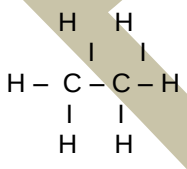
1.9 A common name of an aromatic amine.

1.10 C_3H_4

(10 × 1) **[10]**

QUESTION 2

2.1



2.1.1 Indicate the type of hybrid orbitals that occurs in ethane. (1)

2.1.2 A mixture of chlorine and ethane gas exposed to light. Write a balanced equation for the reaction. (4)

2.1.3 The reaction in QUESTION 2.1.2 occurs in three-step. Name the reactive species that are formed during the reaction as intermediate products. (1)

2.1.4 Name the type of bond cleavage that is involved during the chlorination of ethane?

Briefly explain your answer. (2)

2.1.5 What is the degree of saturation of ethane molecule? (1)

2.1.6 Write a balanced reaction equation for the combustion of the ethane. (4)

2.1.7 List THREE properties of alkanes. (3)

2.2 The addition of HBr to ethylene is an example of polar reaction.

2.2.1 Write a balanced equation for the reaction. (3)

2.2.2 Differentiate between a *nucleophile* and an *electrophile*. (4)

2.2.3 Is ethylene a polar or non-polar? Explain your answer. (2)
[25]

QUESTION 3

3.1 Draw and write the IUPAC names of TWO structural isomers of $C_2H_4O_2$. (4)

3.2 Use structural formula to write an equation for the elimination of hydrogen bromide from of 2-bromobutane. (5)

3.3 What is a *carbonium*? (2)

3.4 Use the following information to answer the questions that follows:

A C_4H_6
B $CH_3CHOHCH_3$
C C_2H_4
D $C\ell CH_2CH_2C\ell$
E CH_3CH_2COOH

3.4.1 Write the general formula of a class of compounds represented by compound E. (1)

3.4.2 What type of a reaction is involved when compound C is converted to compound D? (1)

3.4.3 To what homologous series does compound B belong to? (1)

3.4.4 To what homologous series does compound E belongs to? (1)

3.4.5 Write a balanced equation for the reaction that occurs when compound A is burned in oxygen. (3)

3.4.6 Write the IUPAC names of compound A–E. (5)

3.5 Draw the structure of a phenol. (2)
[25]

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QUESTION 4

4.1 For a compound with a molecular formula $C_4H_{10}O$:

4.1.1 Write the IUPAC name of a branched isomer. (2)

4.1.2 Draw the structure of a branched isomer. (2)

4.1.3 To what homologous series does the compound mentioned in QUESTION 3.1.2 belong to? (1)

4.1.4 Draw the structural of a straight chained isomer. (2)

4.2 Alcohol $\xrightarrow[180\ 0C]{H_2SO_4} CH_2 = CH_2 + H_2O$

4.2.1 Draw the structure of the alcohol. (2)

4.2.2 Classify the alcohol as primary or secondary alcohol. Justify your answer. (2)

4.2.3 What is the main purpose of H_2SO_4 in the reaction? (1)

4.3 Briefly explain why alcohols have higher boiling points when they are compared to alkanes. (2)

4.4



4.4.1 Draw the structural formula of the Grignard reagent.

4.4.2 Name the reagent in QUESTION 4.4.1 above.

4.4.3 Write the IUPAC name of the product.

(3 × 2) (6)

[20]

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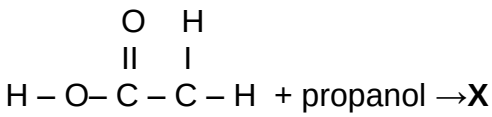
QUESTION 5

5.1



A

5.1.1 To what homologous series des compound A belong to? (1)

5.1.2 Write the IUPAC name of compound A. (2)

5.1.3 Draw the structural formula of compound X. (3)

5.1.4 Write the IUPAC names of all the products that are formed in this reaction. (4)

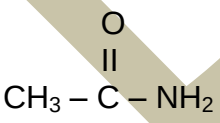
5.1.5 What type of a reaction is this? (1)

5.2 Name of the following compounds:

5.2.1 $CH_3 – CH_2 – O – CH_2 – CH_3$

5.2.2 $N(CH_3)_3$

5.2.3



(3 × 2) (6)

