

OPTICAL ISOMERS – WORKSHEET 1

QUESTION 1

Which of the following statements is not true regarding pairs of enantiomers?

- A They have identical melting points.
- B They have identical boiling points.
- C They rotate plane polarized light.
- D They react at identical rates with chiral reagents.

QUESTION 2

Which of the following is NOT true of enantiomers?

They have the same:

- A Solubility in water
- B Density
- C Chemical reactivity towards achiral compounds
- D 3-dimensional shapes

QUESTION 3

Which of the statements below incorrectly describes a chiral molecule?

- A The molecule has a non-superimposable mirror image.
- B The molecule shows optical activity when it interacts with plane-polarised light.
- C The molecule has an enantiomer.
- D The molecule interacts identically with chiral and achiral molecules.

QUESTION 4

Which of the following statements correctly relates to a pair of enantiomers?

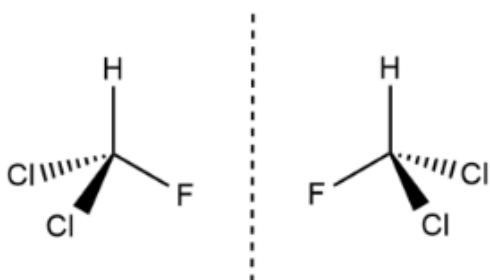
Enantiomers rotate polarised light by

- A the same amount and in the same direction
- B the same amount but in opposite directions
- C different amounts and in the same direction
- D different amounts and in opposite directions

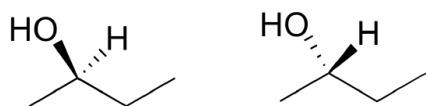
QUESTION 5

Are the following pairs of molecules enantiomers?

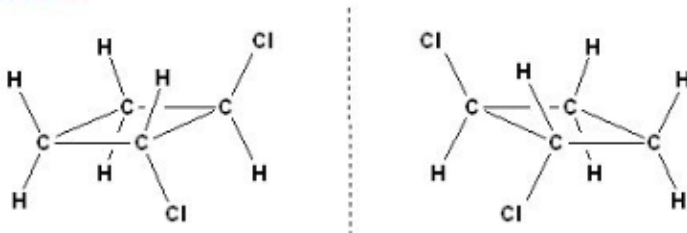
(a)



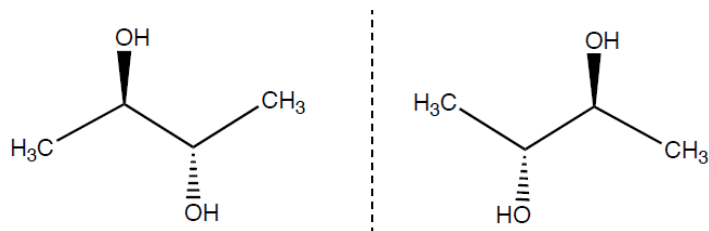
(b)



(c)



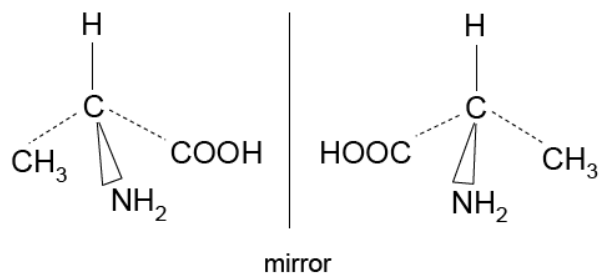
(d)



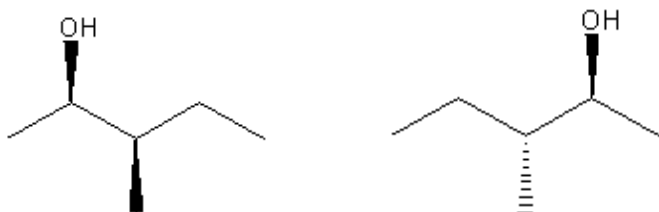
QUESTION 6

Are the following pairs of molecules optical isomers?

