

Stereoisomerism

Spoken Tutorial Project

<http://spoken-tutorial.org>

National Mission on Education through ICT

<http://sakshat.ac.in>

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Learning Objectives



Learning Objectives

We will learn about:



Learning Objectives

We will learn about:

- ## ► Conformational isomerism



Learning Objectives

We will learn about:

- ▶ **Conformational isomerism**
- ▶ **Geometrical isomerism**



Learning Objectives

We will learn about:

- ▶ **Conformational isomerism**
- ▶ **Geometrical isomerism**
- ▶ **R-S configurations with examples**



System Requirement



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- ## ► Ubuntu Linux OS v 14.04



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- ▶ **Ubuntu Linux OS v 14.04**
- ▶ **Avogadro version 1.1.1**



Pre-requisites



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► Avogadro interface



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- ▶ **Avogadro** interface
- ▶ For relevant tutorials, visit our website
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- ▶ **Avogadro** interface
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- ▶ Example files used in this tutorial are provided as code files



Stereoisomerism



Stereoisomerism



Stereoisomerism

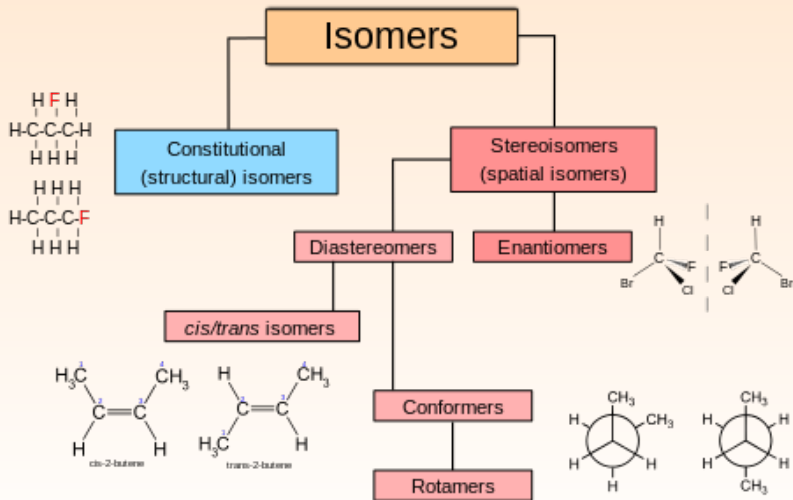
- ▶ Stereoisomerism arises due to difference in spatial arrangement of atoms



Classification of Isomers



Classification of Isomers



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Conformational Isomerism



Conformational Isomerism

- It is a form of stereoisomerism



Conformational Isomerism

- ▶ It is a form of stereoisomerism
- ▶ Isomers can be inter-converted by rotation about single bonds



Conformational Isomerism

- ▶ It is a form of stereoisomerism
- ▶ Isomers can be inter-converted by rotation about single bonds
- ▶ Rotation about single bond is restricted by rotational energy barrier



Conformations



Conformations

1,2-dichloroethane exists in three conformers namely:



Conformations

1,2-dichloroethane exists in three conformers namely:

► **Eclipsed**



Conformations

1,2-dichloroethane exists in three conformers namely:

- ▶ Eclipsed
- ▶ Gauche



Conformations

1,2-dichloroethane exists in three conformers namely:

- ▶ **Eclipsed**
- ▶ **Gauche**
- ▶ **Anti**



Assignment

1. Draw various conformers of butane and Cyclopentane



Geometrical Isomersism



Geometrical Isomerism

- ▶ Geometrical isomerism arises due to different spatial arrangement of atoms around a double bond



R-S Configurations



R-S Configurations

- ▶ R-S configurations arise due to the presence of a **Chiral centre**



R-S Configurations

- ▶ R-S configurations arise due to the presence of a **Chiral centre**
- ▶ **Chiral centre** is an atom connected to four different substituents



R-S Configurations

- ▶ R-S configurations arise due to the presence of a **Chiral centre**
- ▶ **Chiral centre** is an atom connected to four different substituents
- ▶ **Configurations are non-superimposable mirror images of each other**



R-S Configurations



R-S Configurations

- ▶ R S configuration is based on priority given to the substituent in clockwise or anticlockwise direction



R-S Configurations

- ▶ **R S configuration is based on priority given to the substituent in clockwise or anticlockwise direction**
- ▶ **Priority is based on atomic number of the substituent**



R-S Configurations

- ▶ R S configuration is based on priority given to the substituent in clockwise or anticlockwise direction
- ▶ Priority is based on atomic number of the substituent
- ▶ Substituent with higher atomic number gets first priority



Summary

We have learnt to draw:

- ▶ Conformations of 1,2-dichloroethane
- ▶ Conformations of cyclohexane
- ▶ Geometrical isomers of cisplatin
- ▶ R-S configurations of amino acid alanine



Assignment

As an assignment draw,

- 1. Geometrical isomers of 2-butene and 1,2-dichloroethene**
- 2. R-S configurations of bromochloriodomethane**



About the Spoken Tutorial Project

- ▶ Watch the video available at http://spoken-tutorial.org/What_is_a_Spoken_Tutorial
- ▶ It summarises the Spoken Tutorial project



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Spoken Tutorial Workshops

The Spoken Tutorial Project Team

- ▶ Conducts workshops using spoken tutorials
- ▶ Gives certificates to those who pass an online test
- ▶ For more details, please write to contact@spoken-tutorial.org



Acknowledgements

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- ▶ It is supported by the National Mission on Education through ICT, MHRD, Government of India
- ▶ More information on this Mission is available at <http://spoken-tutorial.org/NMEICT-Intro>

