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

CHEMISTRY
DEPARTMENT OF SCIENCE

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

OC: MOLECULAR STRUCTURES – 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. All members of an homologous series

   A contain the same number of bonds.
   B contain the same number of carbon atoms.
   C share a general formula.
   D share the same melting and boiling points.

2. Which of the following statements about an homologous series is **false**?

   A Members of a homologous series contain a different number of hydrogen atoms.
   B Members of a homologous series have different melting and boiling points.
   C Members of a homologous series share the same empirical formula.
   D Members of a homologous series undergo similar chemical reactions.

3. Down a homologous series, the boiling points of each successive member increases because

   A the intermolecular forces between the molecules increases.
   B the number of hydrogen atoms increases.
   C there are a larger number of bonds to be broken.
   D there covalent bonds are get increasingly stronger.

4. Which of the following is **not** a trend across a homologous series, in order of increasing number of carbon atoms?

   A Increasing density.
   B Increasing flammability.
   C Increasing mass.
   D Increasing viscosity.

5. Which of the following is a possible general formula for carboxylic acids?

   A $C_nH_{2n+1}COH$ **B** $C_nH_{2n}CO_2H$ **C** $C_nH_{2n}O_2$ **D** $C_nH_{n+1}CO_2H$

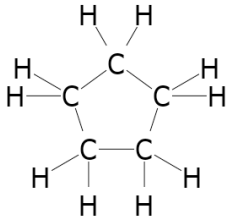
6. What is the molecular formula for propanoic acid and butanol?

	propanoic acid	*butanol*
A	C_2H_5COOH	C_3H_7OH
B	C_2H_5COOH	C_4H_9OH
C	C_3H_7COOH	C_3H_8O
D	C_3H_7COOH	$C_4H_{10}O$

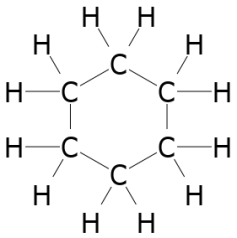
7. Which of the following correctly states the molecular formula, empirical formula and simplified structural formula of propene?

	molecular formula	*empirical formula*	*structural formula*
A	CH_2	C_3H_6	CH_2CHCH_3
B	CH_2CHCH_3	CH_2	C_3H_6
C	C_3H_6	CH_2	CH_2CHCH_3
D	C_3H_6	CH_2CHCH_3	CH_2

8. Cycloalkanes are compounds with a 'ring' carbon chain. Two examples of cycloalkanes are cyclopentane and cyclohexane:



cyclopentane



cyclohexane

Which of the following correctly shows the general formula for alkanes, alkenes and cycloalkanes?

	alkanes	*alkenes*	*cycloalkanes*
A	C_nH_{2n}	C_nH_{2n}	C_nH_{2n+2}
B	C_nH_{2n}	C_nH_{2n+2}	C_nH_{2n}
C	C_nH_{2n+2}	C_nH_{2n}	C_nH_{2n}
D	C_nH_{2n+2}	C_nH_{2n}	C_nH_{2n+2}

9. Which of the following statements about the alkene homologous series is true?

A All members are gaseous at room temperature.
B All members have the same empirical formula.
C All members have the same molecular mass.
D All members have the same structural formula.

10. Which of the following statements about the alcohol homologous series is true?

A All members are hydrocarbons.
B All members are liquid at room temperature.
C All members have different empirical formulae.
D All members have different chemical properties.

11. A member of a homologous series has a molecular formula of C_8H_{10}. What is the molecular formula of the preceding member (i.e. the member just before it)?

A C_4H_{10} **B** C_6H_9 **C** C_7H_8 **D** C_7H_9

12. A member of a homologous series has a formula of C_2H_5N. What is the formula of the following member (i.e. the member just after it)?

A C_3H_6N **B** C_3H_7N **C** $C_3H_7N_2$ **D** $C_4H_{10}N_2$

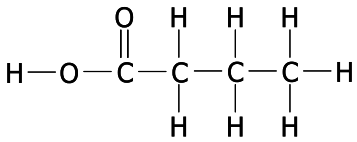
13. Which one of the following molecules contains a C=C bond?

A C_3H_8 **B** C_4H_8 **C** C_2H_6O **D** CH_3COOH

14. Eicosapentaenoic acid is a type of fatty acid and has a formula of $C_{19}H_{29}COOH$. How many C=C bonds are there in its structure?

A none **B** three **C** five **D** ten

15. The structure of an organic compound **X** is shown below.



Identify **X**.

A butanoic acid **B** butanol **C** propene **D** propanoic acid

16. A molecule has the formula $C_4H_8O_2$. It follows that the molecule

A combusts completely to produces carbon dioxide and water only.
B contains a C=C double bond in its structure.
C must be miscible with water and other polar solvents.
D must have a –COOH functional group in its structure.

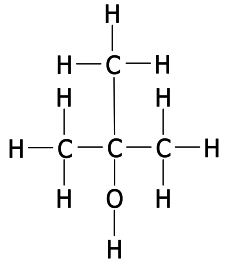
17. Which of the following statements is **false**?

A Both ethane and ethene are insoluble in water.
B Both ethanol and ethanoic acid are soluble in water.
C Ethane contains only C–H bonds in its structure.
D Ethanoic acid contains a double bond in its structure.

18. Which of the following statements is **true**?

A Any compound with a C=C bond will have chemical properties of an alkene.
B Members of a homologous series must share the same empirical formula.
C Molecular size is the only factor affecting the boiling point of an organic compound.
D The first four alcohols are gaseous at room temperature and pressure.

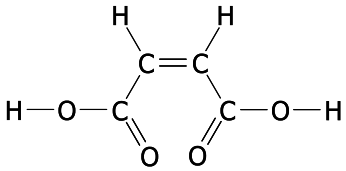
19. The structure of an organic compound **Y** is shown below.



Which of the following best describes **Y**?

A **Y** is an alcohol.
B **Y** is an alkane.
C **Y** is both an alcohol and an acid.
D **Y** is both an alkene and an alcohol.

20. The structure of an organic compound **Z** is shown below.

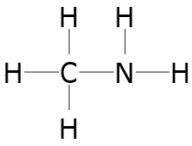


Which of the following best describes **Z**?

A **Z** has the properties of an alkene, an alcohol and an acid.
B **Z** has the properties of both an alcohol and an acid.
C **Z** has the properties of both an alkene and an acid.
D **Z** has the properties of both an alkene and an alcohol.

Structured Questions [10 Marks]

21. Amines refer to a homologous series of molecules with the $-NH_2$ group in its structure. The first member of this homologous series is methylamine, as shown:



(a) In the space below, write down the name and structural formula of the next member in the homologous series. [2]

(b) (i) State the general formula for this homologous series. [1]

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(ii) Hence state the formula of the amine with 28 atoms in its structure. [1]

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22. (a) Define the term 'homologous series'. [2]

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(b) Explain what is meant by a 'functional group'. [1]

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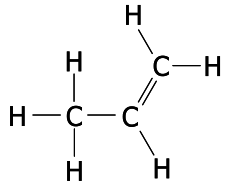
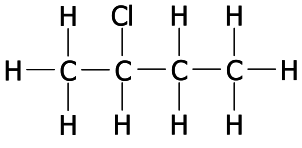
23. Complete the table below. [3]

molecule name	simplified structural formula	full structural formula
	CH_3COOH	
methylpropane	$CH_3CH(CH_3)CH_3$	
		
chlorobutane		

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