SYNTHESIS OF A NEW FAMILY OF POLYELECTROLYTES FROM IONIC METHACRYLATES

DHANJAY JHURRY, SHAHEEN MOTALA TIMOL AND ARCHANA BHAW-LUXIMON

Department of Chemistry, Faculty of Science, University of Mauritius, Réduit, Mauritius

ABSTRACT

The use of renewable resources, in particular carbohydrates and its derivatives in polymer chemistry, has known extensive interest in the past two decades and has been a major research theme of our group. The presence of carbohydrate units imparts specific properties to the polymers so that they may find diverse applications in various fields. Much effort has been devoted to the synthesis of vinyl polymers containing pendant saccharide moieties as summarized in an excellent review by Wulff *et al.*[1] The strategy adopted by various groups consisted of anchoring a sugar derivative to a polymerizable double bond through ester, ether, carbon-carbon, and amide linkages.

Recently, we reported on a facile and economical one-step method of derivatizing D-gluconolactone to yield a new family of ionic compounds, namely gluconamidoalkyl ammonium methacrylates[2] (Fig. 1). This synthesis proceeds in water as solvent at room temperature. The first step involves a reaction between methacrylic acid and a diamine to give an aminoalkyl ammonium methacrylate salt. Amidation of D-gluconolactone is then achieved *in situ* at ambient temperature with the remaining amino group, yielding the water-soluble gluconamidoalkyl ammonium methacrylate. Free-radical polymerization of these monomers lead to novel homopolymers exhibiting polyelectrolyte behaviour.

We outline in this paper the derivatization of gluconolactone via an ester linkage. Basically, the reaction scheme is similar to that described above except that the diamine is replaced by an aminoalcohol such as ethanolamine or 2-amino-2-methyl-1-propanol (Scheme 1). Under our experimental conditions, the reaction occurs selectively at the amino group yielding hydroxyalkyl ammonium methacrylates. The latter react quantitatively with gluconolactone with the formation of gluconyl-oxyalkyl ammonium methacrylate derivatives, which upon free-radical polymerization give rise to polyelectrolytes exhibiting much higher viscosities, as compared to the gluconamidoalkyl ammonium methacrylates. In a second part of this paper, the efficiency of the hydroxyalkyl ammonium methacrylates as initiators for the ring-opening polymerization of other lactones, such as ε-caprolactone, and lactides, will be discussed.

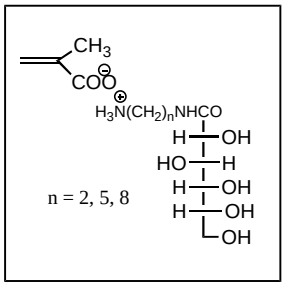
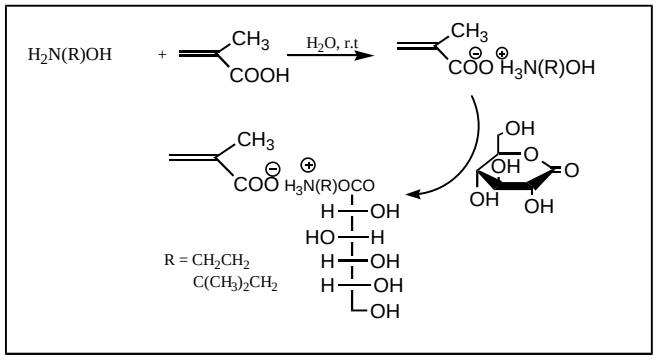


Fig 1: Gluconamidoalkyl ammonium methacrylates



Scheme 1: Synthesis of gluconyloxyalkyl ammonium methacrylates

1. Wulff, G.; Schmid, J.; Venhoff, T. *Macromol. Chem. Phys.* **197**, 259 (1996) and references therein
2. Narain, R.; Jhurry, D. *Polym. Int.* **51**, 1 (2002)