Spectroscopic characterization of the inclusion complexes of luteolin with native and derivatized ?-cyclodextrin

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The inclusion complexes of Luteolin (LU) with cyclodextrins (CDs) including ?-cyclodextrin (?CD), hydroxypropyl-?-cyclodextrin (HP?CD) and dimethyl-?-cyclodextrin (DM?CD), Scheme 1, have been investigated using the method of steady-state fluorescence. The stoichiometric ratio of the three complexes was found to be 1:1 and the stability constants (K) were estimated from spectrofluorometric titrations, as well as the thermodynamic parameters. Maximum inclusion ability was obtained in the case of HP?CD followed by DM?CD and ?CD. Moreover, 1H NMR and 2D NMR were carried out, revealing that LU has different form of inclusion which is in agreement with molecular modeling studies. These models confirm that when LU-?CD and LU-DM?CD complexes are formed, the B-ring is oriented toward the primary rim; however, for LU-HP?CD complex this ring is oriented toward the secondary rim. The ESR results showed that the antioxidant activity of luteolin was the order LU-HP?CD > LU-DM?CD > LU-?CD > LU, hence