

# IMMOBILIZATION OF BIOACTIVE COMPOUNDS IN AMPHOTERIC STARCH DERIVATIVES

Migle Babelyte\*, Ramune Rutkaite

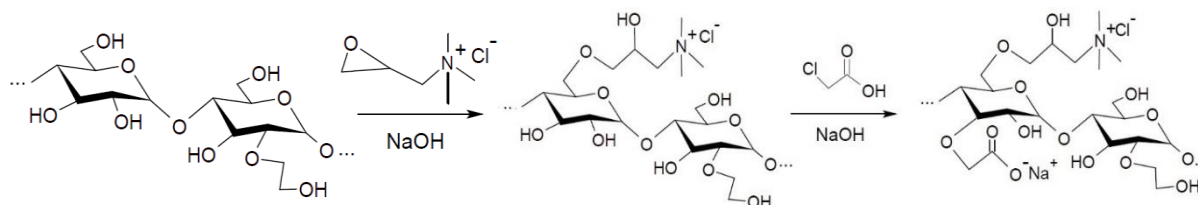
*Department of Polymer Chemistry and Technology, Kaunas University of Technology, Kaunas, Lithuania*  
*\*migle.babelyte@ktu.edu*

Amphoteric starch contains both cationic and anionic groups in the same molecule. Cationic starch derivatives are starch ethers prepared by using tertiary amino or quaternary ammonium groups containing reagents. Meanwhile, anionic starches can be synthesized by introducing phosphate, phosphonate, sulfate, sulfonate or carboxyl groups into starch molecules. The introduction of positively and negatively charged groups into starch may be realized by using several approaches: firstly anionization and thereafter cationization or firstly cationization and after that anionization.

Bioactive compounds such as caffeic acid and natural green coffee bean extract possess good antimicrobial and antioxidant properties. However, these compounds are unstable and quickly lose their beneficial properties. The biological activity of phenolic compounds could be preserved by the immobilization in amphoteric starch derivatives which have both positively and negatively charged groups and could form complexes with negatively and positively charged compounds.

The aim of the present work was to prepare amphoteric hydroxyethyl starches (CHES/AHES) of different composition and investigate their interaction with caffeic acid (CA) and natural green coffee bean extract (GCBE).

Preparation of CHES/AHES has been achieved by using two - step reaction approach as demonstrated in the synthesis scheme in Fig. 1.



**Fig. 1.** Two – step synthesis scheme for preparation of amphoteric starches

Firstly, cationic hydroxyethyl starches (CHES) were prepared by the reaction of hydroxyethyl starch with (2,3-epoxypropyl)trimethylammonium chloride in the presence of sodium hydroxide at 45°C for 24 h [1]. Synthesized CHES then were reacted with monochloroacetic acid in alkaline solution at 55 °C for 48 h. Consequently, by changing the molar ratios of cationic and anionic reagents four different CHES/AHES samples were obtained.

Water soluble amphoteric hydroxyethyl starch derivatives were used for polyelectrolyte complex formation in water between amphoteric hydroxyethyl starch derivatives and components of GCBE. Water insoluble amphoteric hydroxyethyl starch derivatives were used for interaction with CA acid via adsorption process.

## References

1. R. Rutkaitė, J. Bendoraitienė, R. Klimavičiūtė, E. Lekniūtė, I. Narmontaitė, V. Šinkūnaitė. Charged starch nanoparticles prepared by polyelectrolyte complex formation. *Chemija*, 2012, Vol. 23; No. 4; p. 328 – 335.