

## **A Preliminary Study on the Use of Carbohydrate Liquid Crystals as Emulsifiers in Cosmetic Chemistry**

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Carbohydrate liquid crystals are a special type of liquid crystals. It has been shown that the carbohydrate liquid crystal used in the present study has surfactant properties. The carbohydrate liquid crystal, 3-pentadecylphenyl-2,3,4,6-tetra-O-acetyl-1-O- $\beta$ -D-glucopyranoside is an amphiphilic molecule, has a polar head group and a non polar long hydrocarbon tail group. As the overall molecule is non-ionic, its structure is compatible to function as an emulsifier. The objective of the present study is to evaluate the ability to use the liquid crystal as an emulsifier in cosmetic products.

Emulsifier, Tween 80, and olive oil were mixed and stirred at 1500 rpm speed for 40 minutes at 70<sup>o</sup>C. Deionized water was then added and restirred at the same speed at the same temperature for the same period of time. Emulsions were kept at room temperature and morphologies were observed soon after, two hours after, one day after, and ten days after preparation. A ternary phase diagram was constructed. Emulsions were prepared with the liquid crystal, 3-pentadecylphenyl-2,3,4,6-tetra-O-acetyl-1-O- $\beta$ -D-glucopyranoside dissolved in distilled ethanol as the emulsifier by varying the ratio of deionized water : olive oil : emulsifier within the microemulsion region of the ternary phase diagram. The ability to formulate emulsions by the liquid crystal and their stabilities were determined using the Storage Test, Polarized Light Microscope and Differential Scanning Calorimetry. The emulsion made using the liquid crystal as the emulsifier had an appearance similar to a microemulsion. The commercial surfactant, Tween 80, a non ionic surfactant, was used as the model emulsifier in order to determine the microemulsion region by constructing a ternary phase diagram. The liquid crystal used has the ability to function as an emulsifier, although it alone cannot form stable emulsions.