



Stereoisomers

Answer all the questions below as fully as you can then check your answers

1. What is a stereoisomer?
 - a. Name two types of stereoisomer.
 - b. What feature of a $C=C$ bond allows for the formation of stereoisomers?
2. Draw the displayed formula of *cis*-1,2-dichloroethene and *trans*-1,2-dichloroethene.
3. There are two naming systems used to identify and name geometric isomers, the *cis/trans* and *E/Z* system. Explain the differences between these two systems of nomenclature and the limitations of the *cis/trans* naming system.
4. *But-2-ene* can exist as a pair of stereoisomers. Draw the structure of these two stereoisomers.
5. Draw the displayed formula of the *E* and *Z* stereoisomers of:
 - a. *hex-3-ene*.
 - b. *3-methylpent-2-ene*.
 - c. *pent-2-ene*.

Answers

1. What is a stereoisomer?

Compounds or molecules with the same structural formula but the atoms are arranged differently in 3d space.

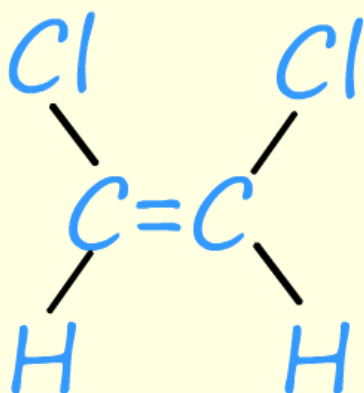
a. Name two types of stereoisomer.

- optical isomers.
- geometric isomers such as cis/trans and E/Z isomers.

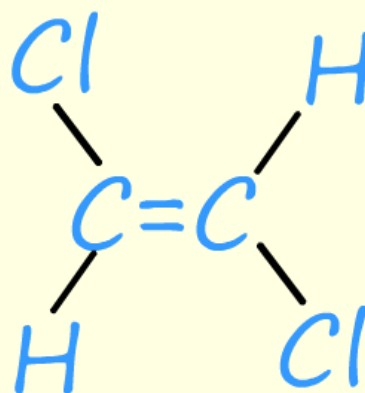
b. What feature of a C=C bond allows the formation of stereoisomers?

No rotation is possible around the carbon carbon double bond (C=C)

2. Draw the displayed formula of cis-1,2-dichloroethene and trans-1,2-dichloroethene.



cis-1,2-dichloroethene

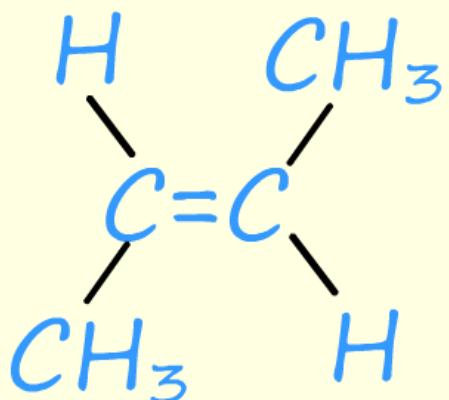


trans-1,2-dichloroethene

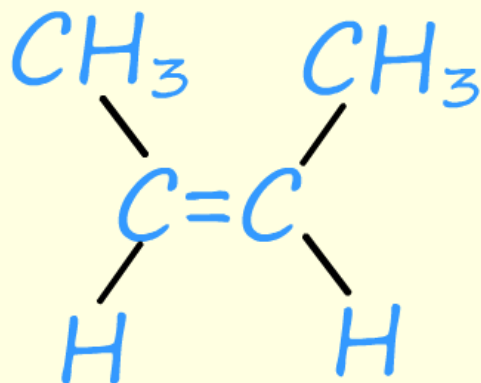
3. There are two naming systems used to identify and name geometric isomers, the cis/trans and E/Z system. Explain the differences between these two systems of nomenclature and the limitations of the cis/trans naming system.

The cis/trans is limited to naming disubstituted alkenes, the E/Z naming system can be used to name ALL alkenes not just disubstituted alkenes.

