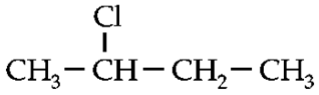
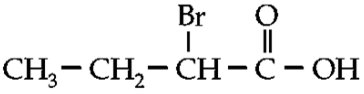
Quiz (Enantiomerism)

1. Consider the following carbon compounds. They all contain a chiral carbon atom.

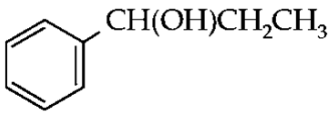
(a)



(b)



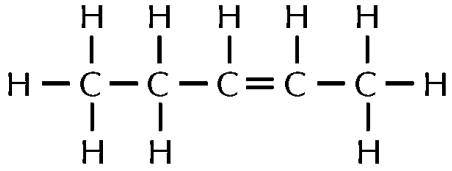
(c)



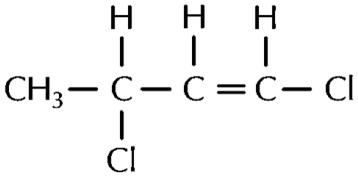
For each compound,
(i) mark the chiral carbon atom with an asterisk (*); and
(ii) draw the three-dimensional structures of the pair of enantiomers.

2. Draw all possible stereoisomers for:

(a)



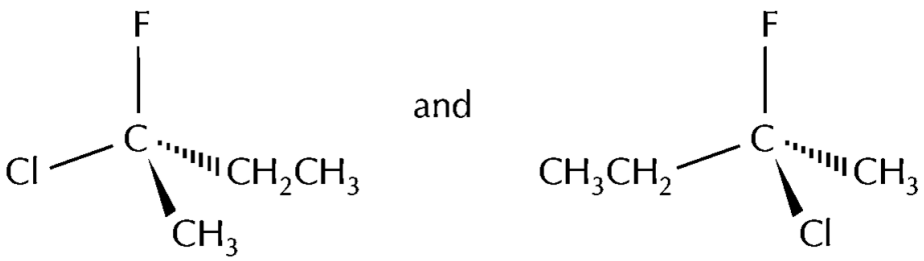
(b)



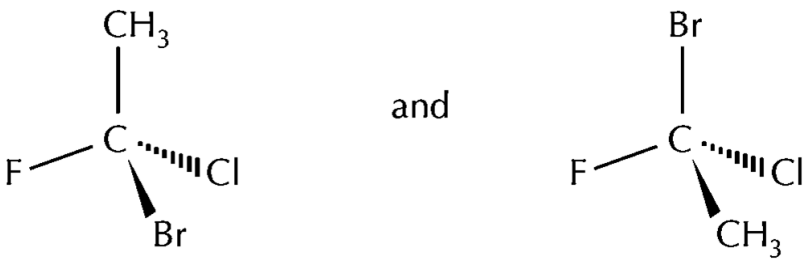
3. For each of the following pairs of molecules, state whether they are identical molecules or enantiomers.

(a)

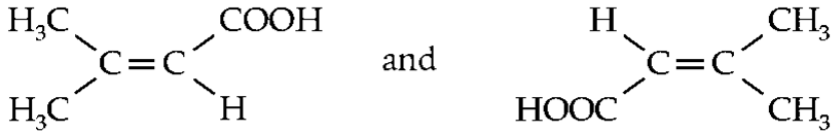
(b)

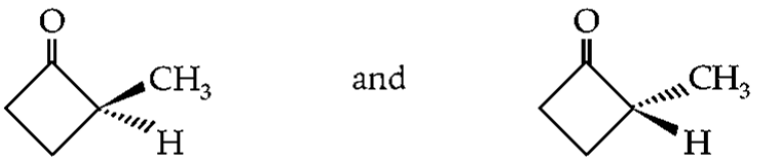


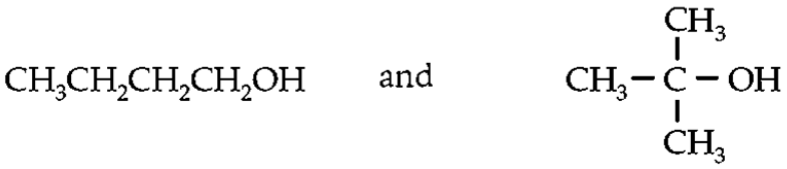
(c)



4. For each of the following molecules, state whether they are 'identical molecules', 'structural isomers' or 'enantiomers'.

