

Supporting Information

A comprehensive understanding of the kinetics and mechanism of fluoride removal over a potent nanocrystalline hydroxyapatite surface

Bishnupriya Nayak^a, Amruta Samant^a, Rajkishore Patel^b and Pramila K. Misra^{a*}

Figure S1- Lagergren pseudo-first order adsorption kinetics model F⁻ ion on HAp.

Figure S2- Plot of percentage desorption of the fluoride ion from HAp surface with variation of pH.

Figure S3- Plot of Percentage removal of the F⁻ ion versus number of useful cycle at temperature 25±2°C.

Supporting Information Figure S1 - Lagergren pseudo-first order adsorption kinetics model F⁻ ion on HAp.

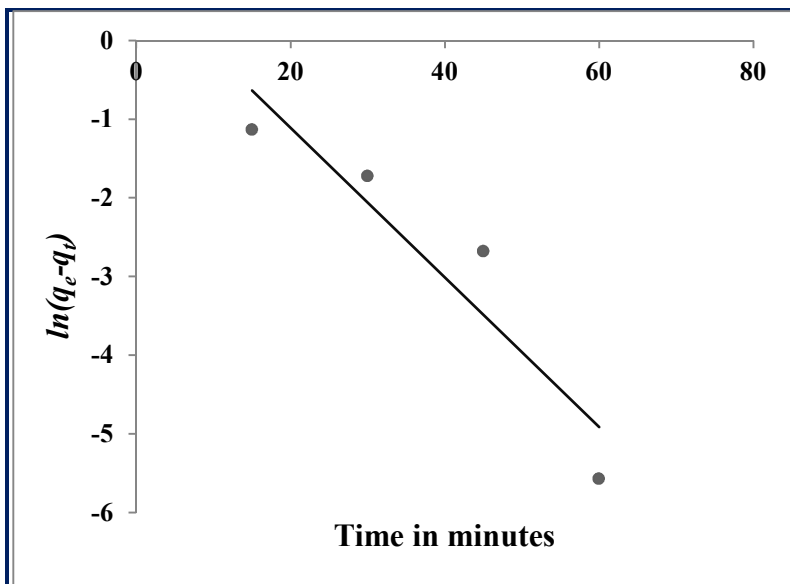


Figure S1: Lagergren pseudo-first order adsorption kinetics model F⁻ ion on HAp.

In this figure q_e and q_t (both in mg/g) are the amounts of fluoride adsorbed at equilibrium and at time ' t '. The value of the adsorption rate constant, k_1 (min^{-1}) was calculated from the plots of $\ln(q_e - q_t)$ vs. time. The very low value for correlation coefficient ($R^2=$) and $k_1(=)$ suggest that sorption kinetics does not follow Lagergren pseudo-first order kinetics.

Supporting Information Figure S2- Plot of percentage desorption of the fluoride ion from HAp surface with variation of pH.

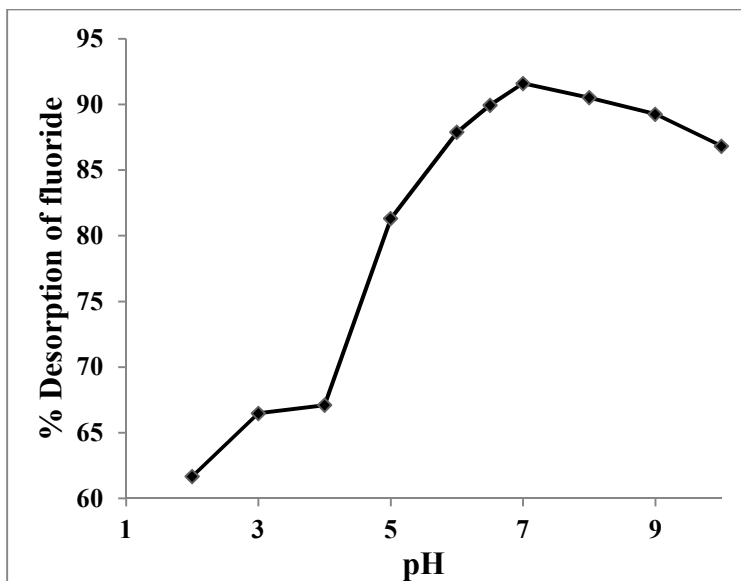


Figure S2: Plot of percentage of fluoride ion desorption from HAp surface with variation of pH.

The pH variation method (pH 2–10) was selected to desorb fluoride ions from the resulted fluoroapatite solutions. The 91.59% of regeneration could be achieved at pH 7.0 indicating the ease of regeneration in low alkalinity of the medium.

Supporting Information Figure S3- Plot of Percentage removal of the F⁻ ion versus number of useful cycle at temperature 25±2°C.

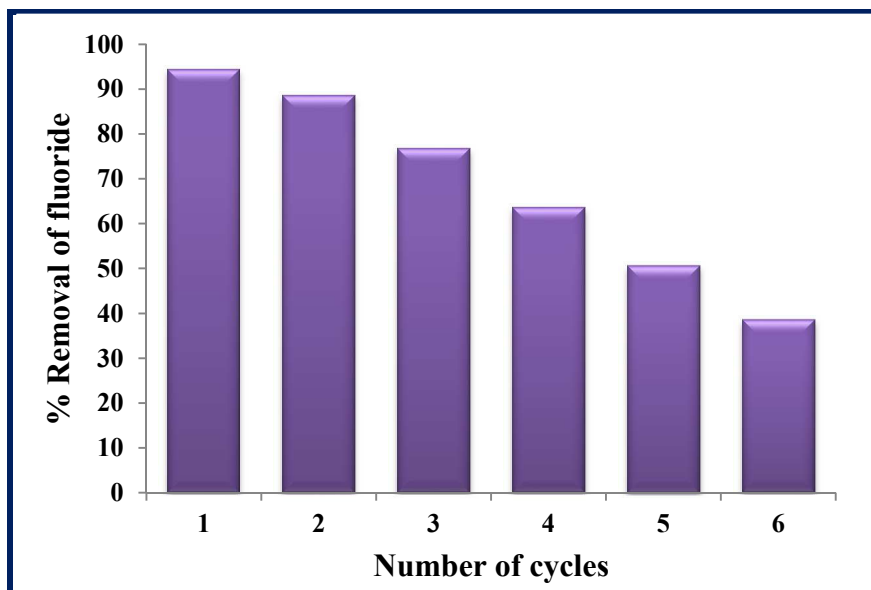


Figure S3: Plot of Percentage removal of the F⁻ ion versus number of useful cycle at temperature 25±2°C.

This study was carried out by taking a number of adsorption/desorption cycles (1–6 nos.) with adsorbent dose 3 g/L and pH 7.0 at temperature 25±2°C. Maximum 94.31% F⁻ removal took place in cycle 1 and the value decreased with increase in number of cycle. The study revealed that the regenerated adsorbent could be used for fluoride removal upto fourth number of cycle to a reasonable extent (fluoride removal= 63.63%).