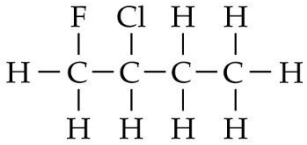
Quiz (Isomerism)

Section A: Multiple-choice

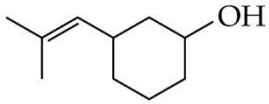
1. Refer to the following compound:



Which of the following statements about the compound is INCORRECT?
A. Its systematic name is 2-chloro-1-fluorobutane.
B. It consists of polar molecules.
C. It is soluble in water.
D. It exhibits enantiomerism.

2. Which of the following pairs of molecules are NOT structural isomers?
A. Prop-1-en-1-ol and prop-1-en-2-ol
B. Pentanoic acid and methyl propanoate
C. Butanoic acid and methylpropanoic acid
D. *Cis*-pent-2-ene and *trans*-pent-2-ene

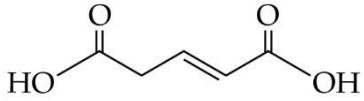
3. Refer to the following compound:



How many *cis-trans* isomers and chiral carbon(s) are there for the compound?

	***Cis-trans* isomer**	**Chiral carbon**
A.	0	1
B.	2	2
C.	0	2
D.	2	1

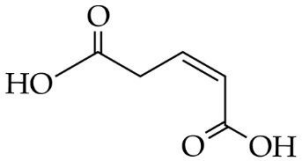
Questions 4 and 5 refer to compound *A*, which has the following structure:



4. Which of the following statements about compound *A* are correct?
(1) Its systematic name is pent-2-enedioic acid.
(2) It is soluble in water.
(3) The molecules of *A* are held together by hydrogen bonds only.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

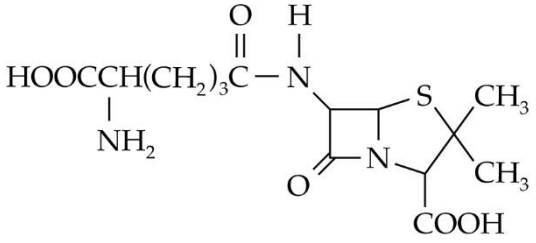
5. Compound *B* has the following structure:



Which of the following statements is INCORRECT?

A. Compound *A* and compound *B* are a pair of *cis-trans* isomers.
B. Compound *A* has a higher boiling point than compound *B*.
C. Compound *A* has a higher melting point than compound *B*.
D. Compound *A* and compound *B* have similar chemical properties.

6. The following diagram shows the structure of a type of penicillin:

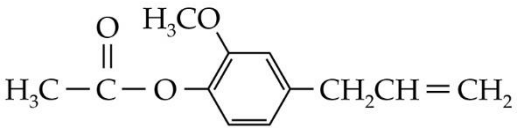


How many chiral carbons are there in the penicillin molecule?

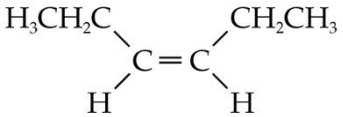
A. 3
B. 4
C. 5
D. 6

7. Which of the following compounds exhibits enantiomerism but not *cis-trans* isomerism?

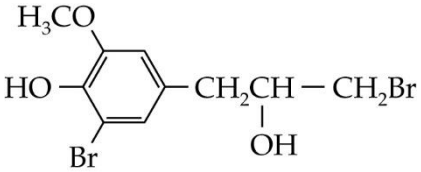
A.



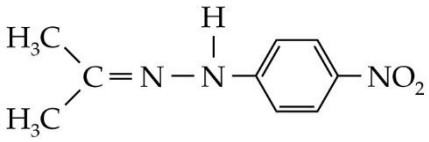
B.



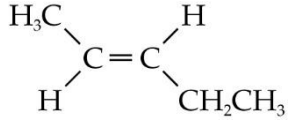
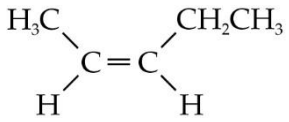
C.

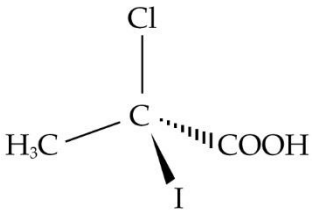
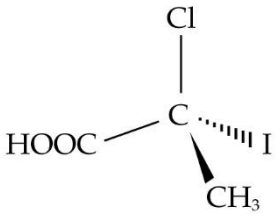


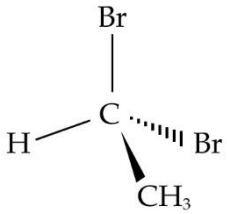
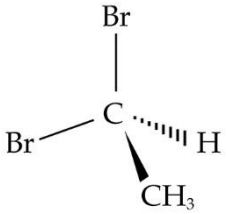
D.



8. Which of the following pairs of compounds is/are identical?

(1)  and 

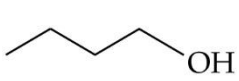
(2)  and 

(3)  and 

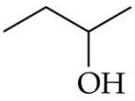
A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

Section B: Structured questions

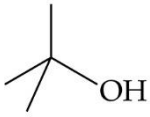
Compounds *X*, *Y* and *Z* have the same molecular formula $C_4H_{10}O$. Their structures are shown below:



X



Y



Z

(a) State the type of isomerism between
(i) *X* and *Y*;
(ii) *Y* and *Z*.

(b) Arrange the three isomers in descending order of boiling points. Explain your answer.

(c) One of the isomers exhibits optical isomerism. Draw the structures of the optical isomers.

Suggested Answer

Section A

1.	C	5.	B
2.	D	6.	B
3.	C	7.	C
4.	A	8.	D

Section B

(a) (i) Position isomerism
(ii) Chain isomerism

(b) *X* > *Y* > *Z*

The molecules of *X* are rod-shaped. The area of contact between molecules is the largest and so the intermolecular forces between the molecules are the strongest.

Comparing *Y* and *Z*, the molecules of *Z* are more spherical in shape and have a smaller area of contact. The intermolecular forces between the molecules of *Z* are the weakest.

(c)