MICROEMULSIONS IN THE SYSTEMS WITH LECITHIN AND OILS FROM TROPICAL PLANTS FOR DRUG DELIVERY

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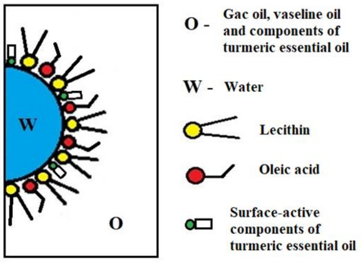

Microemulsions are thermodynamically stable isotropic dispersions of oil and water containing nanometer-sized droplets stabilized by surfactant(s). Nanostructures of lecithin, which is well known surfactant of natural origin, the main lipid component of cell membranes, can be used to develop drug carriers. Microemulsions of lecithin with various cosurfactants have been considered as drug carriers. They have such advantages as biocompatibility, the ability to solubilize biologically active substances while maintaining their activity, and the ability to accelerate transport through the skin.

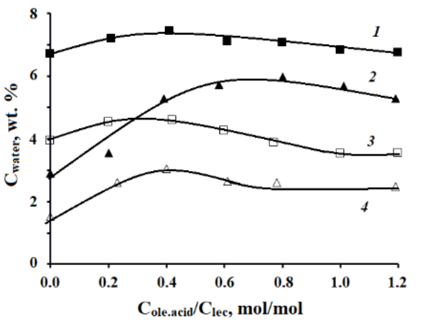

Figure 1. Dependence of the maximum water content in microemulsions on the ratio of molar concentrations of oleic acid and lecithin. Microemulsions contain: 1.3 - gac oil, 2.4 - avocado oil. The concentrations of lecithin in the organic phase of microemulsions, wt.%: 1,2 - 20; 3,4 - 10. T=25 °C.

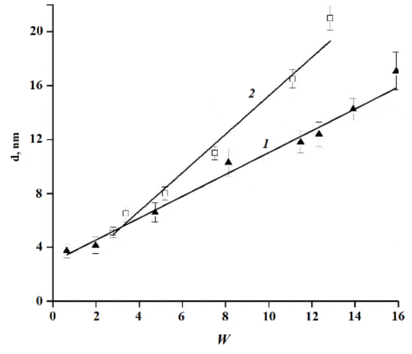

Figure 2. The dependence of the hydrodynamic diameter of microemulsion droplets on W, T=25 ºC. The concentrations of lecithin in the organic phase of microemulsions, wt.%: 1 - 20; 2 - 10. A ratio of vaseline oil and gac oil 1:1 by weight, a molar ratio of oleic acid and lecithin 0.6, and ratio of essential oil and lecithin 0.225

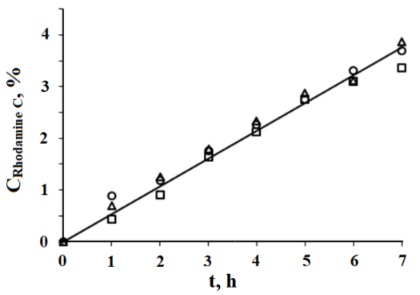

Figure 3. Release of Rhodamine C dye from microemulsion into saline solution (results of three parallel experiments). The composition of the microemulsion sample, wt %: lecithin, 19.5; oleic acid, 4.4; vaseline oil - 34.6; gac oil - 34.6; turmeric oil - 4.4; water - 2.5. T=37 °C

Table 1. Microemulsion resistance to heating and freezing. Sample composition, wt %: lec-ithin, 19.5; oleic acid, 4.4; vaseline oil - 34.6; gac oil - 34.6; turmeric oil - 4.4; water - 2.5.

T, °C	25	60	After heating and cooling	After freezing and thawing
d, nm	6.4±0.9	5.4±0.6	6.7±0.9	6.2±0.8

Using IR-Fourier spectroscopy, it was shown that for the microemulsion with the molar ratio of water and lecithin W=14, the fraction of bulk (free) water in the droplets was 36.5 mol %, the fraction of hydration water (bound to polar groups of surfactants) was 55.0 mol %, the fraction of water trapped between hydrocarbon chains – 8.5 mol.%. Thus, in the system under study, both bound (hydrated) and free (bulk) water are present in the droplets, which indicates its microemulsion nature and distinguishes it from reverse micelles.

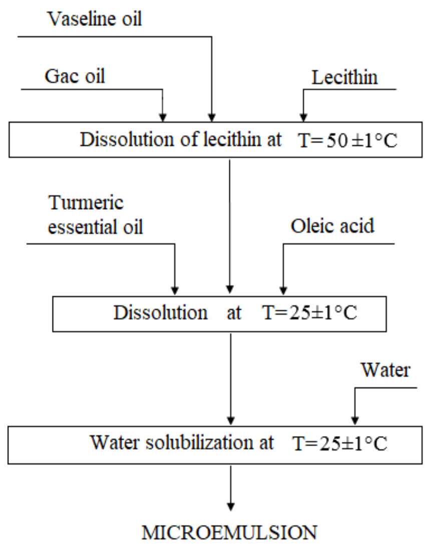

Figure 4. Technological scheme of the microemulsion obtaining

Conclusions: It has been shown that in order to obtain inverse microemulsions in the systems lecithin - oleic acid - vaseline oil - vegetable oil - essential oil - water, oil from the tropical gac plant (Momordica cochinchinensis) and turmeric (Curcuma longa) essential oil can be used. Microemulsions containing biocompatible components, such as lecithin and oleic acid, as well as biologically active substances from gac oil and turmeric essential oil, can be used in medicine and cosmetics to develop drugs with anti-inflammatory and antioxidant effects, with a slow release of drugs.