

Isomers Quiz Answer Key PDF

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Which of the following are examples of structural isomers? (Select all that apply)

- A. Ethanol and dimethyl ether ✓
- B. Cis-2-butene and trans-2-butene
- C. Propanol and isopropanol ✓
- D. Glucose and fructose ✓

What factors can differ between isomers? (Select all that apply)

- A. Boiling point ✓
- B. molecular formula
- C. Chemical reactivity ✓
- D. Density ✓

Which of the following is a characteristic of optical isomers?

- A. They can be separated by distillation.
- B. They rotate plane-polarized light. ✓
- C. They have the same chemical reactivity.
- D. They are always superimposable.

Which statements are true about enantiomers? (Select all that apply)

- A. They have identical physical properties except for optical activity. ✓
- B. They can be separated by ordinary physical methods.
- C. They rotate plane-polarized light in opposite directions. ✓
- D. They have different molecular formulas.

Explain the difference between structural isomers and stereoisomers.

Structural isomers are compounds that have the same molecular formula but different structural formulas, meaning the atoms are connected in different ways. Stereoisomers, on the other hand, have the same structural formula but differ in the orientation of their atoms in space, which can include cis-trans isomerism and enantiomerism.

Which characteristics are associated with geometric isomers? (Select all that apply)

- A. They have different physical properties. ✓**
- B. They are non-superimposable mirror images.
- C. They differ in the arrangement around a double bond. ✓**
- D. They have the same connectivity of atoms. ✓**

Describe how chirality affects the properties of optical isomers.

Chirality affects the properties of optical isomers by causing them to rotate plane-polarized light in opposite directions and potentially exhibit different reactivities and interactions in biological systems.

Which property is most likely to differ between structural isomers?

- A. molecular formula
- B. Boiling point ✓**
- C. Atomic number
- D. molecular weight

Which of the following is a type of structural isomer?

- A. Geometric isomer
- B. Optical isomer
- C. Chain isomer ✓**
- D. Enantiomer

Which of the following is an example of a geometric isomer?

- A. Butane and isobutane
- B. Cis-2-butene and trans-2-butene ✓**
- C. Ethanol and dimethyl ether

D. Lactic acid and pyruvic acid

Which type of isomerism is most relevant in the pharmaceutical industry due to different biological effects?

- A. Chain isomerism
- B. Geometric isomerism
- C. Optical isomerism ✓**
- D. Position isomerism

What type of isomerism involves different spatial arrangements around a double bond?

- A. Chain isomerism
- B. Functional group isomerism
- C. Geometric isomerism ✓**
- D. Optical isomerism

What is the main characteristic of enantiomers?

- A. They have different functional groups.
- B. They are non-superimposable mirror images. ✓**
- C. They have different connectivity of atoms.
- D. They differ in the position of a double bond.

Discuss the significance of isomerism in the pharmaceutical industry.

Isomerism is significant in the pharmaceutical industry because different isomers of a drug can have vastly different biological activities, which can impact their therapeutic effectiveness and safety profiles.

How can NMR spectroscopy be used to distinguish between different isomers?

NMR spectroscopy can be used to distinguish between different isomers by examining the unique chemical shifts and coupling patterns of the protons or carbons in each isomer, which arise from their distinct molecular environments.

Provide an example of a functional group isomer and explain how it differs from its counterpart.

Ethanol (C₂H₆O) and dimethyl ether (C₂H₆O) are functional group isomers; ethanol contains a hydroxyl (-OH) group, while dimethyl ether contains an ether (-O-) group.

What is the term for molecules with the same molecular formula but different connectivity of atoms?

- A. Stereoisomers
- B. Structural isomers ✓**
- C. Enantiomers
- D. Diastereomers

Describe a real-world application where geometric isomerism plays a crucial role.

One real-world application of geometric isomerism is in the development of the drug cisplatin, where the cis isomer is effective in treating cancer, while the trans isomer is not.

Which of the following can be used to distinguish between isomers? (Select all that apply)

- A. NMR spectroscopy ✓**
- B. Mass spectrometry
- C. IR spectroscopy ✓**
- D. Melting point analysis ✓**

Which of the following are types of stereoisomers? (Select all that apply)

- A. Chain isomers
- B. Geometric isomers ✓**
- C. Optical isomers ✓**
- D. Position isomers