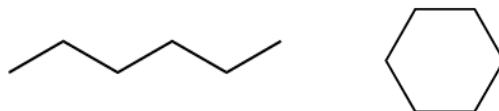


## ISOMERS – TOPIC TEST 1

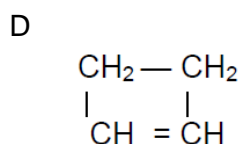
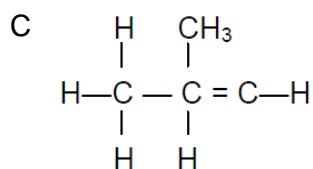
### QUESTION 1

Are the following pair of molecules isomers? Give a reason for your answer. (2 marks)



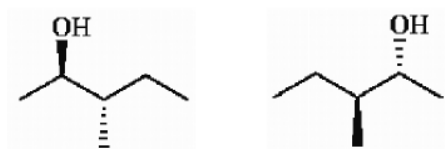
### QUESTION 2

Two isomers of butene are  $CH_2CHCH_2CH_3$  and  $CH_3CHCHCH_3$ . Which of the following structures could be a third isomer of butene? (1 mark)



### QUESTION 3

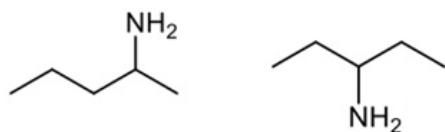
Are the following molecules enantiomers, structural isomers or the same compound? (1 mark)



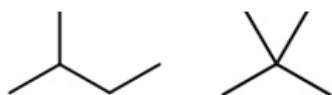
#### QUESTION 4

Structural isomers can be chain isomers, positional isomers or functional isomers. Identify what type of structural isomerism exists in the following pairs of molecules. (3 marks)

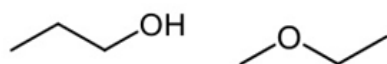
(a)



(b)



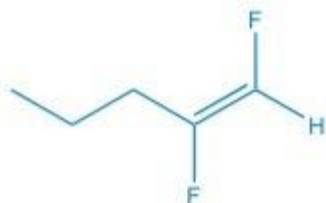
(c)



#### QUESTION 5

Identify the following molecules as cis, trans or neither. (3 marks)

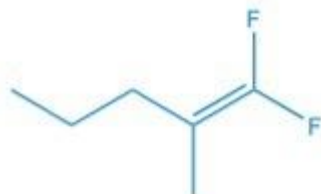
(a)



(b)



(c)



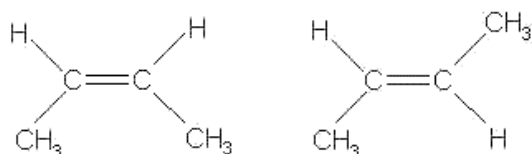
**QUESTION 6**

Isomerism that arises due to differences in the spatial arrangement of atoms or groups about a pair of double bonded carbon atoms is known as

- A Structural Isomerism
- B Chain Isomerism
- C Geometrical Isomerism
- D Optical Isomerism

**QUESTION 7**

Consider the following pair of molecules. (1 mark)

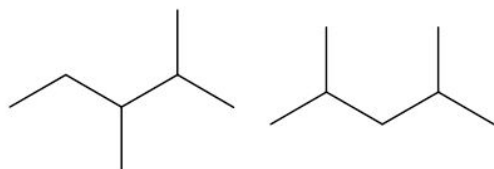


The given molecules are examples of

- A structural isomers
- B geometric isomers
- C optical isomers
- D enantiomers

**QUESTION 8**

Are the following molecules structural isomers or stereoisomers? (1 mark)



### QUESTION 9

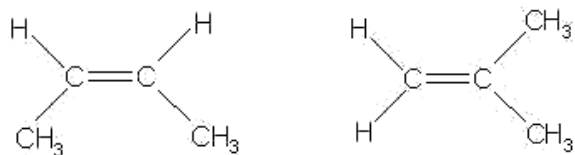
Chlorobutane has four structural isomers.