(a) 

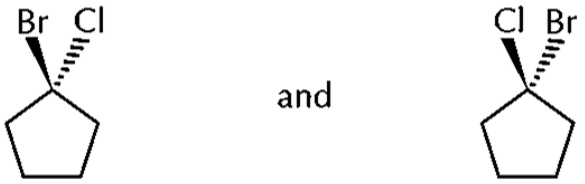
(b) 

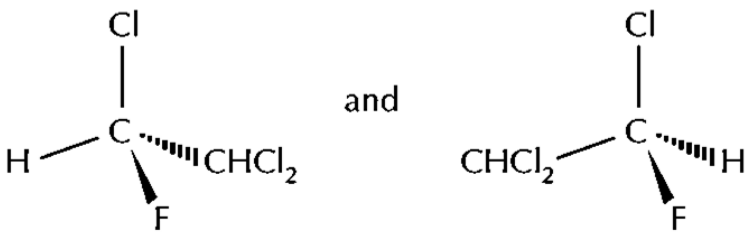
(c) 

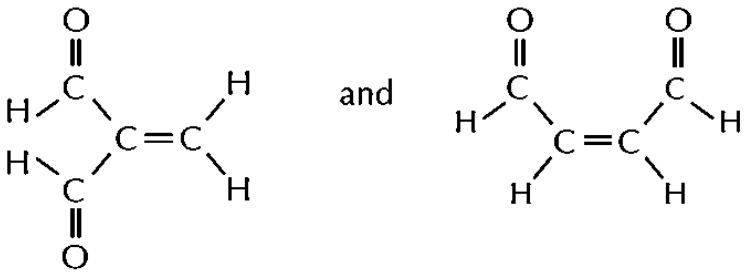
5. Compound *X* has a molecular formula of $C_3H_6Cl_2$.
   (a) Draw all possible structural isomers of compound *X*.
   (b) Draw all possible stereoisomers of compound *X*.

6. For each of the following pairs of molecules, state whether they are identical molecules, structural isomers, *cis-trans* isomers or enantiomers.

(a) 

(b) 

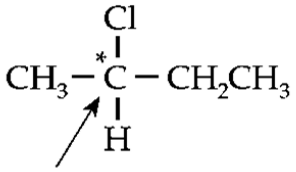
(c) 

(d) 

7. (a) Write the structural formulae for all possible isomers of 2-chloropentane.
   (b) State the type of isomerism involved in those isomers mentioned in (a).
   (c) Suggest ONE method to distinguish the isomers in (a) from each other.

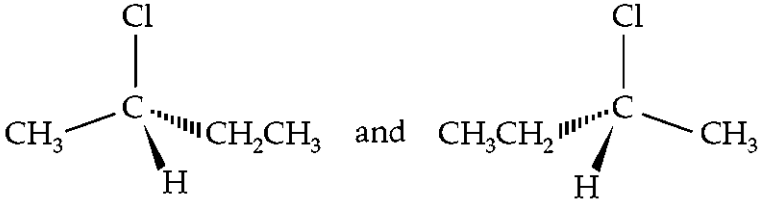
Suggested Answer

1. (a) (i)

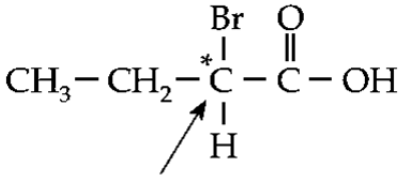


this carbon atom is bonded to four different atoms or groups of atoms: –H, –Cl, $–CH_3$, $–CH_2CH_3$

(ii)

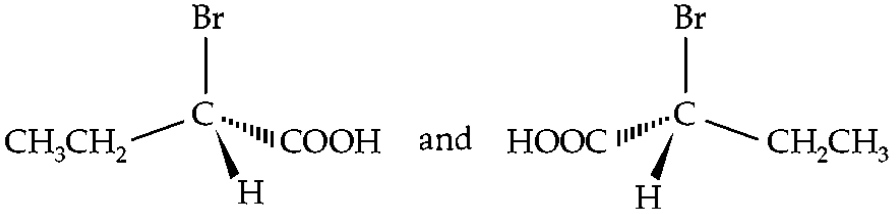


(b) (i)

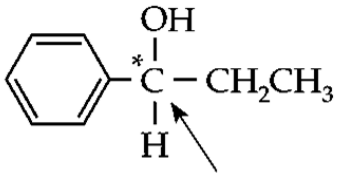


this carbon atom is bonded to four different atoms or groups of atoms: –H, –Br, $–CH_2CH_3$, –COOH

(ii)

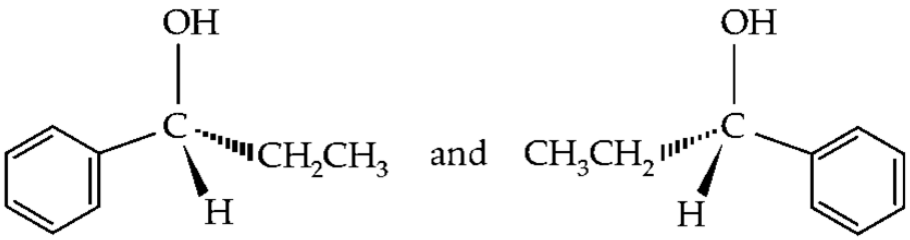


(c) (i)

