Solubility of Some Single Gases in the Ionic Liquid [HMIM][Tf_2N]

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Hydrogels are polymer networks of hydrophilic monomers. Their thermodynamic properties are governed by the interplay of intermolecular forces (similar to the behaviour of liquids) and elastic behaviour (similar to solids) resulting in very interesting phenomena such as e.g. the swelling and shrinking depending on their surroundings. The review deals with the phase equilibrium when (nonionic as well as ionic) hydrogels (of – neutral - isopropyl acrylamid and ionic – sodium methacrylat) are immersed in aqueous solutions of strong as well as weak electrolytes, neutral organic solvents and neutral polymers). Experimental results for the (in some cases surprising) swelling behaviour and the partitioning of solutes between the gel phase and the coexisting liquid are reported and discussed. That behaviour is modelled by a thermodynamic framework that combines the Gibbs excess energy of aqueous solutions with the Helmholtz energy of an elastic network. Models for both contributions are available in the literature. Model parameters are determined – as far as possible – from independent experimental investigations e.g. on the vapor-liquid equilibrium of binary subsystems. Only some model parameters are adjusted to the swelling equilibrium data. The model does not only result in a reliable correlation for the observed phenomena, it also allows for reliable predictions for e.g. the influence of crosslinking density on the swelling equilibrium.