Chirality is a fundamental concept in chemistry and physics. It exists in certain crystals, is a fundamental property in the chemistry of living organisms and is an indispensable condition for certain physical properties.

The chirality of molecules

In 1848 Pasteur's commented that crystals can have two identical and yet opposing forms, a mirror image of each other. This interpreted the existence of two chiral molecules. The chirality of crystals is primarily due to the manner in which the constituent atoms or molecules are arranged. Asymmetric molecules have two chiral forms; in nature one of these two forms is generally the dominant one.

Our bodies are made up of basic chiral structures: amino acids, sugars...

The chirality comes from the Greek word chiro which means 'hand'. When your palms are turned towards the sun, your left hand cannot be superimposed on your right hand.

Enantiomers with different properties

Two enantiomers have identical physical and chemical properties in a symmetrical environment. However, they are perceived differently by living organisms. In other words, depending on whether the molecule can be found in one or the other form, it will not have the same effect.

- This explains why the molecule (R)-carvone smells of spearmint whilst (S)-carvone smells of cumin; our olfactory receptors are sensitive to chirality.
- The same apply to taste: the molecule of S-asparagine has the bitter taste of asparagus, whilst the R-asparagine molecule is sweet to the taste.
- These differences in properties can be dramatic for drugs: this is the case of thalidomide, one form is an analgesic and the other causes foetal malformations.

A chiral molecule in one or the other form will not have the same effect on (all) our body. This is the case with certain medicines, and for the perception of certain tastes and smells.