OAT-SPELTS XYLAN MOLECULAR MASSES ESTIMATION BY SIZE EXCLUSION CHROMATOGRAPHY

Andrei Sarbu, Fernando Gonçalves, Maria Norberta de Pinho

Chemical Engineering. Department, Instituto Superior Técnico de Lisboa

PA172

The characterisation of oat-spelts xylan, as all natural polysaccharides, is a difficult task due the variability of vegetal sources and extraction methods. This difficulty can be observed by the contradictory values present in literature.

This work addresses the systematic investigation of the parameters that may affect the molecular mass estimation by size exclusion chromatography (SEC). The xylan concentration, solvent characteristics and eluent ionic strength influence on the molecular mass was studied in order to set up the optimal determination conditions. The SEC experiments were performed in a Sephacryl S-400 column with glycine-NaOH-0.1 M buffer eluent. The oat-spelts xylan was dissolved in aqueous NaOH solutions.

The degradation reaction was performed by heating OSX solutions in aqueous NaOH 0.5 M, under air, with potassium persulfate as radical initiator. The reaction was systematically studied in terms of determinant parameters: initiator concentration, xylan concentration and reaction time.

The characterisation of OSX by SEC showed that both xylan concentration, ranging from 0.4 g/l to 2 g/l, and ionic strength, NaCl concentration between 0 and 1M , have no significant influence on the determined molecular mass. Otherwise, the NaOH concentration of the OSX solutions has a great effect on the molecular mass determined by this method. This is explained by possible change of oat-spelts xylan conformation in function of the solvent quality

The optimal SEC parameters were used to check the radical induced degradation of the oat-spelts xylan (OSX).

The study of the oxidative degradation showed that in the absence initiator and at 2 % potassium persulfate (mass percentage calculated to oat-spelts xylan) a slight decrease of the products molecular mass is observed. However, at 5% and 10 % of initiator the molecular masses are half of the initial oat-spelts xylan. Small xylan concentrations (1 and 2%), in the reaction medium, produce a reduction of the molecular mass, but at higher xylan conconcentraion there is an increase. The molecular mass of the products changes along the reaction time, decreasing and growing randomly. This behaviour shows that the degradation reaction was accompanied by depolymerization and recombination reactions.