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The Concept of Melting Point Lowering due to Ethoxylation

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Most of the commonly used Ionic Liquids (ILs) contain bulky organic cations with suitable anions. With our COMPLET (Concept of Melting Point Lowering due to Ethoxylation), we follow a different approach. We use simple, low-toxic, cheap, and commercially available anions of the type Cx(EO)yCH2COO– to liquefy presumably any simple metal ion, independently of its charge. In the simplest case, the cation can be sodium or lithium, but synthesis of Ionic Liquids is also possible with cations of higher valences such as transition or even rare earth metals.

Anions with longer alkyl chains are surface active and form surface active ionic liquids (SAILs), which combine properties of ionic and nonionic surfactants at room temperature. They show significant structuring even in their pure state, i.e., in the absence of water or any other added sol-vent.
In particular, we studied the octyl ether octaethyleneoxide carboxylic acid ([H+][C8E8c–], Akypo™ LF2), with partial replacement of H+ by Na+ and Ca2+ in its pure state and in mixtures with water as well as with dodecane. The resulting phase diagrams are remarkable. The surfactants always form spheroidal or only slightly prolate direct micelles, from the dilute aqueous solution via interdigitated micelles in the pure IL state and even when oil is added to the pure IL without water. Further, this type of surfactants (CiEi-carboxylates) shows a completely different type of lower critical separation behaviour: the dynamic equilibrium is between highly cross-linked and classical core-shell globular micelles since micellar shape-transitions are sterically forbidden.

References

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