OPTICAL ISOMERS – TOPIC TEST 1

QUESTION 1
Enantiomers are molecules that

A are superimposable mirror images of each other
B are non-superimposable mirror images of each other
C have a mirror image
D are non-superimposable images

QUESTION 2

(a) What key feature about a molecule allows you to decide that it will have optical isomers?

_____

_____

_____

(b) What differences will you observe in the physical properties of enantiomers?

_____

_____

_____

(c) What differences will you observe in the physical properties of enantiomers?

_____

_____

_____

(d) What differences will you observe in the chemical properties of enantiomers?

_____

_____

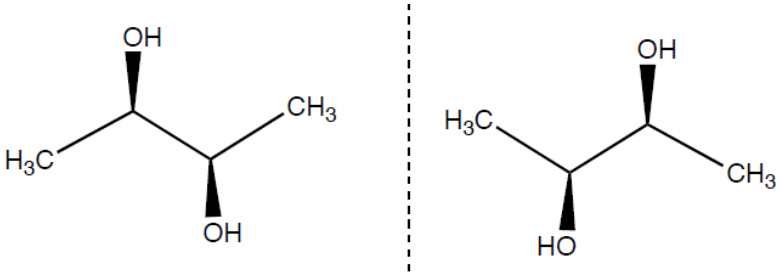
_____

(e) What similarities will you observe in the chemical properties of enantiomers?

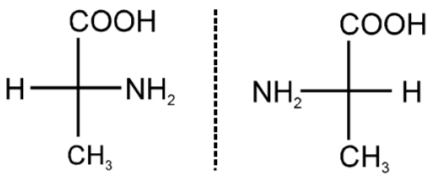
(f) Comment on the importance of optical isomerism with regards to many biologically important molecules such as proteins.

QUESTION 3
Are the following pair of molecules enantiomers?

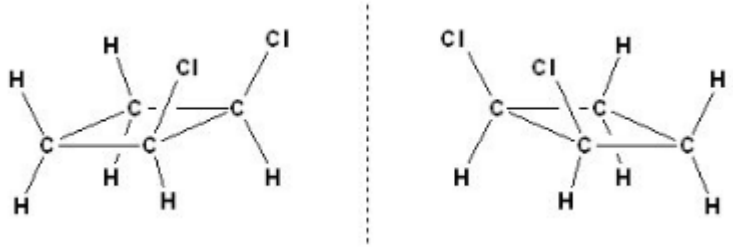
(a)



(b)



(c)

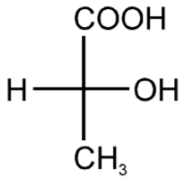


QUESTION 4
Which of the following compounds displays optical isomerism?

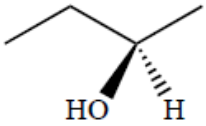
A CH_2CHCl
B $CHClCHCl$
C $CH_3CHClCOOH$
D $CH_3OC_2H_5$

QUESTION 5
Draw the enantiomer of the given structures.

(a)



(b)



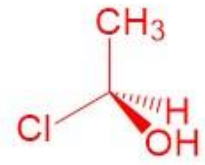
QUESTION 6
All twenty of the amino acids found in proteins are chiral. Is this true or false?

Solution

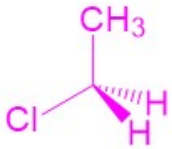
QUESTION 7
State whether the molecules shown below are chiral or achiral.

(a) $(CH_3)_3CCH(CH_3)_2$

(b)

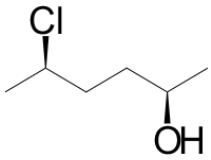


(c)

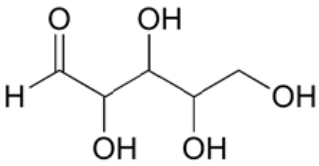


QUESTION 8
Circle all the chiral centres in the given molecules.

(a)



(b)



SOLUTIONS

QUESTION 1 Answer is B

QUESTION 2

(a) There are 4 different functional groups around one carbon atom.

(b) There will be no differences most physical properties like boiling point, melting point, density etc.

(c) There is only one difference in physical properties – that is the direction of rotation of plane polarised light.

(d) The reactions between enantiomers and other chiral compounds.

(e) The reactions between enantiomers and non-chiral compounds.

(f) Proteins and many biological compounds are chiral. Some enzymes only recognise one enantiomer of a chiral compound. Some enantiomers have different functions in the body and are metabolised differently.

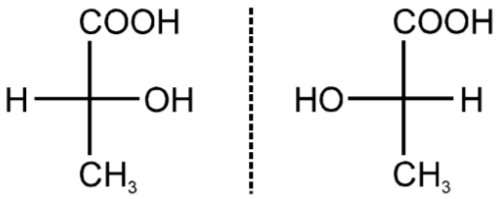
QUESTION 3

(a) Yes
(b) Yes
(c) No

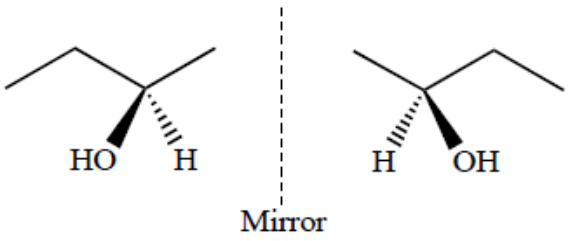
QUESTION 4 Answer is C

QUESTION 5

(a)



(b)



QUESTION 6

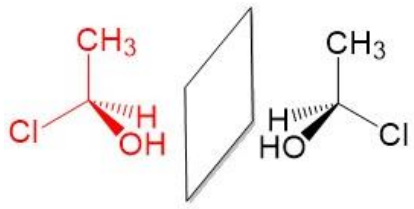
False. Glycine has only three different groups attached to the central carbon atom (two of the groups are hydrogens) so it does not exhibit chirality.

QUESTION 7

State whether the molecules shown below are chiral or achiral.

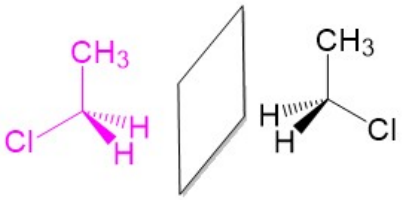
(a) Achiral

(b) Chiral



Mirror images are non-superimposable

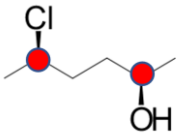
(c) Achiral



Mirror images are superimposable

QUESTION 8

(a)



(b)