Diffusion coefficients of fluoro-alcohols in fluorocarbons used in liquid ventilation

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The development of fluorocarbon-based microemulsions for biomedical applications has been a topic of interest in recent years [1]. Of particular relevance are water-in-fluorocarbon inverse emulsions, used for the transport and controlled release of drugs in the context of liquid ventilation [2].
The stability of these emulsions is fundamental to their successful use. This depends on a set of thermodynamic and thermophysical properties that must be known, such as the molar volume of water, the solubility of water in the continuous phase, the water/fluorocarbon interfacial tension, and the diffusion coefficient of water in the continuous phase. The mobility in the continuous phase of the surfactant used to stabilise the emulsion is also particularly relevant. Knowledge of these properties allows the stability of this type of emulsion to be predicted, which is a fundamental criterion for their use.
Among the surfactants to be used in this type of two-phase system, fluorinated surfactants stand out for their potential, of which fluorinated alcohols can serve as a simple model.
In this study, diffusion coefficients of a series of fluorinated alcohols (1H,1H-perfluoro-1-butanol, 1H,1H-perfluoro-1-pentanol, 1H,1H-perfluoro-1-hexanol, 1H,1H-perfluoro-1-heptanol and 1H,1H-perfluoro-1-octanol) in fluorocarbons used in blood substitute formulations and liquid ventilation (perfluoro-octyl bromide, perfluoro-decaline, pefluoro-octane) were determined as a function of composition and temperature, using the spin-echo NMR technique.
The results were interpreted in the light of knowledge accumulated in recent years regarding mixtures involving fluorinated and hydrogenated alcohols, water, alkanes and perfluoro-alcohols [3,4].

References:

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