5.3 Amines like ammonia are weak proton acceptors. Justify the statement with an aid of a reaction equation for the dissociation of methylamine in water. (3)

[20]

TOTAL: 100

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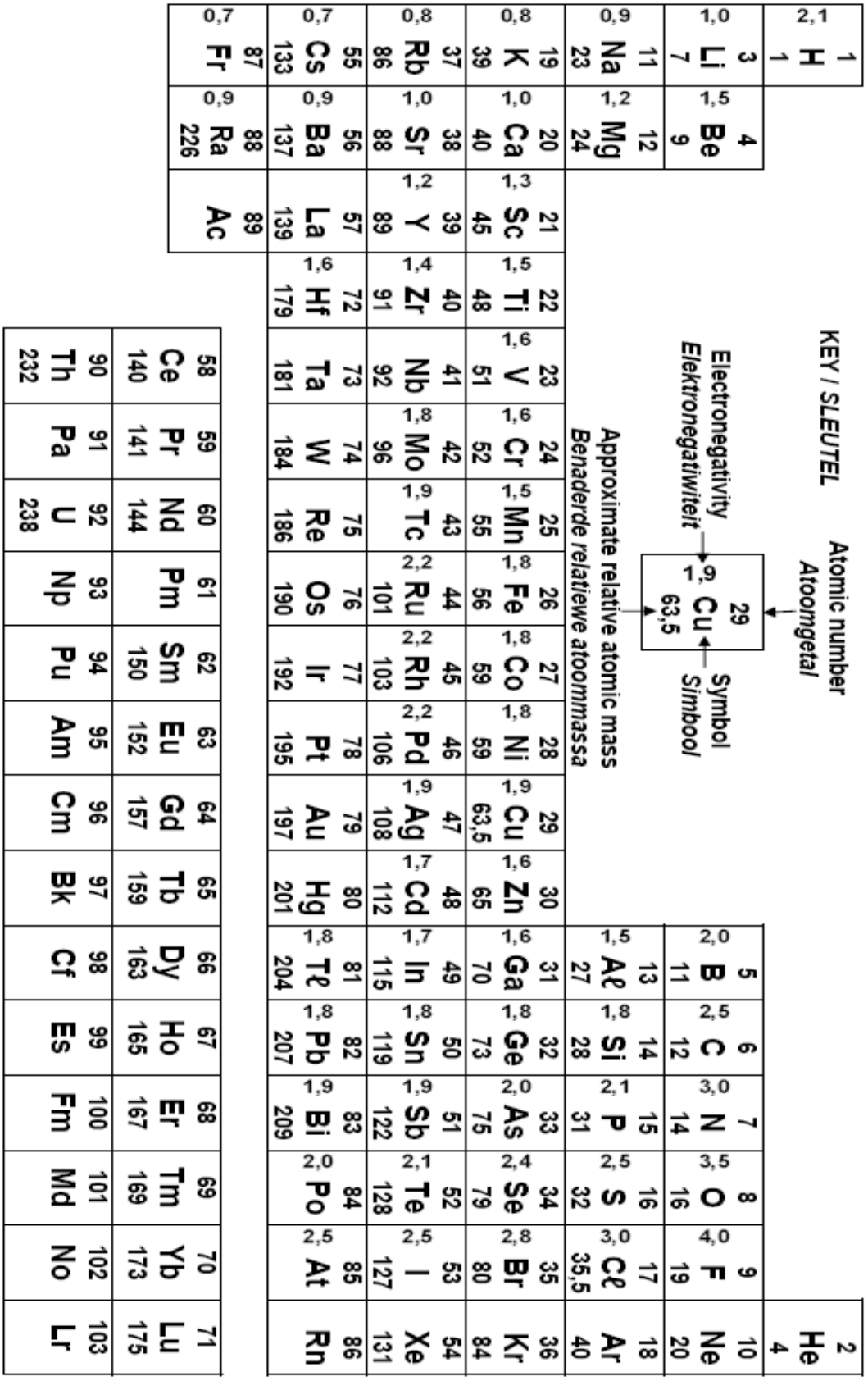
PERIODIC TABLE



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