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On the efficiency of cyclodextrin inclusion complexes with ibuprofen and naproxen

Stiliyana Pereva, Tony Spassov, Tzvetla Sarafska and Svetla Bogdanova
Sofia University, Bulgaria

Cyclodextrin (CDs) have a vast and important applications in many fields of natural sciences – chemistry, pharmacy, gas storage, catalysis, foods, cosmetics. This interest and nearly 40 years of research on CDs is due to their structure – they have a hydrophobic cavity and a hydrophilic exterior, thus they can be hosts of molecules with proper size, which can be entrapped into their cavity. Ibuprofen and naproxen are non-steroidal anti-inflammatory drugs with high bioavailability and permeability, but low water solubility. Very few researches investigate the complex efficiency and how this can improve the solubility of the drugs in water, their properties and also shed a light to the mechanism of complex formation. We propose a modified ball milling method (with the use of a solvent), which is very effective, compared to the classical pharmaceutical methods – it's cheap, environmentally friendly and can be applied in an industrial scale. With the help of thermal analysis (Differential Scanning Calorimetry and Thermal Gravimetry), we were able for a first time to quantitatively determine how efficient is this modified synthetic method. We proved that for ibuprofen complexes 1 molecule ibuprofen, replaces 7 molecules water from the cavity of the cyclodextrin.

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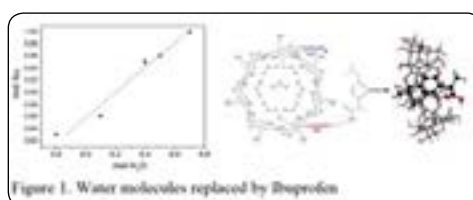


Figure 1. Water molecules replaced by Ibuprofen

Recent Publications:

1. Pereva, S., Himitliiska, T., Spassov, T., Stoyanov, S.D., Arnaudov, L.N., Dudev, T. (2015) Cyclodextrin-Based Solid-Gas Clathrates., *Journal of Agricultural and Food Chemistry*, 63, Issue 29, Pages 6603-6613.
2. Pereva, S., Sarafska, T., Bogdanova, S., Spassov, T. (2016), Efficiency of "cyclodextrin-ibuprofen" inclusion complex formation., *Journal of Drug Delivery Science and Technology*, 35, Pages 34-39.
3. Angelova S., Nikolova V., Pereva S., Spassov T., Dudev T. (2017) α -Cyclodextrin: How Effectively Can Its Hydrophobic Cavity Be Hydrated?, *J Phys Chem B.*, (39):9260-9267.

Biography

Stiliyana Pereva – graduated The National High-School of Mathematics and Sciences with profile in chemistry, biology and mathematics. This followed to a bachelor degree in Computational Chemistry at Sofia's University. Meanwhile I started to work in the group of prof. DSc Tony Spassov at the Department of Applied Inorganic Chemistry, which led me to obtaining my master degree in Materials Science with special interest in Cyclodextrins (CDs): their inclusion complexes, and especially their application in pharmaceutical industry. In April, 2017 I become a PhD in Solid State Chemistry, successfully defending my Thesis on "Inclusion compounds based on Cyclodextrins ". Now I'm working on new ways to improves the complex formation between cyclodextrins and some drugs, conducting experiments and applying the methods of Quantum-chemistry for a better understanding on the complex mechanism.

SPereva@chem.uni-sofia.bg