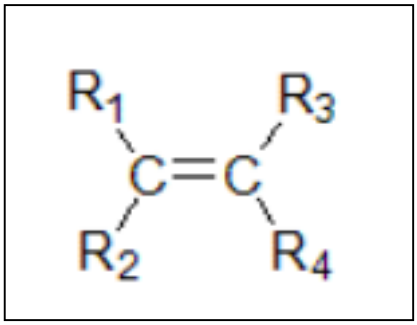
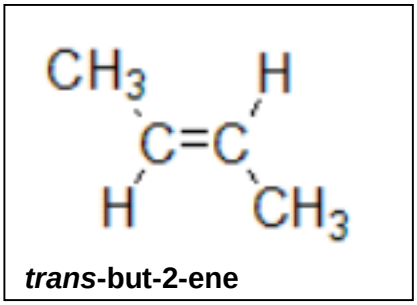
Lesson 4 Naming cis and trans isomers and writing their semistructural formulae

Click to revise cis and trans isomers

Click to revise structural and semistructural formulae

An alkene can exist as *cis* or *trans* isomers *only* if R_1 is not equal to R_2 and R_3 is not equal to R_4



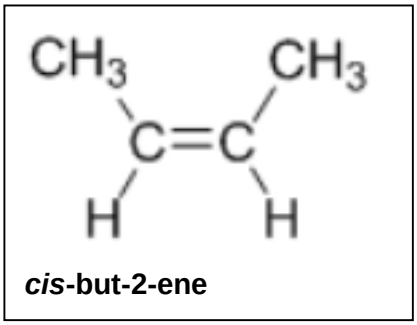


***trans*-but-2-ene**

cis- if the two alkyl groups, R-, are on the same side of the C=C

trans- if the two alkyl groups, R-, are on opposite sides of the C=C.

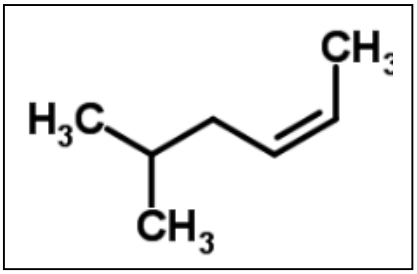
the terms ***cis*** and ***trans*** are inserted into the name as prefixes.



***cis*-but-2-ene**

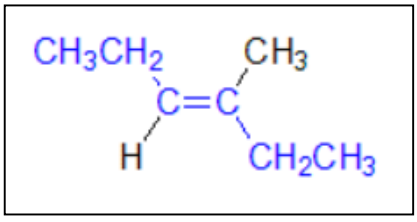
Example 1

Name the molecule shown on the right.
This molecule is a cis isomer of 5-methylhex-2-ene
We write the name with the cis prefix *cis-5-methylhex-2-ene*. The semi-structural formula is given as *CH_3 $CH(CH_3)CH_2CHCHCH_3$.*



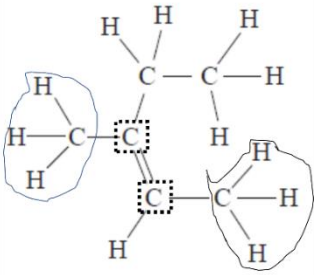
Example 2

Name the molecule shown on the right.
This molecule is a trans isomer of 3-methylhex-3-ene
We write the name with the cis prefix *trans-3-methylhex-3-ene*. The semi-structural formula is given as *$CH_3CH_2CHC(CH_3)CH_2CH_3$*

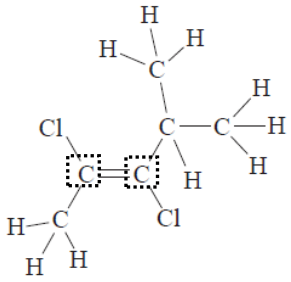


Below is a recommendation from the Chief assessor in the 2021 assessment response. Follow the Assessors comments when answering the questions below. "Geometric – *cis*/*trans* – isomers of alkenes can exist when the same atoms/groups are attached at both ends of the C=C double bond. At VCE level students should be aware that when these atoms/groups are on the same side of the C=C, the compound is the *cis* isomer, and when they are on different sides, the compound is the *trans* isomer. In Molecule 1 there are methyl, CH_3-, groups on different sides of C=C, so on that basis it would be classified a *trans* structure (i.e. *trans*-3-methylpent-2-ene). Molecule 2 there are chloro, Cl-, groups on different sides of the molecule, so on that basis it would also be classified as a *trans* structure (i.e. *trans*-2,3-dichloro-4-methylpent-2-ene)."

Molecule 1

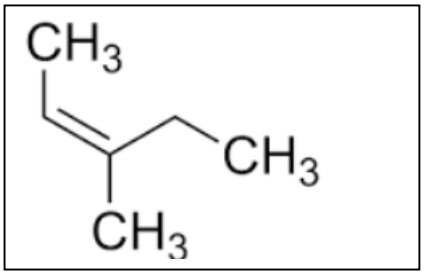


Molecule 2

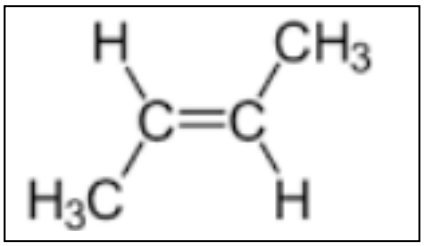


1) Name the molecules shown on the right and give their semi-structural formulae

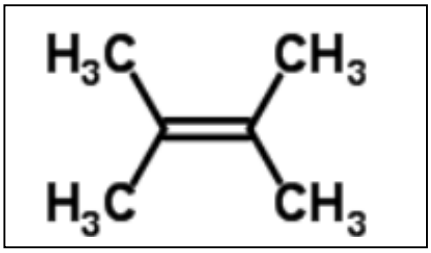
a)



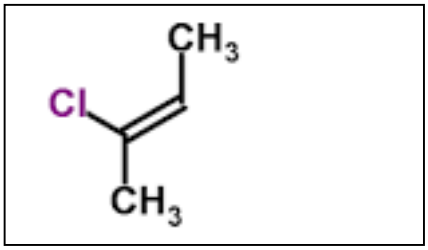
b)



c)



d)



e)