

Limiting Hydration Phase Behaviour of Glycolipids: A Review

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Structured Abstract

Background: In the chemistry of material states, liquid crystals (LC) are substances that appear to be liquids but really have molecules structured in layers resembling crystals. These substances originate when matter undergoes a transformation and the molecules inside that state are rearranged. According to Aljamali (2021), the term "liquid crystal" refers to an intermediate state whose composition is limited to two different states: a regular, irregular liquid state, in which the particles of a substance move randomly, and a regular, crystalline solid state, in which the particles are constrained in motion and have a three-dimensional geometric system. Glycolipids are one of the common types of liquid crystals

Factor Influencing the Phase Behaviour of Glycolipid Lyotropic Liquid Crystals: The phase can be altered by many factors. Water content and amphiphilic molecules were shown to be internal factors that influence the phase behaviour of glycolipids' lyotropic liquid crystal, whereas temperature, pressure, and light were found to be exterior factors. These contributing elements have been the subject of much investigation in an effort to precisely construct the desired phase. Controlling the preparation conditions and attaining a stable liquid crystal phase are made possible by having a thorough grasp of the variables that impact lyotropic liquid crystal structure (Huang, 2018).

Technique to Characterise Phase Behaviour: Techniques such as DSC, OPM and SAXS were used to characterise the liquid crystal phase. OPM is a useful method for identifying the glycosides' liquid crystalline phase, while SAXS serves as a quantitative approach to assess the structural component of the mesophase shown in the OPM. DSC technique measures heat flow differences between the substance and references as the function of temperature while the sample is subjected to a controlled temperature program. According to Collings & Hird (1997), an optical polarising microscope's job is to identify the mesomorphic compound by analysing its texture. It is also an easy approach to determine the liquid crystalline compound's transition temperature. The X-ray scattering technique is usually considered the definitive technique for the determination of phase structures, where different liquid crystal phases give different X-ray scattering patterns (Ahmad, 2012).

Conclusion: In a nutshell, glycolipids, also known as carbohydrate liquid crystals, are amphiphiles whose fundamental unit consists of a sugar group connected to an alkyl chain (Hashim, 2018). The lamellar, bicontinuous cubic, hexagonal, and micellar cubic phases of lyotropic liquid crystals are the ones that have been the subject of the most research.

Keywords: Lyotropic, glycolipids, liquid crystals, phase behaviour

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