

# CHARACTERISTICS OF MICROEMULSION SYSTEMS PARAFFIN OIL – WATER – NONIONIC SURFACTANTS

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Microemulsions are intensely studied because of their potential use in pharmaceuticals. The main purpose of this study was to characterize microemulsion systems of paraffin oil, water and nonionic surfactant or surfactant mixtures, and investigate two main parameters which affect stabilization of microemulsions: the O/W interface tension and the viscosity of the microemulsions.

Paraffin oil was used as the oil phase, and Hexaglyn PR-15 (Nikko Chemicals Co. Ltd) and Tween 80 were used as surfactants. Hexaglyn PR-15 and Tween 80 were mixed at the weight ratios of 0,932:0,0678, 0,890:0,110, 0,847:0,152, 0,805:0,195 and 0,763:0,237 to obtain the surfactant mixtures. Paraffin oil, water and Hexaglyn PR-15 or surfactant mixture were mixed and heated at 60°C, while stirring mixture using a magnetic stirrer until turbidity was observed. Microemulsions were prepared by homogenizing these mixtures during 2 min at room temperature using a laboratory mixer with a shear rate of 1500 s<sup>-1</sup>. The stability of microemulsions was studied via phase separation observation. The microemulsion with concentration of Hexaglyn PR-15 2 wt % and fraction of paraffin 18 wt % was stable at the room temperature and 60°C. Phase separation was observed for all microemulsions with surfactant mixtures. The influence of the different concentrations of Tween 80 on the viscosity of microemulsions was evaluated. The incorporation of Tween 80 into microemulsion resulted in the significant decrease of viscosity in comparison with microemulsion prepared with Hexaglyn PR-15. The effect of increasing Tween 80 concentration in the mixture is illustrated in Figure 1. The increase of Tween 80 led to a decrease of the viscosity of microemulsion. To characterize the interfacial properties of the surfactant and surfactant mixtures, we determined the interfacial tension between water and oil solutions of Hexaglyn PR-15 or surfactant mixtures at different concentrations of surfactants. We observed that Hexaglyn PR-15 has high surface activity at paraffin/water interface and increasing of the concentration of Tween 80 in the surfactant mixture has led to decreasing of the interface tension.

**Figure 1.** Viscosity (mPa\*s) of microemulsion systems with surfactant mixtures (Hexaglyn PR-15/ Tween 80) as a function of shear stress (Pa).

