Anglo-Chinese School
(Barker Road)
A Methodist Institution
Founded in 1886

CHEMISTRY
DEPARTMENT OF SCIENCE

Name: ..... ( ) Class: SEC 4 .....

OC: ALKANES & ALKENES – ASSIGNMENT

Multiple-Choice Questions [20 Marks]

TOTAL SCORE / 30

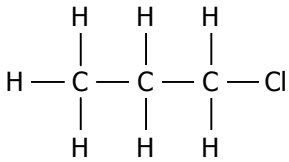
Write in your selected answer for the multiple-choice questions in the boxes provided.

1	2	3	4	5	6	7	8	9	10

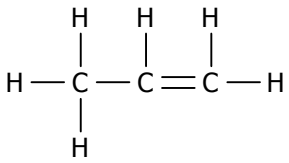
11	12	13	14	15	16	17	18	19	20

1. Which of the following compounds is unsaturated?

A



B



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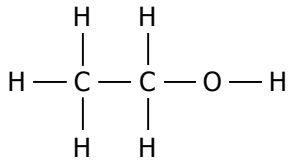
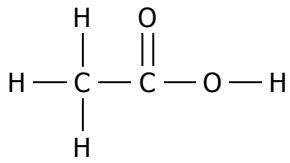


D



2. Which of the following best describes alkanes?

A All molecules which are saturated hydrocarbons are alkanes.
B All molecules which consist only of single bonds are alkanes.
C All molecules which contain C–C bonds are alkanes.
D All molecules which react with gaseous chlorine are alkanes.

3. Which of the following correctly describes saturated compounds?

A All saturated compounds are hydrocarbons.
B All saturated compounds are solid at room temperature.
C All saturated compounds are unable to undergo addition reactions.
D All saturated compounds only contain single bonds.

4. Which of the following compounds is able to undergo an addition reaction with chlorine?

A C_3H_5COOH **B** $C_4H_8Cl_2$ **C** C_4H_9OH **D** C_5H_{12}

5. Gaseous samples of ethane and ethene can most easily be differentiated by

A bubbling through aqueous bromine.
B comparing their combustion products.
C measuring their molar volume.
D reacting with chlorine under ultra-violet light.

6. Which of the following equations does **not** represent an addition reaction?

A $C_2H_4 + Br_2 \longrightarrow C_2H_4Br_2$
B $C_3H_6 + H_2O \longrightarrow C_3H_7OH$
C $C_4H_7Cl + H_2 \longrightarrow C_2H_9Cl$
D $CH_2Br_2 + Br_2 \longrightarrow CHBr_3 + HBr$

7. In the combustion of an alkane, which of the following may not be produced?

A carbon monoxide
B hydrogen
C soot (carbon)
D water vapour

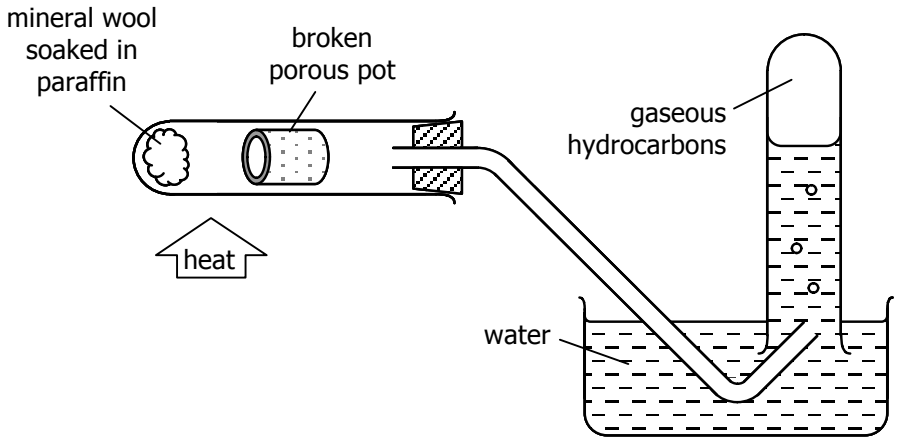
8. During incomplete combustion, a yellow flame is formed due to the soot produced. Which of the following is unable to produce a yellow flame upon combustion?

