The insight into characteristics of polyNIPAM-co-PEG nanodispersion by conductometric measurements in the course of extraction-purification

W. Musiał\textsuperscript{1,2}, J. Pluta\textsuperscript{2}, J. Kobryn\textsuperscript{2}, M. Duškova\textsuperscript{1}, M. Šlouť\textsuperscript{1}, P. Štěpánek\textsuperscript{1}, M. Přádný\textsuperscript{1}, J. Michálek\textsuperscript{1}

\textsuperscript{1} Institute of Macromolecular Chemistry of the Academy of Sciences of Czech Republic, Heyrovského nám. 2, 162 06 Praha 6 – Břevnov, Czech Republic
\textsuperscript{2} Department of Pharmaceutical Technology, Wrocław Medical University, Szewska 38, 50-139 Wrocław, Poland
*e-mail: witold@ktpl.am.wroc.pl

Various extraction times are given by numerous authors for the acceptable purity of newly synthesized nano-structured polymers in the course of surfactant free dispersion polymerisation in aqueous environment. The conductivity in the donor and acceptor compartment changes with time, and depends both on the extraction conditions, as well as on the characteristics of obtained nanostructure. The temperature of synthesis in the case of N-isopropylacrylamide derivatives exhibits influence on the concentration of residual monomer and initiator in the post-reactant mixture, revealed i.a. by conductometric measurements, like in the case of incorporated bioactives [1]. In this study the conductivity in acceptor compartment was evaluated and compared in series of freshly synthesized polyNIPAM-co-polyoxyethylenglycoldimethacrylate (PEG) nanodispersions, in the course of purification.

![Graph](https://via.placeholder.com/500)

The rate of conductivity increase in the acceptor compartment during purification of nano-dispersions (left, A and B represent 1\textsuperscript{st} and 2\textsuperscript{nd} stage of extraction respectively, numbers denote the batches), and sizes of nanoparticles evaluated in DLS measurements at 25 °C expressed in nm (right).

The rates of conductivity increase in first phase of purification were considerably higher than in the second step. High conductivity was observed in the case of smaller particles, what indicates that the overdosing of initiator promotes synthesis of particles with lower diameter, independently of applied temperature in the course of synthesis. However in the case of temperatures below known VPTT for N-isopropylacrylamide derivatives the diameters were significantly higher. The final value of conductivity, obtained through the purification, stabilized ca. after one month of intensive extraction by daily changes of de-ionized water.

The study was supported by research fellowship within “Development program of Wrocław Medical University” funded from European Social Fund, Human Capital, National Cohesion Strategy, contract no. UDA-POKL.04.01.01-00-01008-00.