# Enantiomers Chemistry Questions with Solutions

**Q1. Which of the following compounds may not exist as enantiomers?**

a.) $CH_3CH(OH)CO_2H$
b.) $CH_3CH_2CH(CH_3)CH_2OH$
c.) $C_6H_5CH_2CH_3$
d.) $C_6H_5CHClCH_3$

**Correct Answer–** (c.) $C_6H_5CH_2CH_3$

**Q2. Which of the following statements is false?**

a.) Enantiomers have the same melting point and boiling point
b.) A mixture containing equal amounts of enantiomers is optically inactive
c.) Enantiomers have the same chemical properties
d.) A mixture containing two enantiomers can be separated into fractions containing pure enantiomers.

**Correct Answer–** (c.) Enantiomers have the same chemical properties.

**Q3. Which of the following statements regarding enantiomers is not true?**

a.) All (+) enantiomers are levorotatory
b.) All (-) enantiomers rotate plane-polarized light in a counterclockwise direction
c.) (+) and (-) enantiomers rotate plane-polarized light in opposite directions
d.) All R enantiomers are dextrorotatory

**Correct Answer–** (d.) All R enantiomers are dextrorotatory

**Q4. Which of the following is capable of existing as a pair of enantiomers?**

a.) 2-methyl propane
b.) 2-methyl pentane
c.) 3-methyl pentane
d.) 3-methyl hexane

**Correct Answer–** (d.) 3-methyl hexane

**Q5. What describes an atom that has four separate groups attached to it?**

a.) Chiral atom
b.) Anion

c.) Cation
d.) Catenation

**Correct Answer–** (a.) Chiral atom

**Q6. What is the difference between enantiomers and diastereomers?**

**Answer.** Enantiomers are chiral molecules that are mirror images of each other but cannot be superimposed. Diastereomers are stereoisomer compounds that contain molecules that are not mirrored images of one another and cannot be superimposable. They are mirror images of each other that cannot be superimposed.

**Q7. How are enantiomers separated?**

**Answer.** Enantiomers can be separated chemically by converting them into species that can be separated: diastereomers. To form diastereomers, react the enantiomers with a single enantiomer of another compound. Separate the diastereomers using traditional methods (chromatography, recrystallization)

**Q8. How are enantiomers identified?**

**Answer.** Recognizing that two molecules are mirror images of each other is the simplest way to identify an enantiomer. Enantiomers must be mirror images of one another.

**Q9. Why do enantiomers have different smells?**

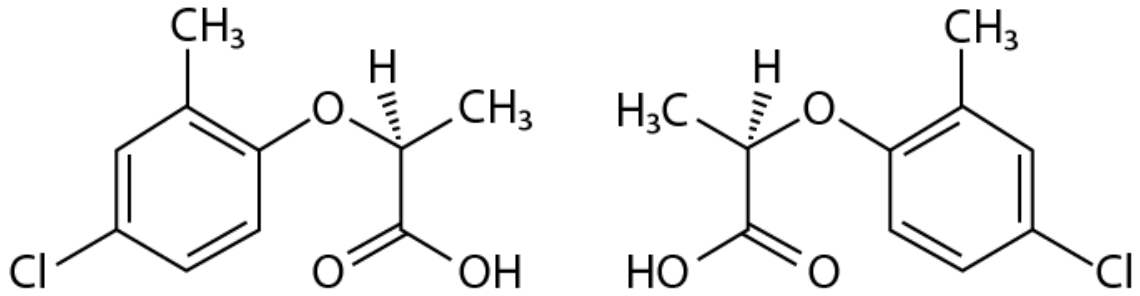
**Answer.** Different molecular configurations bind differently to the odorant receptor proteins found in your olfactory receptor neurons in your olfactory epithelium. These cell populations "code" graded potentials in different distributions, which are recognised by glomeruli and mitral neurons, which send information up a pathway to your brain.

