OSTWALD RIPENING IN EMULSION SYSTEMS. THE EFFECT OF AN ADDED THIRD COMPONENT

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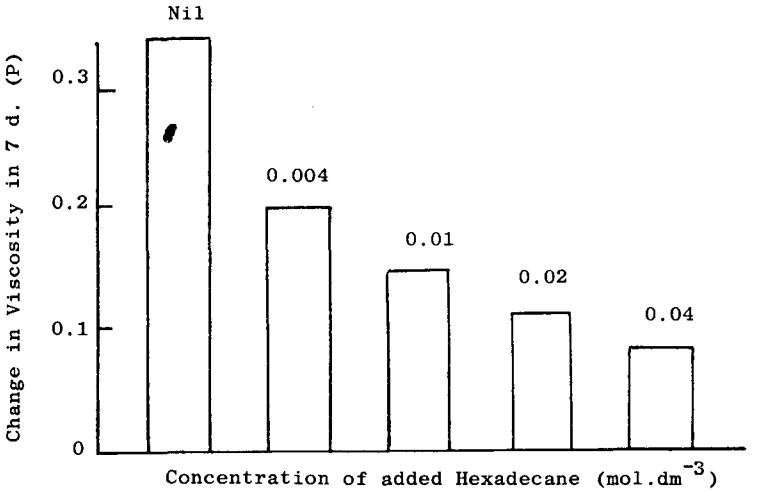
Emulsions are thermodynamically unstable systems that manifest instability in a variety of ways, such as creaming and coalescence. Emulsions of small particle size, made from oils that have a finite solubility in water, can degrade by another route termed molecular diffusion or Ostwald Ripening. The phenomenon of Ostwald Ripening in suspensions is well recognised but its occurrence in emulsion systems is less well researched.

We have reported previously that hexane emulsions stabilised by sodium dodecyl sulphate (SDDS) degrade by Ostwald Ripening rather than by coalescence (Davis & Smith, 1976, Buscall et al. 1979). Interestingly, the presence of a third component in the system can retard the process of ripening. The mechanism for this effect is not well understood although osmotic and interfacial complexation have been proposed. We have now studied the effect of a variety of components on the stability of hexane in water emulsions stabilised by SDDS. The stability of these systems has been assessed by particle size analysis photomicrography, Coulter Counter) and rheometry. The stabilising effect of added hexadecane at a variety of concentrations is impressive. A variety of perfluorochemical oils were also found to have a stabilising effect at 0.05 and 0.1 mol.dm.$^{-3}$. (Pf. methylcyclohexane, pf. tributylamine, pf. decalin). In contrast pf. hexane has a destablising effect. The process of Ostwald Ripening has been considered in relation to Lifshitz, Slezov, Wagner theory (Kahlweit, 1975) and the effect of minor components on the thermodynamics of the oil/water interface.

Fig. 1 Effect of added hexadecane on the stability of hexane emulsions (20%) stabilised by SDDS (10^{-2} mol.dm^{-3})



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