

Solubility and Phase Behaviour of Polymer Excipients in Fluorinated Liquids

Alison Paul, Gemma Talbot

*School of Chemistry, Cardiff University,
Main Building, Park Place, Cardiff, CF10 3AT
paula3@cf.ac.uk*

Abstract

Partially fluorinated liquids have unique solvent properties, and their biocompatibility makes them suitable solvents for drug delivery, most notably in pressurised metered dose inhalers (pMDIs). Environmentally damaging CFC propellants used in pMDIs are being replaced with hydrofluoroalkanes (HFAs), which have similar but not identical solvent properties, therefore the solubility and phase behaviour of polymers and surfactants in these systems is of considerable interest as they are often used as formulation additives.

In this work we have studied the phase behaviour of poly(ethylene oxide) oligomers (PEGs) in various fluorinated liquids. Two molecular weight series of dihydroxyl- dimethyl- or monomethyl- end-capped PEGs have been studied individually, and as mixtures. Hydrogen bonding interactions with the solvent are found to be essential for solubility, and a strong end-group effect is observed. Quantification of component partitioning in these systems by dry-weights analysis and NMR experiments is allowing us to further investigate the influence of polymer chemical structure and the importance of specific molecular interactions, in order to determine the factors which dominate the phase behaviour.

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