(a)



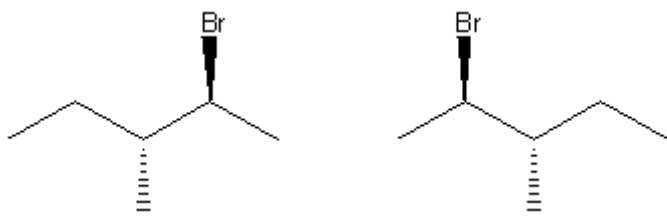
(b)



(c)



(d)



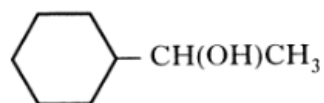
QUESTION 7

Which of the following molecules does not exhibit optical isomerism?

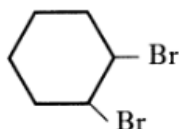
A



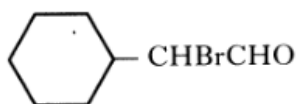
B



C



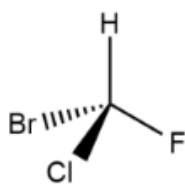
D



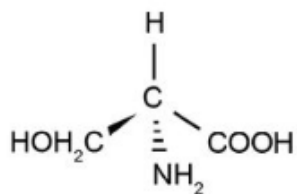
QUESTION 8

Draw the enantiomer of the given structures.

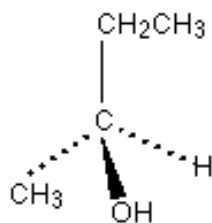
(a)



(b)



(c)

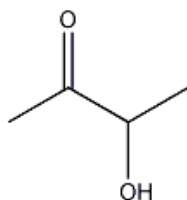


QUESTION 9

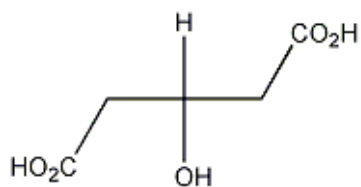
State whether the molecules shown below are chiral or achiral.



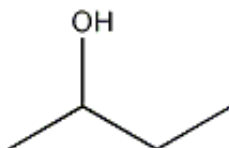
(b)



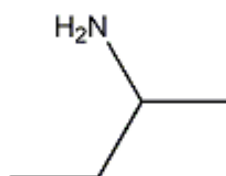
(c)



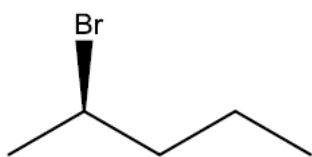
(d)



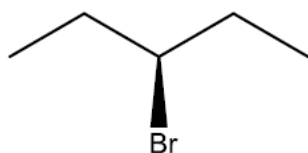
(e)



(f)



(g)



QUESTION 10

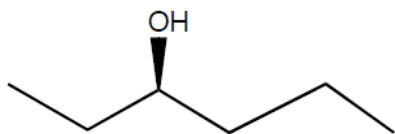
Which of the following is a chiral molecule?

- A 2-propanol
- B 2-pentanol
- C 2-methyl-1-butanol
- D 1-bromo-3-butene

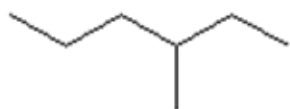
QUESTION 11

Circle all the chiral centres in the given molecules.

