

Student Name: _____



CHEMISTRY 2021

Unit 4

Key Topic Test 1 – Organic chemistry - structure and nomenclature

Recommended writing time*: 50 minutes

Total number of marks available: 50 marks

QUESTION BOOK

*The recommended writing time is a guide to the time students should take to complete this test. Teachers may wish to alter this time and can do so at their own discretion.

Conditions and restrictions

- Students are permitted to bring into the room for this test: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the room for this test: blank sheets of paper and/or white out liquid/tape.
- A scientific calculator is permitted in this test.
- VCAA Chemistry data booklet is provided

Materials supplied

- Question and answer book of 11 pages.

Instructions

- Print your name in the space provided on the top of the front page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the room for this test.

SECTION A – Multiple-choice questions

Instructions for Section A

Answer **all** questions.

Choose the response that is **correct** for the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks are **not** deducted for incorrect answers.

If more than one answer is completed for any question, no mark will be given.

Question 1

The following molecules are all unsaturated;

- A. C_6H_6 , C_2H_2 , C_2H_6
- B. benzene, cyclohexane, octene
- C. ethyne, ethene, decene
- D. ethanol, C_2H_4 , C_2H_3Cl

Question 2

The following molecules are all in the same homologous series;

- A. C_6H_6 , C_2H_2 , C_4H_4
- B. methanol, ethanol, propanol
- C. ethyne, ethene, ethane
- D. ethanol, ethanoic acid, chloroethane

Question 3

The number of isomers of trichloroethane is;

- A. 1
- B. 2
- C. 3
- D. 4

Question 4

A correctly named isomer of 3-aminobutan-2-ol is

- A. 2-aminobutan-3-ol
- B. 1-aminobutan-3-ol
- C. 2-aminobutan-2-ol
- D. 5-aminobutan-2-ol

Question 5

A student named a molecule as 2-hydroxybutan-4-oic acid. The correct name is;

- A. 2-hydroxybutan-1-oic acid
- B. 3-hydroxybutan-1-oic acid
- C. 2-hydroxybutanoic acid
- D. 3-hydroxybutanoic acid

Question 6

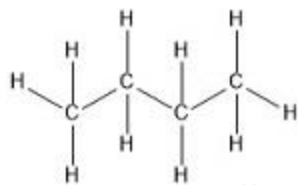
The general formula for carboxylic acids is;

- A. $C_nH_{2n}O_2$
- B. $C_nH_{2n}O_n$
- C. $C_nH_{2n+2}O_2$
- D. $C_nH_{2n+1}O$

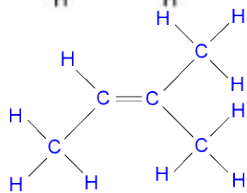
Question 7

The molecule that has a geometric isomer is;

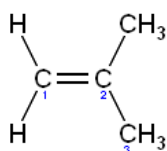
A.



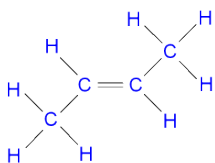
B.



C.



D.



Question 8

$\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$ is a;

- A. primary alcohol
- B. secondary alcohol
- C. tertiary alcohol
- D. quaternary alcohol

Question 9

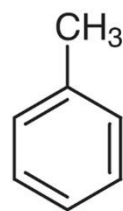
The systematic name of the compound $\text{CH}_3\text{CH}_2\text{COOCH}_3$ is;

- A. propyl ethanoate
- B. ethyl propanoate
- C. methyl ethanoate
- D. methyl propanoate

Question 10

The molecular formula of toluene (shown on the right) is;

- A. C_6H_8
- B. C_6H_9
- C. C_7H_8
- D. C_7H_9



SECTION B- Short-answer questions**Instructions for Section B**

Questions must be answered in the spaces provided in this book.

To obtain full marks for your responses you should:

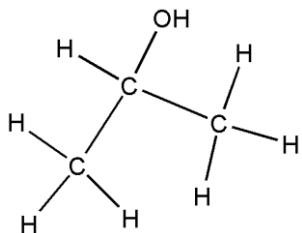
- Give simplified answers with an appropriate number of significant figures to all numerical questions; unsimplified answers will not be given full marks.
- Show all workings in your answers to numerical questions. No credit will be given for an incorrect answer unless it is accompanied by details of the working.

