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

CHEMISTRY
DEPARTMENT OF SCIENCE

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

OC: MOLECULAR STRUCTURES (EXTENSIONS) – 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 statements about isomers is false?

   A Isomers have the same relative molecular mass.
   B Isomers have the same strength of intermolecular forces.
   C Isomers may have the same chemical properties as each other.
   D Isomers have the same percentage composition of elements.

2. Two molecules are isomers. It follows that these two molecules

   A contain the same elements.
   B contain the same functional group.
   C have different molecular formulae.
   D have the same structural formula.

3. Butanoic acid has a formula $C_4H_8O_2$. It can be concluded that an isomer of this molecule

   A must be able to react with carbonates.
   B must combust to form carbon dioxide and water.
   C must contain the –COOH functional group.
   D must **not** contain a C=C bond in its structure.

4. What property do methylpropane and butane **not** have in common?

   A combustion products
   B empirical formula
   C melting and boiling points
   D relative molecular mass

5. The smallest alkane to have more than one structural isomer is

   A butane **B** ethane **C** pentane **D** propane

6. How many structural isomers exist for C_2H_6O?

A one **B** two **C** three **D** four

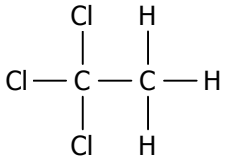
7. Which of the following molecules have the greatest number of structural isomers?

A C_3H_7Cl **B** $C_3H_6Cl_2$ **C** $C_3H_4Cl_4$ **D** $C_3H_2Cl_6$

8. A compound with the formula C_4H_9F has

A 2 isomers. **B** 3 isomers. **C** 4 isomers. **D** 5 isomers.

9. Which, of the four molecules below, is a different structure from the other three molecules?

A


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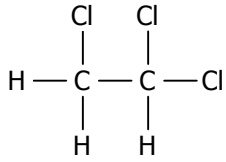

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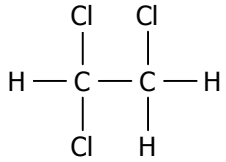
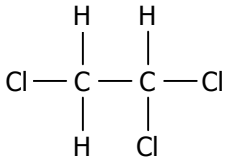
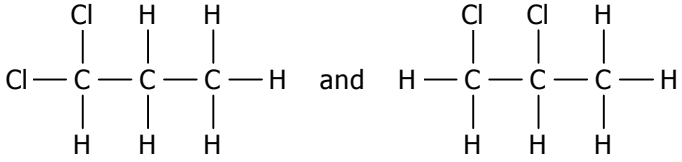


D


10. Which of the following pairs of molecules are **not** isomers?

A


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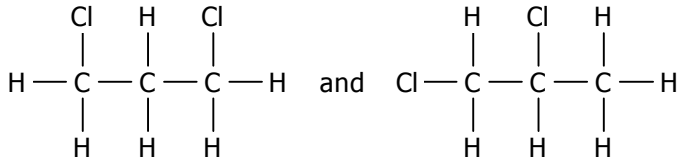

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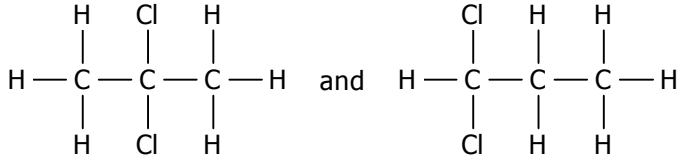

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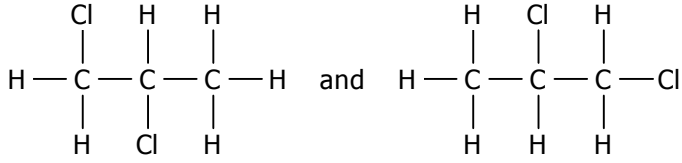
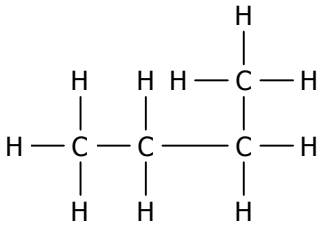
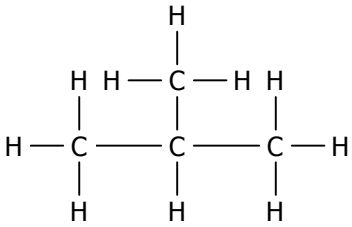


