

# PC 06

## THE INFLUENCE OF THE REACTION PROGRESS ON COPOLYMER COMPOSITION IN INVERSE MINIEMULSION

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In the last years new applications were developed for water-soluble, high molecular weight polymers, which led to a renewed interest in inverse emulsion polymerization. The inverse miniemulsion, using cyclohexane as the continuous phase and water as the dispersed phase, is one way to synthesize those polymers. [1, 2] Miniemulsions, prepared by ultrasonication, combine the bulk-wise reaction in nanosized droplets and the advantages of emulsion polymerization.

We copolymerized the acceptor monomer 2-acrylamido-2-methylpropanesulfonic acid (AMPS) and the donor-monomers 1-vinylimidazole (1-VIm), 4-vinylpyridine (4-VP) and (2-dimethylaminoethyl) methacrylate (DAMA) under different conditions, varying the monomer feed composition and the pH-value in the dispersed phase. The latter leads to different compositions of the copolymers at identical monomer feed. Thus a distribution of the monomers into both phases of the miniemulsion can be assumed, caused by the deprotonation of the monomer. This enhances a monomer transfer between the monomer droplets which should not occur in an ideal miniemulsified system. To analyze this assumption and its influence on the copolymer composition, the distribution of the monomers at the beginning of the reaction was modified. Monomers were dissolved and sonicated separately or the basic monomer component was added to the cyclohexane phase. The results were compared to the conventional system.

Not only is the absolute copolymer composition affected but also the distribution of the monomers in the polymer chain. An easy way to get an insight into the distribution of functional groups is the potentiometric and conductometric titration of the polymer solution.[3] The slope of the effective  $pK_a$  value of the polymer during the titration differs when acidic or basic groups are well distributed or cumulated in the polymer due to the polyelectrolyte effect.

[1] S. Wiechers, G. Schmidt-Naake *Macromol. React. Eng.* **2008**, in press

[2] K. Landfester, M. Willert, M. Antonietti *Macromolecules* **2000**, *33*, 2370-2376

[3] T. Hoare, R. Pelton *Langmuir* **2006**, *22*, 7342-7350