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Commentary

Cis-Trans Isomers and its Differences in Properties

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DESCRIPTION

Cis-trans isomerism, also known as geometric isomerism or conformation isomerism is an organic chemistry term. In the context of chemistry, cis means that functional groups (substituents) are on the same side of the plane, and trans means that they are on the opposite side. The cis-trans isomer is a stereoisomer. A pair of molecules that have the same formula but with functional groups in different directions is in three-dimensional space. The cis-trans notation does not always correspond to the EZ isomer, which is an absolute stereo chemical description. In general, the character isomer can contain a non-rotating double bond or a ring structure in which the rotation of the bond is restricted or prevented. Cis and trans isomers occur in both organic molecules and inorganic coordination complexes. Cis and trans descriptors are not used in the case of conformational isomers, where two geometries easily interconvert, as in most open-chain single-bonded structures. The cis-trans isomer represents a type of steric isomer in which atoms have different spatial arrangements in three-dimensional space. In the field of organic chemistry, cis isomers contain functional groups on the same side of the carbon chain and trans isomers have functional groups on the opposite side. This type of isomerization can occur in both organic and inorganic molecules. Cis and trans isomers are possible only if the alkene has two different atoms or groups of atoms on each double bond carbon atom.

Differences in properties

Often, the cis-trans isomers of a compound have different physical properties. These differences can result from different dipole moments in the molecule or different spatial arrangements of the atoms. The boiling point of the cis isomer of pentene is 37°C, while the boiling point of the trans isomer is 36°C. Due to the low bond polarity, the difference is small. Due to the polarity of the 1,2-dichloroethylene bond, the cis isomer has a boiling point of 60.3°C and the trans isomer has a boiling point of 47.5°C. The cis and trans isomers of butenedioic acid show very different reactivity. This is due to different characteristics. Maleic acid is a cis isomer and fumaric acid is a trans isomer. Elaidic acid and oleic acid are cis-trans isomers. The former is a solid at room temperature (melting point=43°C) and the latter is a liquid with a melting point of 13.4°C. Therefore, it can be said that trans isomers generally have a higher melting point than their cis isomers. They also tend to be sparingly soluble in solvents that are essentially inert. It has been suggested that the density of trans isomers tends to be lower than that of cis isomers. In general, the individual bond dipole moments of the trans isomers are on opposite sides, so it can be observed that they cancel each other out. Acyclic cis isomers tend to be less stable than trans variants.

CONCLUSION

This can be explained by the steric interaction of substituents. The cis isomers are called molecules with the same atomic connectivity. They represent similar page groups placed on the same side of the double bond. Trans isomers, on the other hand, are composed of molecules with similar side groups located on the opposite side of the double bond. You can identify the cis-trans isomer as if you were looking at the longest chain with a double bond. If the two groups bonded to the carbon of the double bond are on the same side of the double bond, the isomer is cisalken. If the two groups are on the opposite side of the double bond, the isomer is a transalkene.

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