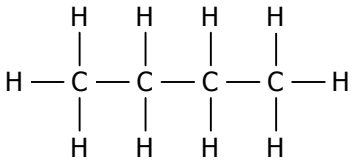
11. Three molecules, **X**, **Y** and **Z**, are shown below.



molecule **X**



molecule **Y**

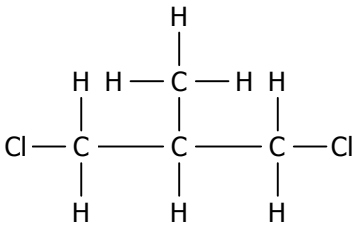


molecule **Z**

Which of the following statements are true?

A Molecules **X** and **Y** have different molecular formula.
B Molecules **X** and **Z** are isomers of each other.
C Molecules **X** and **Z** have the same structural formula.
D Molecules **Y** and **Z** have the same melting and boiling points.

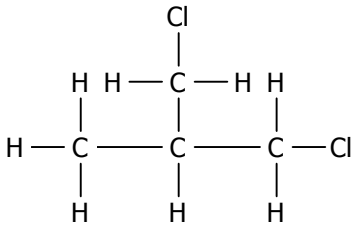
12. The structure of a chloroalkane **P** is shown below.



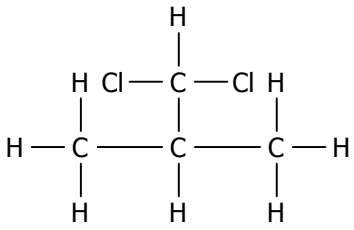
molecule **P**

Which of the molecules below are identical to **P**?

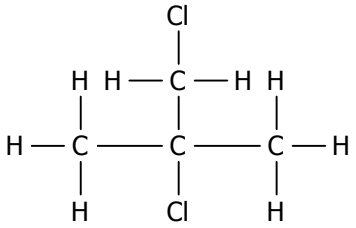
A



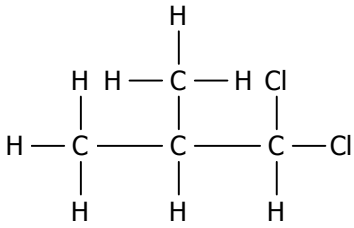
C



B



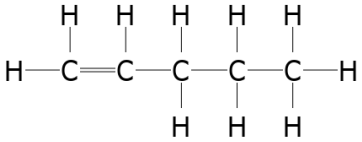
D



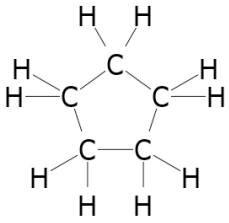
13. Which of the following molecules only exist as one isomer?

A $C_2H_4F_2$ **B** $C_2H_3F_3$ **C** $C_2H_2F_4$ **D** C_2HF_5

14. Two molecules, pentene and cyclopentane, are shown below.



pentene

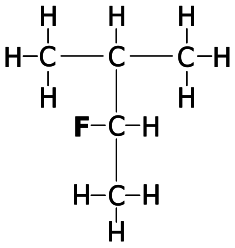


cyclopentane

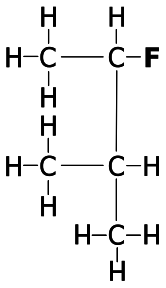
Which of the following statements about these two molecules are true?

A Pentene and cyclopentane are isomers of each other.
B Pentene and cyclopentane have the same chemical properties.
C Pentene is a hydrocarbon while cyclopentane is not.
D Pentene requires more oxygen for combustion compared to cyclopentane.

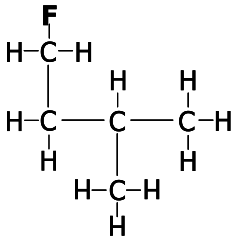
15. The diagrams below show five fluoroalkanes with the formula $C_5H_{11}F$.