**Q10. Are enantiomers Superimposable?**

**Answer.** Enantiomers are non-superimposable mirror images of stereoisomers. In an achiral environment, enantiomers have identical chemical and physical properties. Enantiomers interact with other chiral molecules differently because they rotate the direction of plane polarised light to equal but opposite angles.

**Q11. Give an example of an enantiomer.**

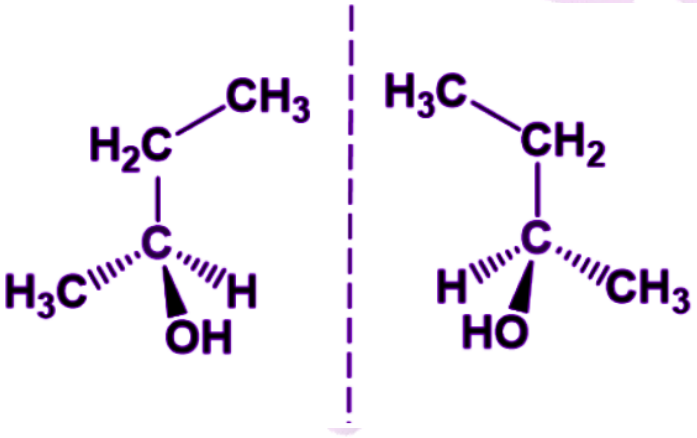
**Answer.**



The names of these isomers are S- and R- methylchlorophenoxypropionic acid (often abbreviated to MCPP and referred to as mecoprop). This compound is known to be a mixture of S- and R-enantiomers, of which the R- enantiomer is known to possess herbicidal properties. Therefore, this compound is widely used as a herbicide.

**Q12. Draw the enantiomer of 2-butanol.**

**Answer.** The enantiomers of 2-butanol is as follows:

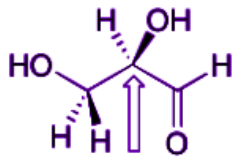
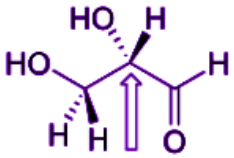


**Q13. Discuss the property of chirality in enantiomers.**

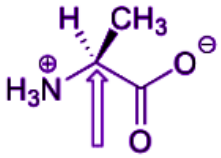
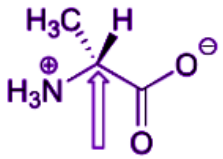
**Answer.** Chirality refers to the property of enantiomers. Chirality refers to objects that are mirror images but cannot be superimposable.
A chiral molecule or ion has two stereoisomers that are mirror images of each other; these are often distinguished as "right-handed" or "left-handed" by their absolute configuration or some other criteria.

**Q14. Draw the enantiomer structure of glyceraldehyde and alanine.**

**Answer.** These molecules are chiral. There is a single stereocenter, indicated with an arrow

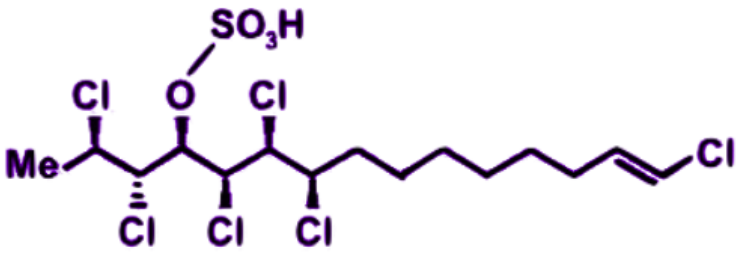



glyceraldehyde

alanine

**Q15. The compound hexachlorosulfolipid belongs to a class of compounds called chlorosulfolipids, which are integral components of algal membranes and are known to inhibit protein kinases. Some have been isolated from mussels and are linked to diarrhetic shellfish poisoning. Based on the wedge and dash structure below, what are the R and S designations from left to right for the stereocenters of this toxin?**



hexachlorosulfolipid

**Answer.** The R and S designations from left to right for the stereocenters of this toxin is-
R, S, R, S, S, R

## Practise Questions on Enantiomers

**Q1. Which of the following molecules exists as a pair of enantiomers?**

a.) 2-Bromopropane
b.) 1-Bromo-3-methylbutane
c.) 2-Cyclohexen-1-ol
d.) cis-1,2-Dichlorocyclobutane

