

Reactive Extrusion of Starch-g-polyacrylonitrile in the Preparation of Absorbent Materials

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A new method for the graft polymerization of acrylonitrile onto starch is presented. Graft polymerization of acrylonitrile onto starch and the subsequent hydrolysis in sodium hydroxide solution to prepare absorbents is well known. This process has been utilized to produce the commercial product, Super Slurper. In a typical batch process, 5% starch in water mixture is gelatinized at 95°C under stirring for 1 hour then cooled to room temperature. The graft polymerization itself is carried out for approximately 2 hours at 25-30°C on the gelatinized starch by ceric ion initiation. In this study, graft polymerization of acrylonitrile onto starch via a reactive extrusion process which is a continuous, efficient process is described. Initial concentration of starch in water is 35% and the reaction temperatures are between 50-80°C. However, the most significant difference in the reactive extrusion process is the short time in which the graft polymerization takes place. Preliminary results on the properties of graft polymerization products obtained from the reactive extrusion process are compared to those obtained from the batch process as well as the absorbency of the hydrolyzed samples. Absorbent material has also been prepared by sequential grafting and saponification in the extruder followed by a 2 hour heat treatment of the extrudate in an air circulated oven at 100°C.