

# 1 ABSTRACT

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Title of thesis: Study of the surfactants effect on polymer nanoparticle parameters

The main aim of this Diploma thesis was to examine whether the use of various stabilizers has any effect on the resultant size of prepared nanoparticles and to find out which type of stabilizer is the most appropriate in terms of preparation of the nanoparticles of the necessary size, adequate polydispersity and steadiness. The preparation of nanoparticles was based on the use of sodium cholate as a surfactant and polymer PLGA (poly (lactid-co-glycolic acid)) consisting of monomers of lactic and glycolic acids. Nanoparticles were prepared by means of nanoprecipitation method. Sodium cholate solution has always been prepared in water in different concentration: 0.005%, 0.01%, 0.02%, 0.05%, 0.1%, 0.2%, 0.3%, 0.4%, 0.5%, 1%, 2%, and 5%. The following have been used as stabilizers: poloxamer 407, polyvinyl alcohol, cetrimonium-bromide (CTAB), and polysorbate 20, all of them in concentration of 0.1% and sorbitan-monostearate in concentration of 0.01%.

Measurement of the size of created nanoparticles was performed using the device Zetasizer at the temperature of 25°C. At the same time polydispersity and zeta potential have been measured. Sodium cholate was able to influence the resultant size of nanoparticles even in the presence of stabilizers. The lowest values have always been measured at the concentration of 1% - 2%. Ascending from this point towards the higher concentrations, the size of particles began to increase. The particles stabilized by CTAB represented great values of size and polydispersity. The highest value (723.67 nm) was measured at the concentration of cholate 0.3% when polydispersity represented 0.34. Poloxamer 407 – Pluronic F-127 seems to be a really convenient stabilizer, using which the particles reached relatively regular dependence of size on the concentration of cholate and at the same time they reached the polydispersity with an average value of 0.11. The presence of this stabilizer caused a slight decrease in the absolute value of the zeta potential as opposed to the cholate itself. The lowest average value of polydispersity reached the particles stabilized by polyvinyl alcohol – 0.09. The values of zeta potential were close to neutral values, which does not have to imply unstable dispersion of particles though. Little bit bigger particles originated using polysorbate 20, however, the polydispersity reached the average value of 0.18 here.

**Key words:** nanoparticles, nanoprecipitation, polyesters, in vitro, surfactants