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Selective preparation of beta-cyclodextrin clathrates by solid-phase exchange of included tetrahydrofurane for volatile guests in absence of water

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Abstract

© 2014 Akadémiai Kiadó, Budapest, Hungary. Solid-phase guest-exchange products, prepared from dehydrated clathrate of beta-cyclodextrin (bCD) with tetrahydrofurane (THF) by its saturation with vapor of second guest, were studied using thermal analysis by thermogravimetry combined with mass-spectrometric detection of evolved vapors. This guest-exchange procedure was found to be effective for inclusion of volatile guests, which otherwise require a difficult optimization of preparation conditions. Besides, a performed solid-phase exchange without liquid/solid-phase contact is a standard, technologically friendly procedure of clathrate preparation, which does not require further drying to provide an end product. An observed exchange of THF in the absence of water is rather selective, with some hydrophobic guests being unable to replace THF in its dried clathrate with bCD. This selectivity together with low toxicity of THF may be an advantage for practical applications of this guest-exchange method.

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Keywords

Beta-cyclodextrin, Inclusion compounds, Preparation method, Thermal analysis