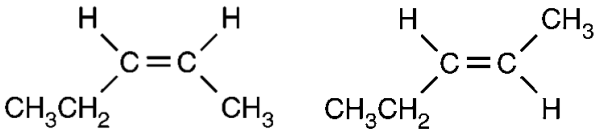


this carbon atom is bonded to four different atoms or groups of atoms: –H, –OH, $–CH_2CH_3$, –C6H5

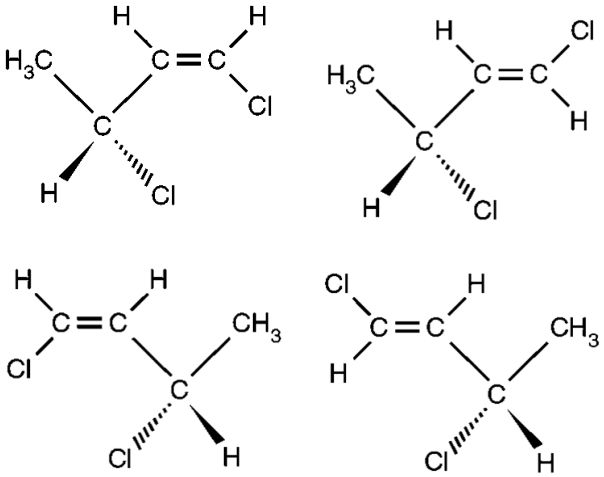
(ii)



2. (a)



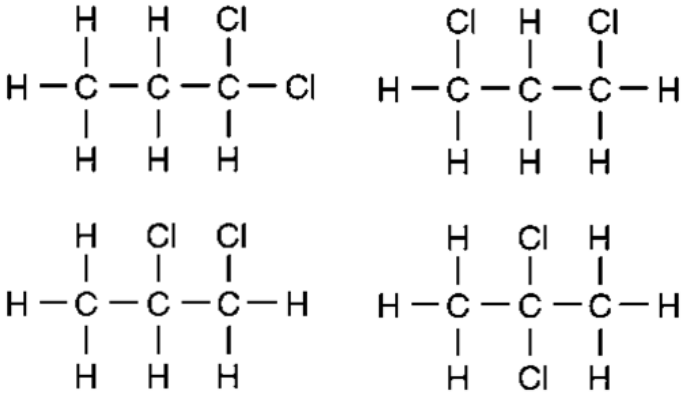
(b)



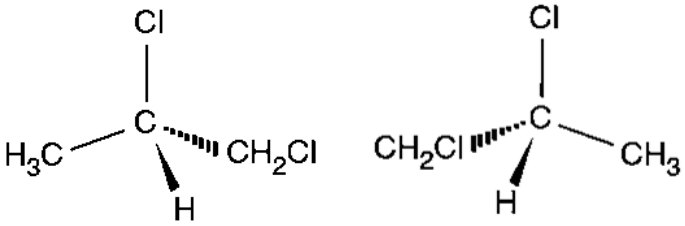
3. (a) Identical molecules
   (b) Identical molecules
   (c) Enantiomers

4. (a) Identical molecules
   (b) Enantiomers
   (c) Structural isomers

5. (a)

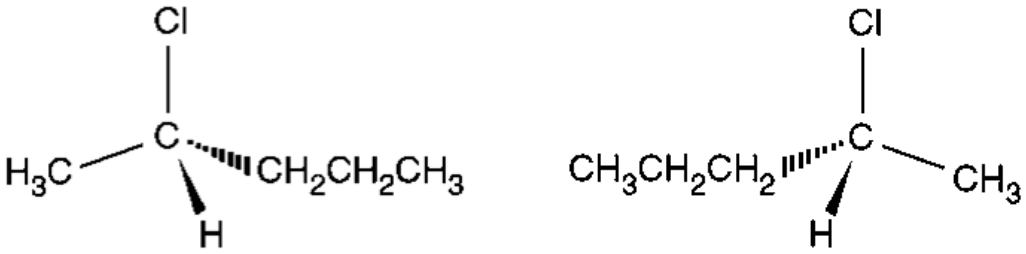


(b)



6. (a) *Cis-trans* isomers
   (b) Identical molecules
   (c) Enantiomers
   (d) Structural isomers

7. (a)



   (b) Enantiomerism

   (c) Measure the optical activity of the isomers by using a polarimeter.

   One of the isomers rotates the plane of polarization of a beam of plane polarized light in clockwise direction.

   Another isomer rotates the plane of polarization in anticlockwise direction to the same extent.