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Detection boundary of single phase area of phase diagram of Vitamin A palmitat using of conductometery method and polarized microscopy

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Background and Aims: In this work we plotted ternary phase diagram of Vitamin A Palmitat and then conductometery and polarized microscopy methods were employed for detection boundary of single phase area. Our system consisting of Sunflower oil , Tween 80 surfactant , vitamin A Palmitate, Sucrose as a co-surfactants and water.
Methods: A titration technique was employed for the preparation of the samples Deionized water was added in different volume to the mixture of sunflower oil, surfactant, co surfactant and model drug at room temperature. After preparation of the samples, phases were identified using visual inspection, conductometery and polarized microscopy.
Results: In single phase area with increase in water content, we were identified four regions consisting of; lamellar liquid crystal phase (D), L2 microemulsion solution phase, bicontinuous solution-phase and L1 microemulsion solution phase respectively. The lamellar liquid crystal phase shows mosaic pattern under polarizing microscope and black background under polarized light is key distinctive property of microemulsion solution phases. In conductometry case when starting with a w/o microemulsion, conductivity is extremely low. As the volume of water increases, conductivity increases as well. Bicontinuous systems possess significantly higher conductivity. After bicontinuous system, conductivity is shown to decrease slightly, which is consistent with the formation of an o/w microemulsion.
Conclusions: These findings show that in addition to visual observation conductometry and polarized microscopy also can be used to determine the exact boundaries between the phases. These areas can be varied in pharmaceutical applications (capsules or ointment or solution) was used. The solution phases of surfactant systems can be used in oral delivery of oil-soluble drugs.

Keywords: Ternary phase diagram; Vitamin A palmitat; Polarized microscopy; Conductometery