ABSTRACT

Non-transparent nanoemulsions are determined by particle size of discontinuous phases in range of 200 – 300nm. Contrary to microemulsions that are transparent and thermodynamically stable, nanoemulsions are affected by number of common destabilizing processes as macroemulsions including Ostwald ripening. Adding of thickening agents to the nanoemulsions shall affect stability of the system. Generally, as the viscosity of continuous phase increases, so does the physical stability of the emulsion system.

However, the system may be destabilized if the viscosity of nanoemulsions is increased due to the effect of addition of polymer thickening agent and if certain concentration of polymer thickening agent is exceeded. This phenomenon is utilized in the thesis in order to select appropriate oil phase of nanoemulsions.

Two cellulose derivatives hydroxypropylmethylcellulose (HPMC) and hydroxyethylcellulose (HEC) were selected as thickening agents which were added to nanoemulsions at the different concentrations assessed as follows: 0.083; 0.167; 0.333 and 0.667 ‰. Samples were then examined using the DLS (Dynamic Light Scattering) method in order to measure size of dispersed particles of oil phase and by the capillary viscosimetry.

In order to test stability of the samples the thermal stress test was used (temperature rise from 8 °C to 40 °C in 5 cycles).The particle size was measured repeatedly during the thermal stress test. For samples with lower concentration of the thickening agent (up to 0.33 ‰), the particle size range was 180 nm ± 50 nm.

Higher concentration of the thickening agent (0.667 ‰) subsequent to higher polydispersity of the system (the particle size range increased to 75 nm – 280 nm) and the system became unstable yet during the measurement.

There was no appreciable influence of the thermal stress test on the viscosity of nano-emulsion system.

The samples of the nanoemulsion No. 25 and No. 27 were evaluated to be the most stable ones, from both perspectives, a macroscopic and change in particle size point of view. Therefore, the oil phase of the nanoemulsion samples No. 25 and No. 27 is suggested as the most prospective for practical use.

Keywords: nanoemulsion, thickening agent, DLS, stability of emulsion, stability tests