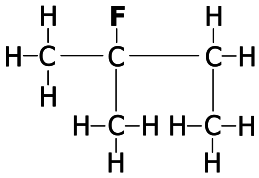
molecule 1



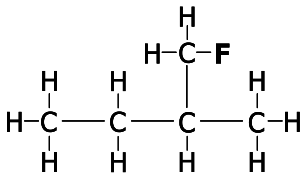
molecule 2



molecule 3



molecule 4



molecule 5

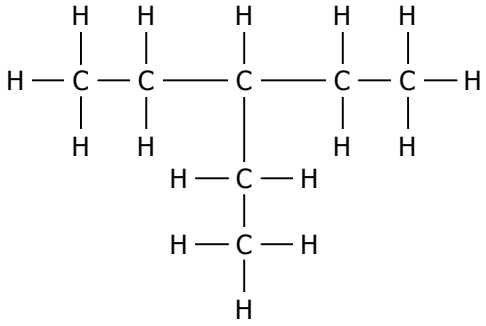
Which two molecules are the same?

A molecules 1 and 2
B molecules 2 and 4
C molecules 3 and 5
D molecules 4 and 5

16. Which of the following molecules contain exactly three chlorine atoms?

A 1,1,3,3-tetrachlorohexane
B 1-bromo-1,1,2-trichloroethane
C 1-chloro-3-fluorobutane
D 2,3-dichloro-1,3-difluoropentane

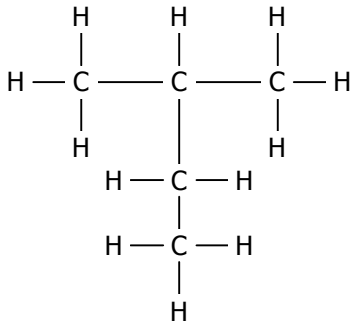
17. The structure of an organic molecule is shown below.



Which of the following names best describe this molecule?

A ethylbutane **B** ethylpentane **C** methylbutane **D** propylpropane

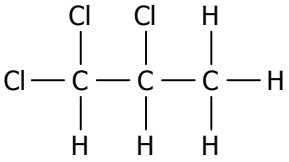
18. The structure of an organic molecule is shown below.



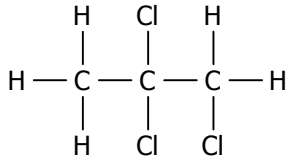
A ethylbutane **B** ethylpropane **C** methylbutane **D** methylpropane

19. Which of the following molecules is 1,2,2-trichloropropane?

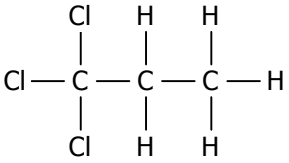
A



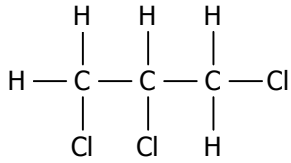
C



B



D



20. Which of the following pairs of molecules are isomers?

A chloromethylpropane and dichloromethylpropane
B dichlorobutane and dichloropropane
C dimethylpropane and methylbutane
D ethylbutane and methylpropane

Structured Questions [10 Marks]

21. Ethane can undergo a chemical reaction with chlorine to form gaseous trichloroethane, $C_2H_3Cl_3$, with hydrogen chloride as a byproduct. This product has two isomers.

(a) Construct a chemical equation, including state symbols, for this reaction. [1]

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(b) Explain what is meant by the term 'isomers'. [1]

.....

.....

(c) In the space below, write down the names of the two isomers of trichloroethane and draw their full-structural formula. [4]

Isomer #1

Name: .....

Full Structural Formula:

Isomer #2

Name: .....

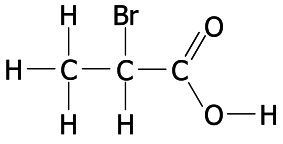
Full Structural Formula:

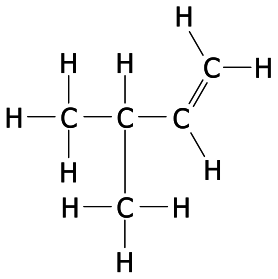
(d) Propane can undergo a similar reaction with chlorine to form trichloropropane, $C_3H_5Cl_3$. How many structural isomers does trichloropropane have? [1]

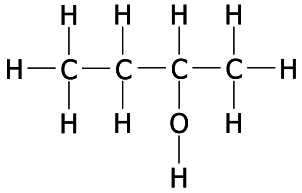
.....

22. From the list of names provided below, identify the molecules shown. [3]

1-bromobutan-2-ol	**2-bromopropanoic acid**	**3-methylbut-1-ene**
1-methylpent-2-ene	**1-bromobutan-2-ol**	**butan-2-ol**







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