(a)

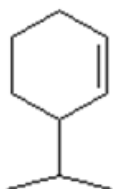


(b)

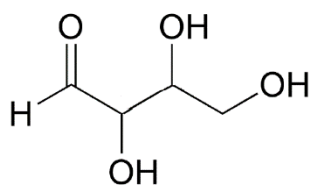


(c) $CH_3CH_2CHBrCH_3$

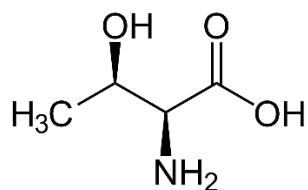
(d)



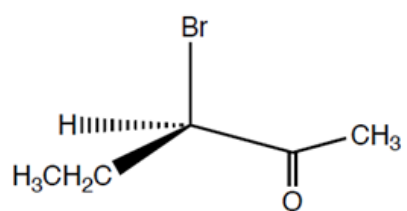
(e)



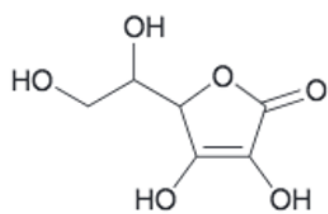
(f)



(g)



(h)



SOLUTIONS

QUESTION 1 Answer is D

QUESTION 2 Answer is D

QUESTION 3 Answer is D

QUESTION 4 Answer is B

QUESTION 5

- (a) No – the structures represent the same molecule
- (b) Yes
- (c) Yes
- (d) No – the structures represent the same molecule

QUESTION 6

- (a) Yes – as mirror images are non-superimposable.
- (b) No – they are not mirror images of one another.
- (c) These molecules are not enantiomers even though they are mirror images as the structures are superimposable, making them identical.
- (d) Molecules are enantiomers i.e. optical isomers.

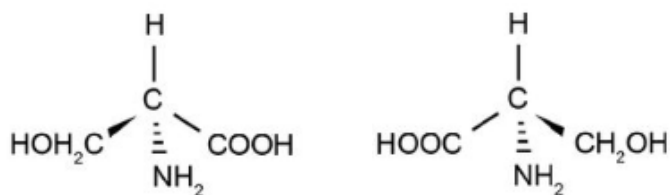
QUESTION 7 Answer is A

QUESTION 8

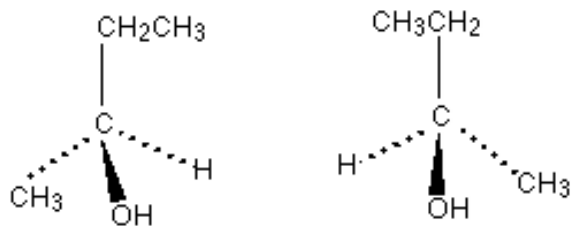
(a)



(b)



(c)



QUESTION 9

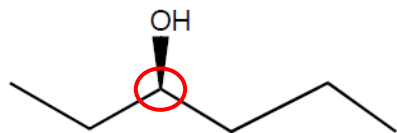
- (a) Achiral
- (b) Chiral
- (c) Achiral
- (d) Chiral
- (e) Chiral
- (f) Chiral
- (g) Achiral

QUESTION 10 Answer is C

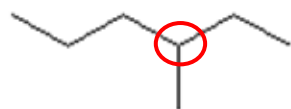
Remember that a chiral compound is one with four different groups attached to the central carbon atom.

QUESTION 11

(a)

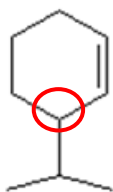


(b)

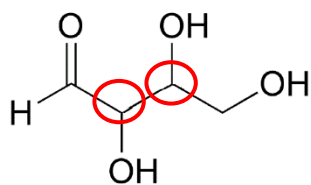


(c) $CH_3CH_2C(Br)CH_3$

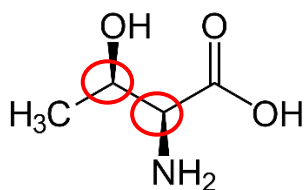
(d)



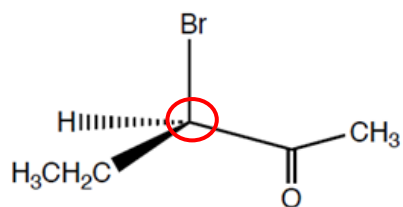
(e)



(f)



(g)



(h)

