Theory and Application of the Surfactant-Emulsifying Essential Oil

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ABSTRACT

This thesis concerns the emulsification of oily orange oil in water. The content includes the uses of different nonionic surfactants — Tween and Span series as emulsifier. The emulsion of resulting oil/water was analyzed by microscope and particle analyzer to observe the stability and the change of particle size. Furthermore, the emulsion has been prepared in an autoclave Mac N2 pressure. Finally, the relationship between the concentration in water and surface tension has been studied by using Tween 20, Tween 60, Span 20, Span 60 and mixed surfactants. The important features were: (1) Mixing Tween/Span surfactant: using Tween 20, Tween 60, Tween 85 and Span 20, Span 60, etc. (nonionic surfactant) to make different mixed surfactants with various HLB values for to emusifying orange oil, was also studied it was found that Tween 20/Span 60 in the best. (2) The optimal conditions: the mixture of Tween 20 and Span 60 at a combined HLB value of 13.1, the dosage of 5%, stirring speed of 300 rpm, temperature of 55 ± 3 °C, water/oil=1:1(weight ratio), reaction time of 24hr, is the optimal result. The addition of ethanol cosurfactant enhanced the emulsion stability, resulting a particle distribution of 1.5~2.5(m in diameter. (3) Stability of emulsion: With ethanol as cosurfactant at different ! ratio, it was observed at room temperature and at 40 °C, that high stability is obtained when ethanol: surfactant=1:1(molar ratio). Also, the stability at room temp. was higher then that at 40 °C. The emulsion was genially stable for over 3 month, without significant change in particle size. (4) The emulsifying rate under high pressure in autoclave. A stable emulsion can be achieved within 180 minutes under the condition of 110 °C, 250psi, 400rpm. By particle analysis, the particle size was 1.1(m in diameter. The reaction time is dramatically shortened in comparing to that using normal pressure(55 °C, 14.7psi, 24hr). (5) The surface phenomenum: Using Tween 20, Tween 60, Span 20, and Span 60 to mixed surfactant in different combinations, the relationship of the concentration and the surface tension was made. The surface tension decreased when the concentration of nonionic surfactant (Tween/Span) increased. The critical micelle concentration (CMC) is about 0.01~1 w%.

Keywords : 界面活性劑 ; 乳液安定性 ; 乳化 ; 柑橘精油 ; 共界面活性劑 ; 非離子型界面活性劑

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