

INVESTIGATION ON THE SORPTION OF FLUORIDE IN WATER USING ACTIVATED ALUMINA R&D 651-X

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Abstract

Fluoride is “more toxic than lead and less toxic than arsenic” and is accumulative toxin. The batch adsorption studies were undertaken to assess the suitability of commercial available adsorbent Activated Alumina. From the earlier work it was evident that the large surface area, higher acidity and good mechanical properties are requisites for the choice of suitable adsorbent. The most promising adsorbent used for defluoridation purpose is activated alumina. Among the various types of activated alumina the type of activated Alumina chosen for present study is UCIL R&D 651-X. To test its performance for defluoridation, the static studies have aimed at investigation of the rate at which adsorption occurs under the varying condition of the major parameters of adsorption, viz .pH, doses of adsorbent ,rate of stirring, contact time and initial adsorbate concentration on fluoride removal efficiency were studied, and optimized by batch procedure. Mixture of known concentration of fluoride solution continuously agitated and samples were taken at appropriate times have been used in all experiments. The optimum sorbent dose was found 3.5g/l by varying the dose of adsorbent from 0 to 5gm; equilibrium was achieved in 100min for the optimum pH. It has been observed that the optimum pH range for adsorption between 6 to 7, by varying pH from 2 to 10 and enhanced adsorption was obtained at pH 6.5. Maximum fluoride removal is possible up to 96%, at optimum conditions. Freundlich as well as Langmuir isotherms were plotted and constants of isotherms were determined.

Keywords: Fluoride ion, adsorption, activated alumina, Freundlich isotherm, Langmuir isotherm