

# APPLICATION OF SUPERCRITICAL CO<sub>2</sub> IN THE β-CYCLODEXTRIN INCLUSION COMPLEXES

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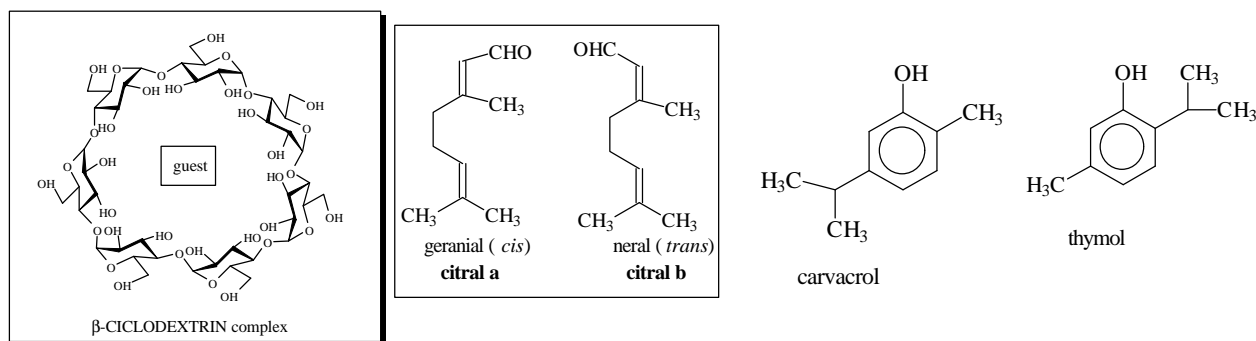
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The preparation of commercially valuable monoterpene (natural occurring) compounds-β cyclodextrin (β-CD), inclusion complexes using supercritical CO<sub>2</sub> was investigated. In an effort to make such wide-ranging natural resources like bioactive compounds more readily available, we have chosen some natural compounds with known biological properties in order to form β-CD inclusion complexes by supercritical CO<sub>2</sub> method.

β-CD, a commercially available cycloheptaamylose, is a biopolymer obtained by enzymatic degradation of starch. It is torus-like amphipathic macro-ring built up from glucopyranose units with a lipophilic cavity and an external hydrophilic side. β-CD is crystalline, non toxic, non hygroscopic and in aqueous solution, the cyclodextrin cavity is occupied by water molecules which are energetically unfavoured (polar-polar interactions) and therefore can be readily substituted by appropriate 'guest molecules' that are less polar than water. The inclusion complex consists of electronic interaction between the torus-like macro ring of β-CD (host) and the active agent (guest) that fits well into the lipophilic cavity of the biopolimeric matrix.

The influence of the temperature, the pressure and the time of exposure on the inclusion rate were studied to determine the optimal conditions for the inclusion of terpene (natural occurring) compounds. The complexes were characterized by <sup>1</sup>H NMR spectrometry in D<sub>2</sub>O in order to compare the guest-host ratio respect to inclusion complexes prepared by classical methods <sup>(1)</sup>. Chemical shifts of H<sup>3</sup> and H<sup>5</sup> β-CD protons, which point out to the lipophilic cavity, are a useful probe to observe formation of inclusion complexes and, thus, evaluate the modification structural level of β-CD.

Supercritical carbon dioxide may prove to be a novel useful inclusion method of non polar drugs into β-cyclodextrin<sup>(2)</sup>. Advantages and limits of supercritical CO<sub>2</sub> method as well as experimental conditions will be described in the poster.



## Bibliography

1. Manunza, B.; Deiana, S.; Pintore, M.; Delogu, G.; Gessa, C. *Pestic. Sci.* **1998**, *54*, 68.
2. Van Hees, T.; Piel, G.; Evrard, B.; Otte, X.; Thunus, L.; Delattre, L. *Pharm. Res.* **1999**, *16*, 1864.