



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T360(E)(A9)T

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.

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.
-

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-NH₂.
- 1.3 Type of a reaction that occurs when C₂H₅OH 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 CH₃CCCH₃
- 1.7 Branched structural isomer of C₄H₈.
- 1.8 Smallest carboxylic acid.
- 1.9 A common name of an aromatic amine.
- 1.10 C₃H₄

(10 × 1) [10]

QUESTION 2

- 2.1
- $$\begin{array}{c}
 \text{H} \quad \text{H} \\
 | \quad | \\
 \text{H} - \text{C} - \text{C} - \text{H} \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- 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 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 $ClCH_2CH_2Cl$
 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 belong 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]**

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 $\xrightarrow[180\text{ }^\circ\text{C}]{H_2SO_4} CH_2=CH_2 + H_2O$

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

$$\begin{array}{c}
 \text{H} \quad \text{O} \quad \text{H} \\
 | \quad || \quad | \\
 \text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}
 + \text{Grignard reagent} \rightarrow
 \begin{array}{c}
 \text{H} \quad \text{OH} \quad \text{H} \\
 | \quad | \quad | \\
 \text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\
 | \quad | \quad | \\
 \text{H} \quad \text{CH}_2 \quad \text{H} \\
 | \\
 \text{CH}_3
 \end{array}$$

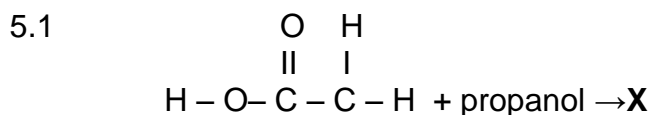
4.4.1 Draw the structural formula of the Grignard reagent.

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]

QUESTION 5



A

- 5.1.1 To what homologous series does 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 $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_3$
- 5.2.2 $\text{N}(\text{CH}_3)_3$
- 5.2.3 $\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3 - \text{C} - \text{NH}_2 \end{array}$ (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

PERIODIC TABLE

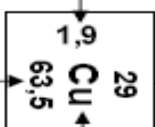
THE PERIODIC TABLE OF ELEMENTS
DIE PERIODIEKE TABEL VAN ELEMENTE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
(I) (II) (III) (IV) (V) (VI) (VII) (VIII)

1 H	2 He																																																																																						
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne	11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	87 Fr	88 Ra	89 Ac	179 Hf	181 Ta	184 W	186 Re	190 Os	192 Ir	195 Pt	197 Au	201 Hg	204 Tl	207 Pb	209 Bi	210 Po	210 At	210 Rn
0,1	1,0	2,1	2,2	2,3	2,4	2,5	2,6	2,7	2,8	2,9	3,0	3,1	3,2	3,3	3,4	3,5	3,6	3,7	3,8	3,9	4,0	4,1	4,2	4,3	4,4	4,5	4,6	4,7	4,8	4,9	5,0	5,1	5,2	5,3	5,4	5,5	5,6	5,7	5,8	5,9	6,0	6,1	6,2	6,3	6,4	6,5	6,6	6,7	6,8	6,9	7,0	7,1	7,2	7,3	7,4	7,5	7,6	7,7	7,8	7,9	8,0	8,1	8,2	8,3	8,4	8,5	8,6	8,7	8,8	8,9	9,0	9,1	9,2	9,3	9,4	9,5	9,6	9,7	9,8	9,9	10,0	10,1	10,2	10,3			

KEY / SLEUTEL Atomic number
Atoomgetal

Electronegativity
Elektronegatieweif
Symbol
Simbool



Approximate relative atomic mass
Benaderde relatiewe atoommassa

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	140 Ce	141 Pr	144 Nd	150 Sm	152 Eu	157 Gd	159 Tb	163 Dy	165 Ho	167 Er	169 Tm	173 Yb	175 Lu	232 Th	238 U
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