Abstract

Drug delivery as modern way of therapeutic application is important goal of contemporary pharmaceutical research. The very specific tailor-made drug carriers and special working methods are used. Parametrs which potentially influence nanoparticle size distribution and their zeta potential were studied. Nanoparticles were prepared by emulsion solvent distribution-evaporation method from commercially available, biocompatible and biodegradable polymer PDLLA (poly (DL-lactic acid)) and other polyesters branched on mannitol or pentaerythritol and polyurethanes synthesized at workplace. Polymers were dissolved in different organic solvents (dichlormethane, chloroform or mixture of both in mass ratio 1:1). Poloxamers and polyvinylalcohol with different molecular weight and different degree of hydrolysis, polysorbate 20, and lecithin from soya bean or from eggs as emulsifying agent were used. Nanoemulsion was prepared by homogenizer with stator and rotor. Particle size and zeta potential was measured by Zetasizer. This study demonstrates that monodisperse nanoparticles can be prepared by emulsion solvent distribution-evaporation method in various composition of organic and also aqueous phase. Dispersion process is modified by organic solvent and emulsifier used. Zeta potential was influenced by composition of aqueous phase and depends on charge of adsorbed surfactant. As the most suitable combination of tensides was evaluated combination of 0,5% soya lecithin and 0,5% poloxamer 6800 or polysorbate 20. The most convenient solvent is dichlormethane. From partial results was the most interesting comparison of soya and egg lecithin. Both of lecithins has same distribution of size. They differs in zeta potential. Eggs lecithin nanoparticles have zeta potential up to -22 mV. Soya lecithin nanoparticles have zeta potential over border of stability -35 mV. For polyvinylalcohol as a tenside is valid the lower molecular weight the smaller particles arise. This technique is suitable for preparation of empty nanoparticles or for nanoparticles with incorporated liposoluble drugs (in this thesis for example antimycotic terbinafin). Boundary concentration for the terbinafin is 30%.

Second subject of interest was silver nanoparticles – their preparation and concentration. After preparation is silver dispersion too diluted and for microbiological testing doesn´t have adequate concentration. We tried to concentrate it by superabsorption PAPA polymers poly(acryl-co-vinylalcohole).

Next step was stabilization of aqueous dispersion. Samples were spray dried together with carrier – mannitol and other stabilizers. Size and zeta potential changed after spray drying and redispergation. Changes were more pronounced at silver nanoparticles then at

polymeric particles. Lower temperature protect particles against aggregation. On the contrary higher temperature accelerated thermic movement of particles and accelerated their aggregation. Size distribution and zeta potential of microparticles were studied. After examination were samples dispersed to the solution and stability was evaluated.

We studied surface tension and parametrs which influence size and zeta potential of rising particles. Stability of particles was influenced by stabilizers. Bovine serum albumine was the most convinient stabilizer. The size and zeta potential stayed same as before drying.

We found out the higher surface tension the smaller nanoparticles rise. We confirmed as the most optimal combination of tensides is combination of 0,5% soya lecitin and 0,5% poloxamer 6800.