**Correct Answer–** (c.) 2-Cyclohexen-1-ol

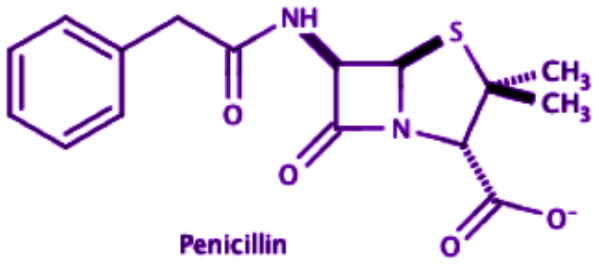
**Q2. Choose the incorrect statement about enantiomers.**

a.) They have the same density
b.) They have the same specific rotation
c.) They have the same melting point

d.) They have the same boiling point

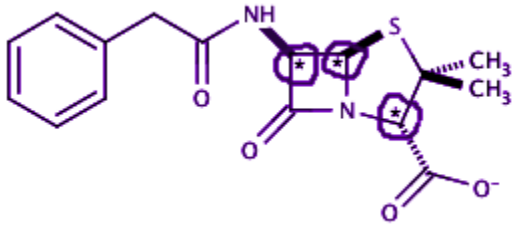
**Correct Answer–** (b.) They have the same specific rotation.

**Q3. How many chiral carbons does penicillin have?**



Penicillin

**Answer.** Three. The key to finding chiral carbons is to look for carbons with four different substituents. We can immediately remove any carbons involved in double bonds or with two hydrogens attached. Given this, we discover three chiral carbons. Carbon chains with varying carbon content will qualify as different substituents, allowing chiral carbons to bond to two other carbons.

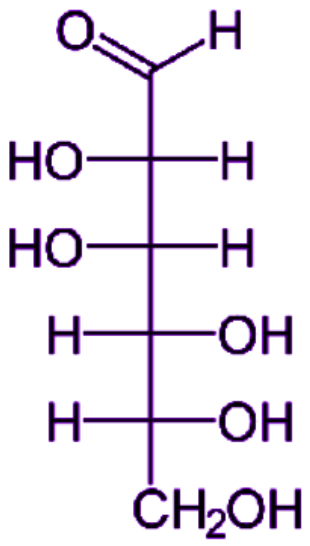



**Q4. Are enantiomers identical?**

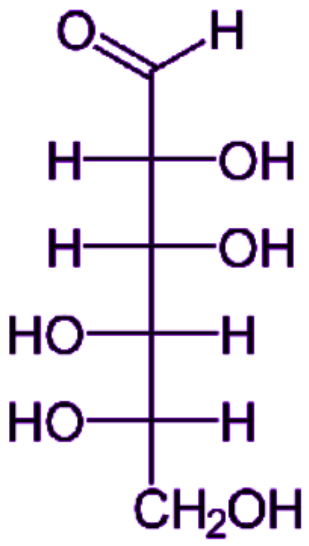
**Answer.** Except for the direction of rotation of the plane of polarised light, enantiomers have identical chemical and physical properties and are indistinguishable from one another.

**Q5. Draw the structure of the enantiomer of Mannose.**
**a.) How many chirality centers are present in this molecule?**
**b.) How many total stereoisomers does Mannose have?**

**Answer.**




D-Mannose




L-Mannose

a.) The total number of chirality centers in Mannose is 4. These centers are found at the intersection of the vertical and horizontal lines in the Fischer projections above.
b.) The total number of stereoisomers that Mannose has is 16.