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Nanoemulsions: Properties and potential applications as drug delivery systems

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Nanocapsules with lipid core are perspective for biomedical applications for delivery of lipophilic drugs. In recent years, considerable interest has been focused on nanoemulsions. Nanoemulsions represent a special type of liquid disperses systems, their droplet sizes are less than 100 nm. Nanoemulsions with a droplet size of about 100 nm are semitransparent and exhibit slight opalescence; dispersions with smaller droplets are transparent. Different methods can be used for nanoemulsion preparation: high-energy and low-energy techniques combined ones. Nanoemulsions are kinetically stable systems, so successful usage of these nanocarriers depends on their colloidal stability. The main problem restricting widespread applications of nanoemulsions is their low stability to Ostwald ripening that leads to nanoemulsion coarsening with time. A solid shell formed by adsorbed molecules on the surface of liquid oil droplets can significantly improve nanoemulsion stability. Ostwald ripening is almost stopped in these systems, as indicates by the droplet diameters that remain unchanged after several months of storage. As drug delivery systems, nanoemulsion may provide prolonged action of the medicaments. Susceptible and unstable drugs can be protected in the lipid core of nanoemulsions. Properties of nanoemulsions, main advantages and drawbacks as drug delivery systems are discussed and compared with other emulsion based carriers: Colloidosomes, solid lipid particles, etc.