A carbon monoxide
B charcoal
C propene
D propanoic acid

9. An alkane **X** undergoes catalytic cracking. Which of the following statements is false?

A Carbon dioxide gas may be formed.
B Hydrogen gas may be formed.
C One of the products must be an alkane.
D One of the products must be an alkene.

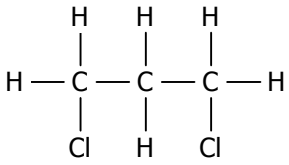
10. An experiment is set up as shown.



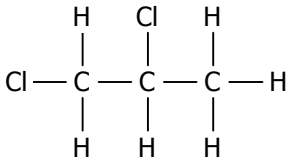
What is the name of the reaction that takes place?

A combustion **B** cracking **C** distillation **D** substitution

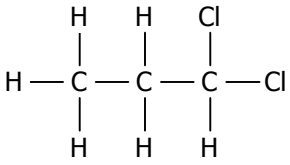
11. Three isomers are shown below.



molecule **A**



molecule **B**



molecule **C**

Which of the molecules may have been the product(s) of an addition reaction with gaseous chloride and the product(s) of a substitution reaction with gaseous chlorine respectively?

	product of addition of chlorine	*product of substitution with chlorine*
A	**A**, **B** and **C**	**A** and **B** only
B	**B** and **C** only	**A** only
C	**B** only	**A**, **B** and **C**
D	**B** only	**A** and **C** only

12. When ethane undergoes a substitution reaction with chlorine, which of the following compounds may be produced?

(i) dichloroethane
(ii) hydrogen chloride
(iii) hydrogen gas
(iv) trichloroethane

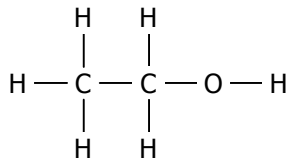
A (i) and (iii) only
B (i) and (iv) only
C (i), (ii) and (iv) only
D (ii) and (iii) only

13. The conversion of ethene to ethane may **not** be described as

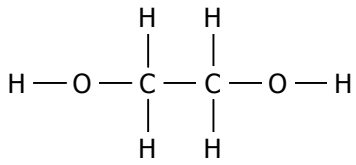
A addition. **B** hydrogenation. **C** reduction. **D** substitution.

14. Propane gas cracked to produce hydrogen and organic product **Y**. **Y** reacts with steam, under special conditions, to form **Z**. Which of the following could be the structure of **Z**?

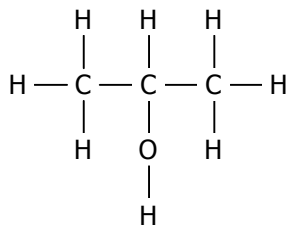
A



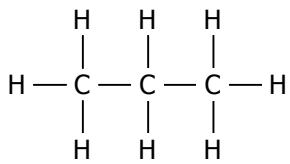
C



B



D



15. The vapour of an alcohol (M_r = 60) was bubbled through concentrated sulfuric acid. A gaseous hydrocarbon **X** was produced which decolourised bromine water. Which one of the following is the molecular formula of **X**?

A C_2H_4 **B** C_2H_6 **C** C_3H_6 **D** C_3H_8

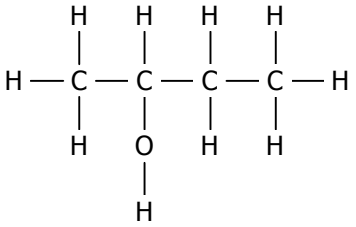
16. In the manufacture of margarine, hydrogen is added to

A an alkane. **B** animal fat. **C** crude oil. **D** vegetable oil.

17. Ethene can be converted into ethanol. Which of the following correctly gives the name and the conditions for this reaction?

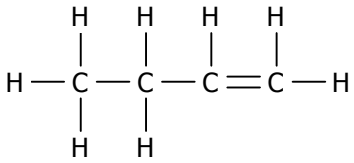
	name of reaction	*temperature*	*pressure*	*catalyst*
A	addition of hydrogen	200 °C	60 atm	finely divided iron
B	addition of hydrogen	300 °C	1 atm	nickel metal
C	addition of steam	200 °C	1 atm	silicon dioxide
D	addition of steam	300 °C	60 atm	phosphoric(V) acid

18. Butan-2-ol, as shown below, is produced by the reaction of steam to an alkene.

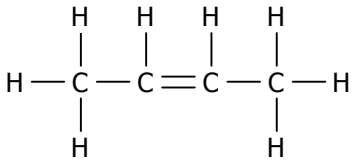


From which of the following alkenes can the above alcohol be manufactured from?

