Like ligands in an organic molecule that are equivalent (see equivalent ligands) under all conditions are said to be homotopic. The replacement test is used to find if two like ligands in a molecule are homotopic. eg:

Apply the replacement test to the two hydrogen atoms in 1 to determine if they are homotopic.

Molecules 2 and 3 are superimposable on each other, meaning that they are identical. Identical molecules have identical chemical properties under all conditions. Since replacement of H (a) and of H (b) with the same atom leads to molecules that have identical chemical properties under all conditions, H (a) and H (b) have identical chemical properties under all conditions, i.e., H (a) and H (b) are homotopic.

see also enantiotopic, diastereotopic, constitutionally heterotopic

Contributors

- Gamini Gunawardena from the OChemPal site (Utah Valley University)