Make sure chemical equations are balanced and that the formulas for individual substances include an indication of state; for example, $\text{H}_2(\text{g})$; $\text{NaCl}(\text{s})$.

Question 1

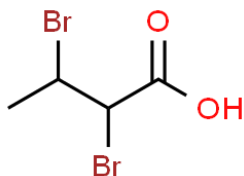
Name the following molecules as according to IUPAC nomenclature;

a.



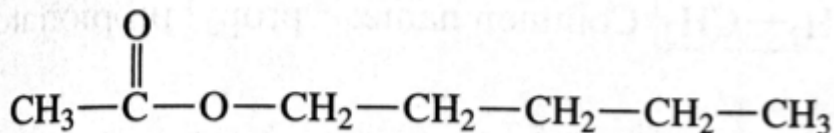
1 mark

b.



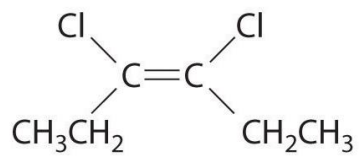
1 mark

c.



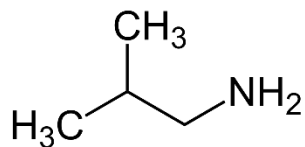
1 mark

d.



1 mark

e.



1 mark
Total 5 marks

Question 2

Draw;

a. Full structural formula of 3-chlorohex-2-ene

b. Skeletal formula of 2-ethylpent-3-en-1-ol

2 marks

2 marks

c. Full structural formula of propyl ethanoate

2 marks

d. Semi-structural formula of cis-1,2-dichloropropene

2 marks

e. Skeletal formula of 4-hydroxybutanoic acid

2 marks
Total 10 marks

Question 3

Consider the following list of molecules;

C_4H_{10} , $C_4H_{10}O$, $C_4H_8O_2$, C_4H_8O , $C_4H_{11}N$, C_4H_9NO , C_4H_8

a. Give the formula of a molecule listed above which could be;

i. An alkane

ii. An amine

iii. An unsaturated alcohol

iv. An aldehyde or a ketone

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v. A carboxylic acid

vi. An ester

vii. An amide

7 x 1 = 7 marks

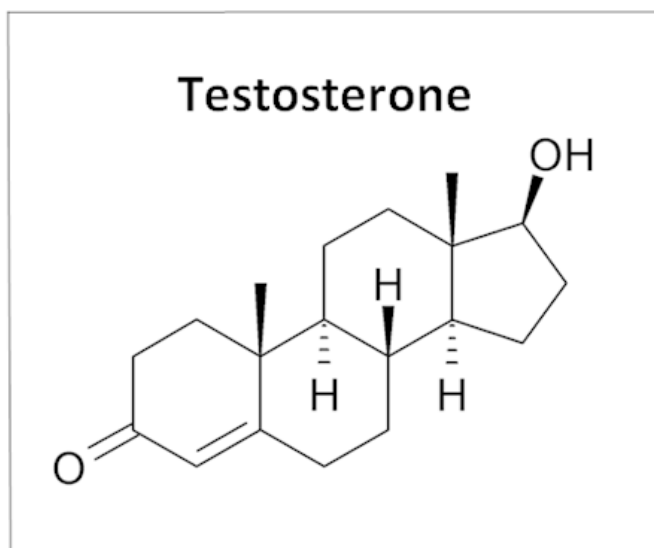
b. Draw the four isomers of C₄H₁₀O

4 marks

Total 11 marks

Question 4

The structure of a testosterone molecule is shown below;



- a. Circle all of the chiral centres on the testosterone molecule above.

2 marks

- b. What are the names of the two functional groups present in the molecule that contain oxygen?

2 marks

Total 4 marks

Question 5

Draw structures of;

- a. a ketone with 3 carbon atoms

2 marks

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b. a geometric isomer of trans-1,2-dibromoethene

c. a secondary amine with 5 carbon atoms

2 marks

d. an aldehyde with 2 carbon atoms

2marks

e. an isomer of 2,3-dimethylbutane

2 marks

2 marks
Total 10 marks

END OF KEY TOPIC TEST