- (a) Draw the structural formulae of the four structural isomers of chlorobutane and state their systematic name. (4 marks)
- (b) Draw the skeletal formulae of two of the structural isomers of chlorobutane. (2 marks)
- (c) Which one of these molecules shows optical isomerism? Give a reason for your answer. (2 marks)

### **Solution**

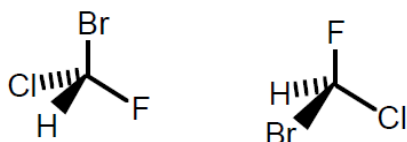
**QUESTION 10**

Consider the following molecules. (1 mark)



The given molecules are examples of

- A structural isomers
- B geometric isomers
- C optical isomers
- D enantiomers

**QUESTION 11**

The compounds shown above are examples of (1 mark)

- A identical molecules
- B enantiomers
- C structural isomers
- D geometric isomers

**QUESTION 12**

Which one of the following molecules can exist as both optical and geometric isomers? (1 mark)

- A  $(\text{CH}_3)_2\text{C} = \text{CHCH}(\text{CH}_3)\text{CH}_2\text{CH}_3$
- B  $\text{CH}_3\text{CH}_2\text{CH} = \text{CHCH}(\text{CH}_3)\text{CH}_2\text{CH}_3$
- C  $(\text{CH}_3)_2\text{C} = \text{C}(\text{CH}_2\text{CH}_3)_2$
- D  $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{C} = \text{CH}_2$

# SOLUTIONS

## QUESTION 1

As the molecules do not have the same molecular formula ( $C_6H_{14}$  and  $C_6H_{12}$ ) (1 mark) they are not isomers (1 mark).

## QUESTION 2     Answer is A

Note that molecule C does not exist as the second carbon atom has 5 bonds.

## QUESTION 3

The molecules represent the same compound.

## QUESTION 4

- (a) Positional isomers
- (b) Chain isomers
- (c) Functional isomers

## QUESTION 5

- (a) Cis
- (b) Trans
- (c) Neither

## QUESTION 6     Answer is C

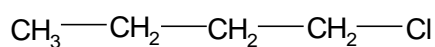
## QUESTION 7     Answer is B

## QUESTION 8

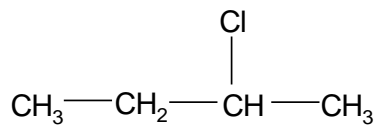
Structural isomers.

### QUESTION 9

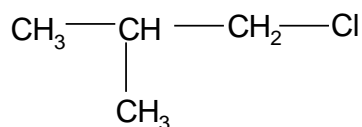
(a)



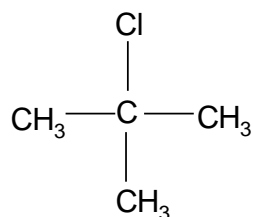
1-chlorobutane



2-chlorobutane



1-chloro, 2-methylpropane



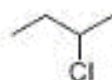
2-chloro, 2-methylpropane

(b)



1-chlorobutane

Chemical Formula: C<sub>4</sub>H<sub>9</sub>Cl



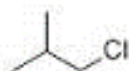
2-chlorobutane

Chemical Formula: C<sub>4</sub>H<sub>9</sub>Cl



2-chloro-2-methylpropane

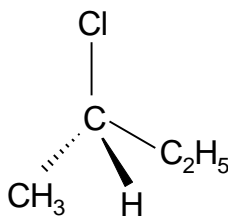
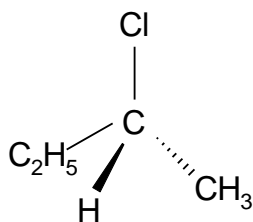
Chemical Formula: C<sub>4</sub>H<sub>9</sub>Cl



1-chloro-2-methylpropane

Chemical Formula: C<sub>4</sub>H<sub>9</sub>Cl

(c) Only 2-chlorobutane shows optical isomerism (1 mark). This is because it has a central chiral carbon (1 mark).



QUESTION 10 Answer is A

QUESTION 11 Answer is B

**QUESTION 12 Answer is B**

A has a chiral carbon, but no geometric isomers.

C has neither optical nor geometric isomers (no chiral carbon).

D does not seem to be a complete structure and would have no geometric isomers. It has two chiral carbons.