Correlation between Solubility Behavior and Molecular Organization in CO_2-Expanded Solvents: The case of Ibuprophen and Naproxen.

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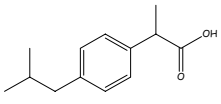
It has been shown that CO_2-expanded liquid solvents could provide significant advantages as solvent media over pure compressed CO_2, in the processing of polar compounds with low solubility in pure CO_2. The potential applications of CO_2-expanded solvents in reactions and separation schemes, and for the processing of materials are summarized in a recent review.[1] The study and determination of solvent and solute molecular structure in such compressed fluids is an area of active research, since it is crucial for understanding and promoting compound solubility in these solvent media.[2-4]

In the present work, we have used infrared spectroscopy to study how solvent and solute molecules are organized in CO_2 expanded solutions, and how this molecular organization is influenced by the CO_2 content of the solution. In particular, we will give a molecular insight on the different solubility behavior, in CO_2 expanded solvents, of ibuprophen **1** and naproxen **2**, two anti-inflammatory drugs with similar molecular structure. We will analyze, at molecular level, why CO_2 has always a co-solvent effect in the case of ibuprophen in CO_2-expanded solvents, and by contrast why the effect of CO_2, either as co-solvent or antisolvent, is strongly dependent on the nature of the organic solvent in the case of naproxen.



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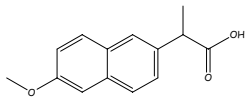

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