Australian Islamic College 2018

ATAR Chemistry Units 3 and 4

Task 9 (Weighting: 3%)

Organic Chemistry Test

Test Time: 40 minutes

Please do not turn this page until instructed to do so.

First Name	Surname

Teacher

Mark / 39	Percentage

Equipment allowed: Pens, pencils, erasers, whiteout, rulers and non-programmable calculators permitted by the Schools Curriculum and Standards Authority.

TIME FOR PAPER: 50 MINS

Multiple Choice (10 marks)

1. Consider the following substances: C (graphite), C_3H_8, CH_3COCH_3, CH_3CH_2OH. Which of the following **correctly** represents these substances in order of increasing melting point?

(A) $C_3H_8 < CH_3COCH_3 < CH_3CH_2OH < C$
(B) $C < C_3H_8 < CH_3CH_2OH < CH_3COCH_3$
(C) $CH_3COCH_3 < CH_3CH_2OH < C_3H_8 < C$
(D) $C_3H_8 < CH_3CH_2OH < CH_3COCH_3 < C$

2. A colourless liquid is known to be one of the following: a primary alcohol, a secondary alcohol, a tertiary alcohol, a ketone or a carboxylic acid. When a sample of the liquid is shaken with a water solution containing both potassium dichromate and sulfuric acid the orange colour of the solution changes to green. What can be concluded about the liquid?

(A) it could be a primary alcohol or a secondary alcohol
(B) it could be a secondary alcohol
(C) it could be a tertiary alcohol or a ketone
(D) it could be a tertiary alcohol, a ketone or a carboxylic acid

3. Which of the following pairs of compounds would form propyl ethanoate when warmed with sulfuric acid?

(A) CH_3CH_2COOH and CH_3CH_2OH
(B) CH_3CH_2OH and $CH_3CH_2CH_2OH$
(C) CH_3COOH and $CH_3CH_2CH_2OH$
(D) CH_3OH and CH_3COOH

4. Which formula represents a ketone?

(A) CH_3OCH_3
(B) CH_3CH_2COH
(C) CH_3COCH_3
(D) $CH_3CH(OH)CH_3$

5. Which formula represents a molecule that can exhibit geometric (*cis/trans*) isomerism?

(A) $CH_3CHCHCH_3$
(B) $H_2CCH(CH_3)_2$
(C) $CH_3CH_2CH_3$
(D) H_2CCHCH_3

6. Which of the following statements about ethene, C_2H_4, are correct?

I It is a planar molecule.
II Its combustion in an excess of oxygen produces carbon dioxide and water.
III It can be converted to an alkane by an addition reaction.
IV It is a saturated molecule.

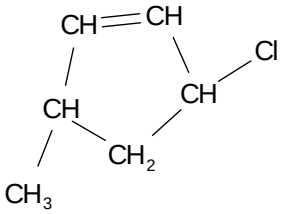
(A) I, II and III only
(B) II and III only
(C) I and III only
(D) I, III and IV only

7. Which formula represents an aldehyde?

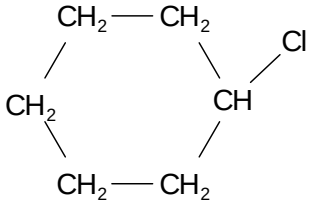
(A) HCOOH
(B) HCHO
(C) CH_3COCH_3
(D) CH_3CH_2OH

8. Which of the following structures is an isomer of 2-chloro-3-methyl-1-pentene?

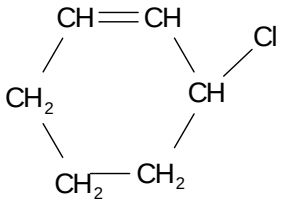
(A)



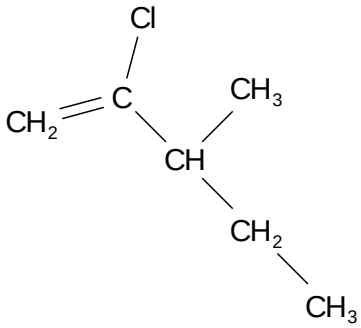
(B)



(C)



(D)



9. Consider the reaction:

$$CH_3CH=CHCH_3 + Br_2 \rightarrow Z$$

Z would be represented by

(A) $CH_3CHBrCHBrCH_3$
(B) $CH_2BrCH_2CHBrCH_3$
(C) $CH_3CHBrCH_2CH_2Br$
(D) $CH_2BrCH_2CH_2CH_2Br$

10. Which pair of substances could be combined to make soap?

(A) Sodium hydroxide and an amide
(B) An amide and an amine
(C) Animal fat and calcium stearate
(D) Vegetable oil and sodium hydroxide

Short Answer (29 marks)

11. a) Draw condensed structural formulae to show the reaction of sodium with methylpropan-1-ol. . (2 marks)

b) Name the organic product resulting from the oxidation of methylpropan-1-ol with an excess of permanganate ions in the presence of sulfuric acid.

(1 mark)

_____

c) Why is it not possible to oxidise methylpropan-2-ol? (1 mark)

_____

_____

_____

d) Propan-1-ol will react with methanoic acid in the presence of hydrogen ions. Give the name and structural formula of the organic product. (2 marks)

Name: _____

Structural Formula:

e) Write a balanced equation for the complete combustion of methylpropane. (2 marks)

12. Give the systematic names of the following organic compounds: (3 marks)

a) $CH^3CHOHCH^3$

_____

b) HCOOH

_____

c) $CH^3CH^2COOCH^2CH^3$

_____

13. State the half-equations and overall redox equation that occurs when ethanal is warmed with a water-solution containing potassium dichromate and sulfuric acid. (3 marks)

14. a) Draw the full structural formulae, showing all bonds and all atoms, of three structural isomers with the molecular formula C_4H_8. (3 marks)

b) Only one of the structural isomers of C_4H_8 exhibits cis/trans isomerism. Identify that isomer. Draw and name the two geometric isomers, in the correct box below.

(4 marks)

Cis isomer	**Trans isomer**

15. You are asked to identify three colourless liquids. The liquids are known to be butan-1-ol, propanoic acid and methyl ethanoate.

a) Give the full structure of each of these compounds. (3 marks)

butan-1-ol	
propanoic acid	
methyl ethanoate	

b) Describe how you could identify each solution using only pieces of magnesium and an acidified potassium dichromate solution. Your answer should include equations and predicted observations for any reactions that take place. State symbols are not required for these equations. (5 marks)

END OF PAPER