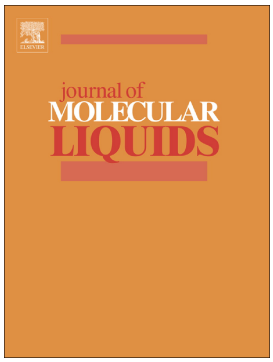

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PII: S0167-7322(17)34593-2
DOI: doi:10.1016/j.molliq.2017.11.164
Reference: MOLLIQ 8280

To appear in: *Journal of Molecular Liquids*

Received date: 30 September 2017
Revised date: 25 November 2017
Accepted date: 27 November 2017

Please cite this article as: Ravi K. Shukla, K.K. Raina , Effect of viscosity, pH and physicochemical parameters of solvent on the aggregation and dielectric behaviour of lyotropic liquid crystals binary mixtures. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:10.1016/j.molliq.2017.11.164

Effect of viscosity, pH and physicochemical parameters of solvent on the aggregation and dielectric behaviour of lyotropic liquid crystals binary mixtures

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Abstract

This paper reports on the synthesis of lyotropic liquid crystalline phases using cetyl pyridinium chloride and sodium dodecyl sulphate in the aqueous (water) and non-aqueous solvent (glycerol) of varying polarity and viscosities. Various crystal-like, liquid-like and liquid crystalline phases are seen in the different solvent media at the expense of increasing concentration of surfactants. It is interesting to highlight that highly viscous and little acidic (pH≈6) mixtures produce more ordered structures comparing to other. Aggregation of cetyl pyridinium chloride in both solvents is found thermally driven process as calorimetric transition confirmed the growth of the lyotropic phases at a higher temperature (331-345K) than 303K. Quenching has been evolved as the proficient technique to bring the higher temperature lyotropic liquid crystalline ordering to the room temperature without breaking the symmetry. Structural and polarizing optical microscopy measurement reveals that viscosity plays vital role on the aggregation in lyotropic liquid crystalline systems as glycerol based quenched and as-synthesized lyotropic liquid crystalline phases are found more ordered than other. Dielectric dynamics reveals that quenched cetyl pyridinium chloride /glycerol-based lyotropic liquid crystalline phases show higher dielectric constant; however, the reverse is true for the sodium dodecyl sulphate /glycerol lyotropic liquid crystalline phases. Dc conductivity of the order 10^{-5} S/m is one of the significant finding of this study, which open up the application perspective of these phases.

Key-words: Viscous and acidic pH lyotropic liquid crystalline phases; Quenched lyotropic liquid crystalline phases; Ionic surfactants, Dielectric spectroscopy; Dc conductivity.

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