# Abstract

Polydiallyldimethylammonium chloride (polyDADMAC) is a water-soluble cationic polyelectrolyte used as a flocculant in water treatment works. Unreacted traces in water react with chlorine to produce a carcinogenic compound during the disinfectation process. This study reports on a preconcentration procedure and spectrophotometric determination of polyDADMAC at trace levels in treated water by in situ co-precipitation with naphthalene with a view to come up with an analytical tool that will be used by water works to routinely monitor the polycation in an effort to supply safe water to consumers. Preconcentration of polyDADMAC polyelectrolyte in water at trace levels was achieved by co-precipitating the polyelectrolyte with naphthalene. This resulted in the formation of a water insoluble adsorbent with a high affinity for azo dyes. The formation of this material was based on multilayer assembly of organic polyelectrolyte systems resulting to multilayers through a layer-by-layer self-assembly process. The co-precipitate was formed by mixing aqueous solutions containing varying concentrations of polyDADMAC with different volumes of solutions containing 0.75 g of naphthalene dissolved in acetone. The resulting respective precipitates were packed in different glass columns and a solution of the dye was eluted through each column. The contents of each column were then dissolved in 10 mL of dimethylformamide (DMF) and the absorbance readings of the resulting solutions recorded. The wavelength of maximum absorption was found to be 540 nm at pH 12.0. A linear calibration for polyDADMAC solutions was obtained with a correlation coefficient of 0.976. The detection limit was found to be $1.90 \times 10^{-4}$ μg mL$^{-1}$ and the method was applied to determine the concentration of polyDADMAC residue in treated water.