

# Removal of Fluoride Ions in Stored Drinking Water by Triethylamine Chemically Modified Polyethylene Containers

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This paper reports the removal of fluoride ions in stored drinking water by a container made from chemically modified polyethylene material. To anchor triethylamine within the structure of the polyethylene material and improve its value, the polyethylene was first heated to melting. To the molten material, hot vegetable oil was added slowly with continuous heating followed by a strongly basic hydrogen peroxide solution then activated with triethylamine to produce a water insoluble material. The resulting synthesized products were characterized using FTIR and <sup>13</sup>C NMR after each step. The triethylamine activated epoxy material was molded into a one liter container which was cured for three hours in an electric oven at 150 °C to form a hard mechanically strong container. It was then used for water storage and removal of dissolved fluoride ions. Its ability to remove fluoride ions was based on complexation reaction between the fluoride ions- quaternary ammonium compounds. A 40% removal efficiency was achieved from a solution containing 12.5 mg l<sup>-1</sup> of fluoride ions in less than 7 days of storage at the physiological pH of water. The existence of sulphate and nitrate ions had no observed significant effect on the fluoride removal process. This study revealed that the container has a potential application for the remediation of fluoride laden waters in the rural areas during the water storage process to make it safe for domestic consumption.

**Keywords:** Fluoride, polyethylene, remediation, regenerate, Quaternary ammonium compounds.