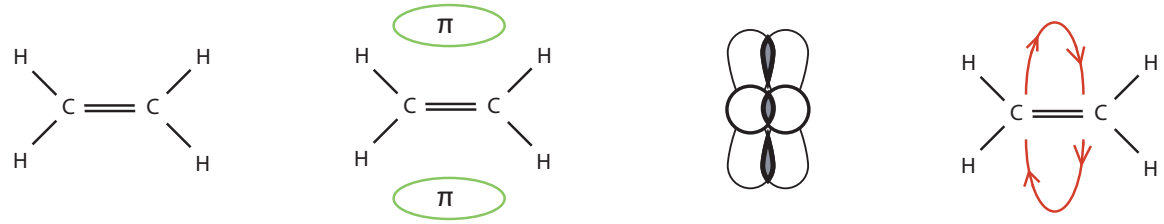
CIS/TRANS ISOMERISM : Saturday 3rd November 2018

("cis" is Latin for 'on the same side', and "trans" is Latin for 'on the other side'.)

- In Organic Chemistry, **a double bond** (cf. diagram below) is created by
  i) a sigma bond connecting the nuclei of two bonded Carbon atoms plus
  ii) the overlap of two unhybridised 'p' orbitals, one from each of the two bonded Carbon atoms, and consequently if you were to rotate the two Carbon atoms in relation to each other (cf. the red circular arrows), then the sigma bond would still be there, but the overlap between the two 'p' orbitals would be broken and there would no longer be a double bond where one had existed previously – and, if the molecule no longer has a double bond, *then at that point it is no longer the molecule that it formerly was*. In the case of Ethene below it would have become an Alkane.

Rotation and the breaking of the double bond in an Ethene molecule. The two green areas make up ONE double bond.



*All that has been executed here is rotation around the double bond. The four H atoms are all the **same** species therefore they are indistinguishable from each other and in the C_2H_4 molecule here, if the rotation were through 180˚, then the 'p' overlap would be re-established and the double bond re-created and no new substance would have been formed.*

However, if there are at least two non H atoms in the Ethene molecule and if they are different from each other then the conditions for cis/trans isomerism exist and a cis/trans isomer will be created by rotation trough 180˚.

Nice and easy isn't it!

- Whether a substance prefers a cis configuration or a trans configuration is often determined by how physically big the cis/trans species are. For example, two 300lb people trying to sit next to each other (a cis configuration) in an aeroplane would find it rather a tight squeeze, but if they sat in different rows (a trans configuration) then they might find it more comfortable that way.