ABSTRACT

The use of crosslinked polymeric supports in the design of solid-phase organic reagents continues to be an active field of investigation ever since the introduction of the polymer-supported solid-phase method by Merrifield. A polymeric organic reagent can provide an effective alternative to its low molecular weight counterpart. The solid polymer support allows an easy isolation of the desired product after the reaction and the polymeric byproduct can be regenerated and recycled for further use without loss of reactivity. The important parameters that determine the physicochemical properties which render a polymer support favorable for organic synthesis are the chemical nature and topographical structure, microenvironment of the solid support such as the nature of the polymer backbone and the nature and extent of the crosslinking and separation of the functional group from the three-dimensional macromolecular matrix. The chemical nature of the monomers and mole percentage of crosslinking agent highly influence the topology of the polymer matrix and provide the desired mechanical integrity and polarity of the solid support. DVB-, EGDMA- and HDODA-crosslinked polystyrenes, polyvinyl pyrrolidones and polyacrylamides were synthesised and functionalised using a saturated solution of CrO₃. These polymeric reagents were characterised using FT-IR, ¹³C CP-MAS NMR, SEM and thermal analysis. Selective oxidation of alcohols to carbonyl compounds was easily accomplished by polymer-supported Cr(VI) reagents under anhydrous conditions. The influence of the macromolecular characteristics of the polymer support on the reactivity of the polymer-supported chromates was carried out using the oxidation of benzoin to benzil as the model reaction. Effect of different reaction parameters like nature of the solvent, molar concentration of the reagent, temperature and time on the rate of the reactions was investigated.

Keywords: polyvinyl pyrrolidone; polystyrene, polyacrylamide, polymer-supported chromate, polymer-supported oxidations; crosslink density; polymer support.