Spectroscopic Study of R- and S-ketoprofen Inclusion Complexes with 2-Hydroxypropyl-β-cyclodextrin

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Abstract:

Ketoprofen, also known as (RS)-2-(3-benzoylphenyl)-propionic acid, has the molecular formula $C_{16}H_{14}O_3$ and is classified as a non-steroidal anti-inflammatory medication. R-ketoprofen has stronger analgesic effects than S-K and as a result, there is a growing interest in enantio-recognition research, which may be accomplished through supramolecular interactions, particularly host-guest reactions. A 1:1 molar ratio was used to produce the combination of separate RK and SK and a 0.01 M stock solution of HPβ-CD to get the final concentration of 6 x 10^{-4} M. Ethanol was used to make stock solutions of ketoprofen enantiomers (1 mM). By combining 100 µL of ketoprofen with HPβ-CD. Spectroscopic study of S-ketoprofen (SK) and R-ketoprofen (RK) enantiomers with 2-Hydroxypropyl-beta-cyclodextrin (HPβ-CD) to form inclusion complexes in aqueous solution. The Benesi–Hildebrand plot was used to determine the inclusion complexes' stoichiometry ratio and binding constant, both enantiomers displayed a 1:1 stoichiometry ratio inclusion complex with HPβ-CD. Compared to SK (799 M^{-1}), RK has a higher binding constant (1038 M^{-1}). These results showed that HPβ-CD preferred to form inclusion complexes with RK over SK. At neutral pH, there are significant differences between RK and SK when HPβ-CD is present.

Keywords:

Inclusion complex, HPβ-Cyclodextrin, Ketoprofen enantiomers, Chiral recognition.