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IR and NMR studies of drugs complexation with β -cyclodextrin

β -cyclodextrin (β -CD) is widely used to increase stability and solubility of drugs in water, to increase the bioavailability of drugs, etc., to reduce the side effects of Dimedrol, Clophelin and Tolperisone. Their β -CD inclusion complexes were obtained with dissolving of drug (as hydrochloride and/or base) and β -CD via slow addition of drug solution to the β -CD solution. The formation of inclusion complexes were affirming by IR and NMR spectroscopy. Using the example of a comparative analysis of IR spectra (Clophelin-base or Dimedrol-base, β -CD and its complexes, Fig. 1 and Fig. 2), it was shown that resulting crystalline product was a physical mixture of Clophelin-base and β -CD (Fig. 1). While the spectrum of complex of Dimedrol-base+ β -CD was characterized by absence of absorption bands observed in drug spectrum at 746.8; 700.8 and 2770-3030 cm^{-1} , related to aromatics. This suggests the formation of inclusion complex by the "occurrence" of both phenyls of Dimedrol into the β -CD cavity, i.e. "guest" - "host" = 1:2. Evidence of inclusion of Dimedrol-base molecule into the β -CD internal cavity by the ¹H NMR spectroscopy was a change in the chemical shifts of the protons H-3 (-0.18), H-5 (0.09) and H-6 (0.18), directed into the internal cavity β -CD molecules and exposed to the incorporated molecule. On the other hand, the descreening of H-9 (-0.22) and C-7 (-1.17), C-9 (-0.24) and C-10 (-0.54) and the screening of both C_q (1.41) Dimedrol's phenyl fragments showed that both phenyl were incorporated into an internal cavity of two β -CD.

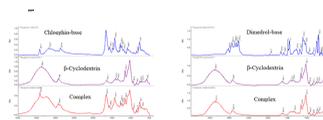


Figure 1: IR spectra of Clophelin-base, β -cyclodextrin and its Complex
 Figure 2: IR spectra of Dimedrol-base, β -cyclodextrin and its Complex



Biography

Aigul Ye Malmakova has completed her PhD from Kazakh-British Technical University. She is the Scientific Secretary and Senior Researcher in Laboratory of Chemistry of Synthetic and Natural Medicinal Compounds at A.B. Bekturov Institute of Chemical Sciences. She has published more than 20 papers, 51 abstracts of conferences and 12 patents of Republic of Kazakhstan and has been serving as an Executive Secretary of Chemical Journal of Kazakhstan.

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