Chiral separation of diastereomeric and enantiomeric products obtained by an organic reaction in aqueous media between cycloehxanone and p-nitrobenzaldehyde by HPLC on chiral stationary phase

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Keywords: enantiomers, diasteroisomers, chiral separation, HPLC, industrial applications.

Abstract

To understand the intimate essence of the phenomena that occur around us and in us it is necessary to go down to the atomic and molecular level. From the scale of atoms to the human one, nature is chiral. A chiral chemical species exists as two isomeric forms, called enantiomers, which are the mirror image of each other and cannot be superimposed on each other. It is important to understand the cause-effect correlations of this asymmetry, which seems universal, in fact many drugs, food additives, flavors, cosmetics, agrochemicals etc. they are chiral and the biological activity of the two enantiomers is often different. To distinguish enanatiomers, an interaction with an entity that is also chiral with the formation of diasteroisomers is required. This work describes the development of the separation method of four diastereoisomers in an organic reaction between cyclohexanone and benzaldehyde using different elution solvents. The chiral separation of the two geometric isomers syn and anti produced by the reaction was obtained by high performance chromatography with a diode detector (HPLC-DAD), using a chiral column and a ternary mixture of n-hexane, dichloromethane and ethanol. In the best chromatographic conditions the diastereomers were well separated; in all reactions a good separation of the major pairs of diastereomers was achieved, while in the same cases it was not possible to separate the minor syn compunds. The separation of the major pair of enantiomers gave the possibility to quantify the enantiomeric excess; while the reaction yield was determined by quantifying the unreacted benzaldehyde in the final system by means of a calibration curve. NMR data support chromatographic data for reaction yield and diasteroemeric excesses.