**Unconventional pressure dependence of Ibuprofen solubility in binary mixture of water and organic solvent**

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**Highlights**

* Solubility of Ibuprofen at elevated pressures
* Hydrogen bond network

**1. Introduction**

Unexpectedly we found that the solubility of Ibuprofen, a hydrophobic compound, in mixtures of water and organic solvent can increase with increasing pressure. This behaviour can be exploited for particle precipitation strategies that are based on a rapid pressure changes.

We therefore characterized the solubility of ibuprofen in binary mixtures of water and organic solvent (here acetone and acetonitrile) up to 20 MPa. The obtained results are interpreted based intermolecular interactions revealed using Raman spectroscopy and on thermodynamic considerations revealed by measuring the partial molar volumes of the solvents and the dissolved ibuprofen.

This kind of binary mixtures also show an ambiguous behaviour in the hydrogen bond network that changes with temperature and pressure. According to “iceberg theory”, water and organic solvent molecules can organise themselves creating regions rich and others poor in water.

**2. Setup**

For the determination of the solubility data at high pressure, the setup consists of a high pressure variable volume view cell (HPVVVC), where pressure can be fixed by increasing/decreasing the volume and temperature can be adjusted by a heating system.

**3. Conclusion**

We aim to contribute with this study in the implementation of a precipitation process by pressure variation.

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