4. But-2-ene can exist as a pair of stereoisomers. Draw the structure of these two stereoisomers.

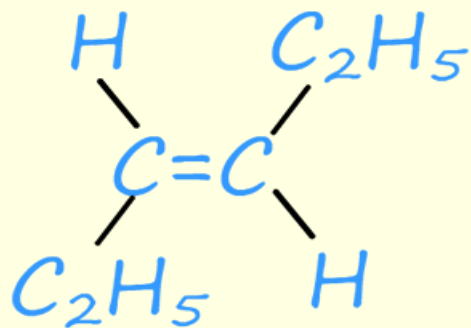


trans-but-2-ene
or
(E)-but-2-ene

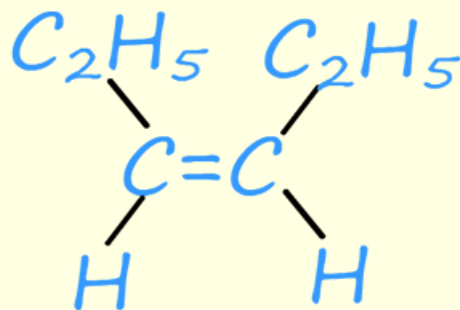


cis-but-2-ene
or
(Z)-but-2-ene

5. Draw the displayed formula of the E and Z stereoisomers of:
a. hex-3-ene.

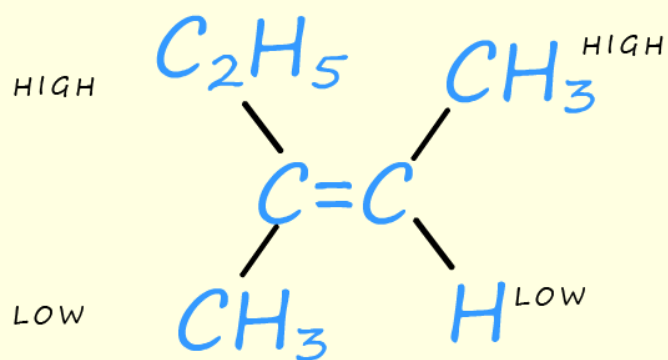


(E)-Hex-3-ene

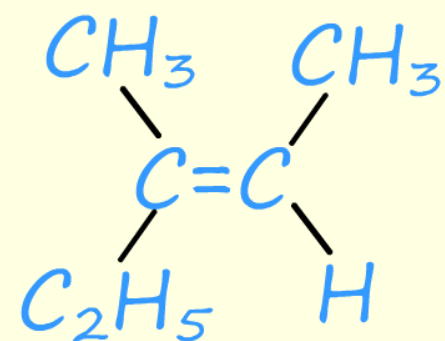


(Z)-Hex-3-ene

b. 3-methylpent-2-ene. Recall that for the Z-isomer both the highest priority groups are on the same side of the molecule, this is shown below:

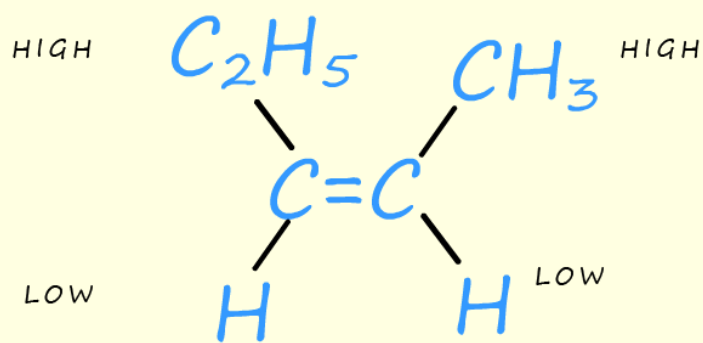


(Z)-3-methylpent-2-ene

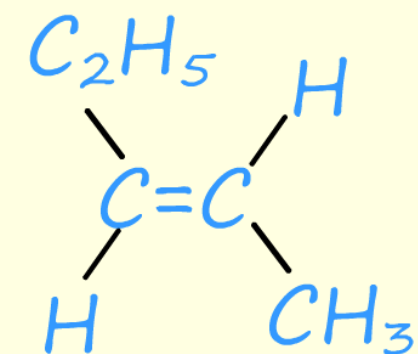


(E)-3-methylpent-2-ene

c. pent-2-ene.



(Z)-pent-2-ene



(E)-pent-2-ene