(i)

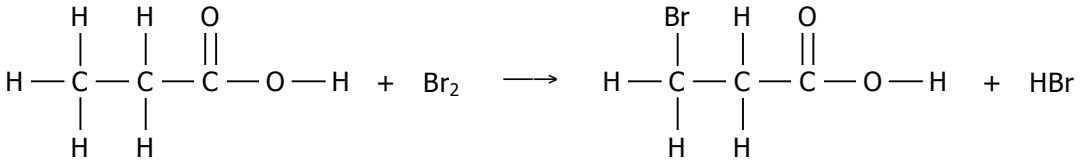


(ii)



A (i) only **B** (ii) only **C** both (i) and (ii) **D** neither (i) or (ii)

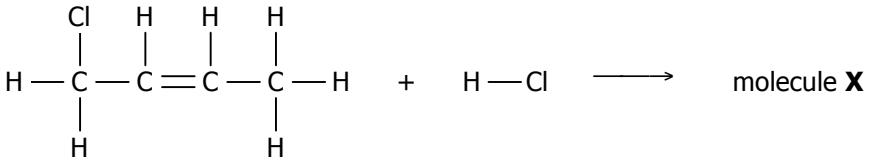
19. A carboxylic acid undergoes the following reaction:



What is the type of reaction that has occurred?

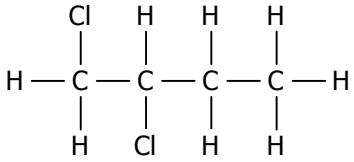
A addition **B** combustion **C** cracking **D** substitution

20. A molecule of chlorobutene undergoes an addition reaction with hydrogen chloride (HCl), as shown below.

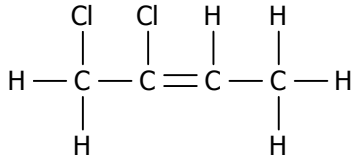


Which of the following shows a possible structure of molecule **X**?

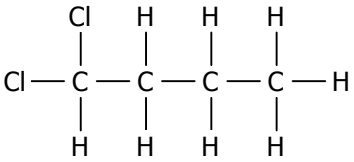
A



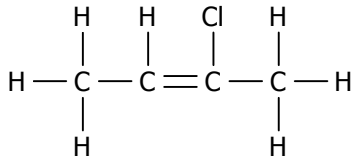
C



B

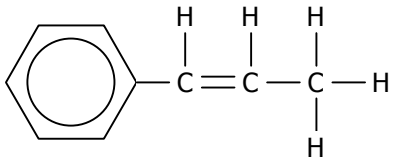


D



Structured Questions [10 Marks]

21. An unsaturated hydrocarbon, **X**, undergoes an addition reaction with aqueous bromine. The structure of hydrocarbon **X** can be represented in the diagram below.



(a) Define the term 'unsaturated hydrocarbon'. [2]

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.....

.....

(b) Define the term 'addition'. [2]

.....

.....

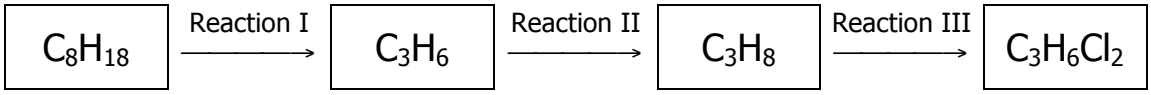
.....

(c) (i) Describe the observations that would be made when **X** reacts with bromine. [1]

.....

(ii) Draw the structure of the product formed between **X** and bromine. [1]

22. Observe the reaction diagram below.



(a) What is the name given to Reaction I? [1]

.....

(b) State the conditions necessary for Reaction II. [1]

.....

(c) Write down the name, the conditions and the equation for Reaction III. [2]

Name: .....

Conditions: .....

Equation: .....

END