

Supporting information

All glassware were soaked in acid for 24 hours and then washed with excessive tap water followed de-ionized water. Samples were run as triplicates and mean is reported as results in this research work. The data was computationally processed by using Origin Pro (version 8 SR0) software. To get neutral pH of processed water, 10 mg/L fluoride solution with 2 gL⁻¹ sorbent was used otherwise up to 1000 mgL⁻¹ fluoride solution was found stable and can be analyzed on same quantity of sorbent dose at room temperature where removal was found 161.17 mg/g (fig. 1).

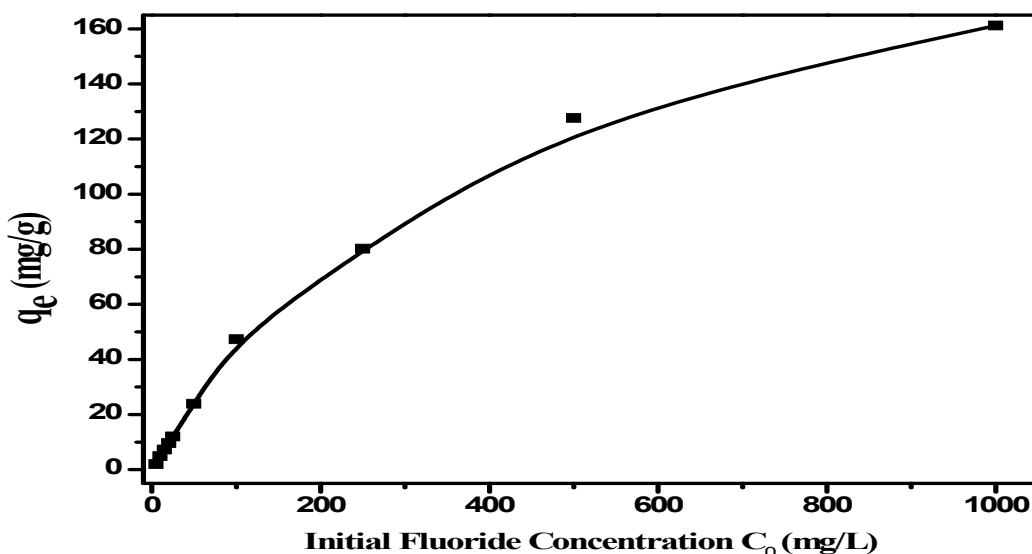


Fig 1, Determination of load by MALW at pH 7(±0.2), Room Temperature at various Fluoride concentration (mg/L) at fixed dose 2g/L

Contact time for 3 different fluoride ion concentrations

The contact time for equilibrium was found to be directly related with concentration of fluoride and adsorbent dose. It is low for diluted solutions while high for concentrated solutions, 40 minutes for 10, 60 minutes for 20.66 and 95 minutes for 45.45 mgL⁻¹ solutions were observed.

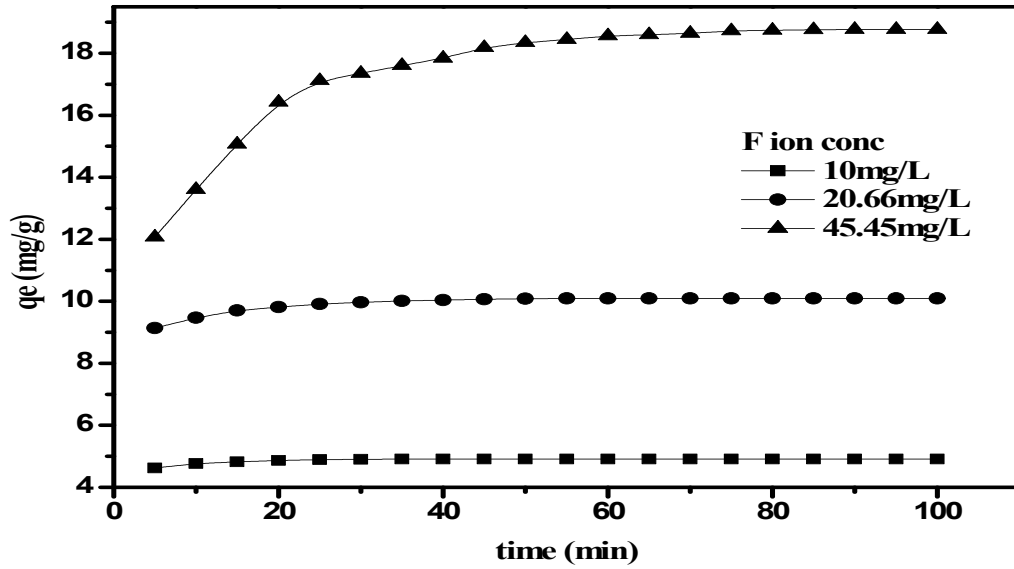


Fig. 2. Effect of concentration on equilibrium, 2g/L adsorbent dose, pH 7 (± 0.2) and room temperature.

To investigate the chemisorption on heterogeneous surfaces, Elovich model was also applied on our research studies. The graph of q_t against Int has $R^2=0.954$ and value of coefficient α is 93.234 indicating a rapid initial intake of fluoride ion.

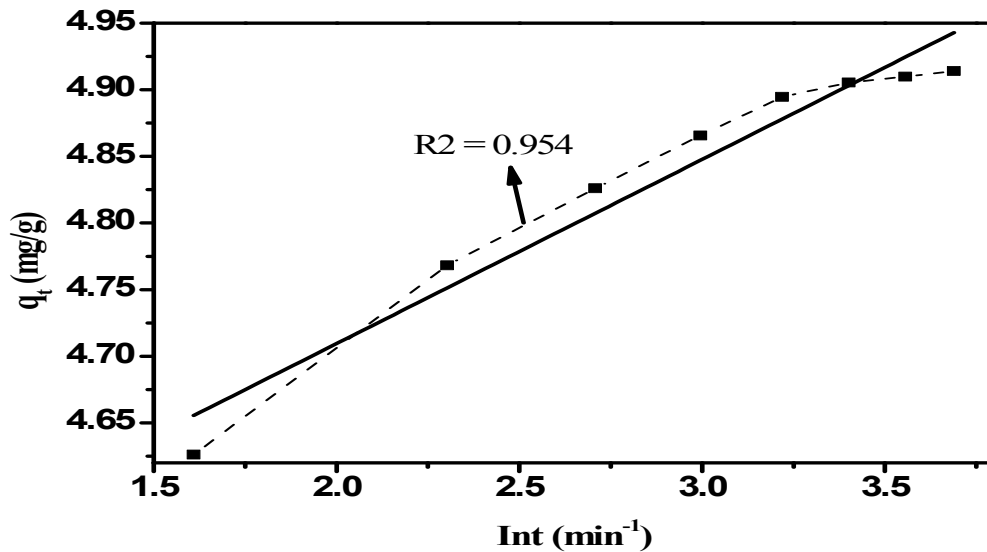


Fig 3. Elovich model

(a)

Element	Wt%	At%
OK	13.97	40.12
MgK	13.49	25.50
AlK	07.56	12.88
LaL	64.98	21.50
Matrix	Correction	ZAF

(b)

Element	Wt%	At%
OK	13.60	40.40
MgK	12.17	23.79
AlK	07.34	12.92
LaL	66.89	22.88
Matrix	Correction	ZAF

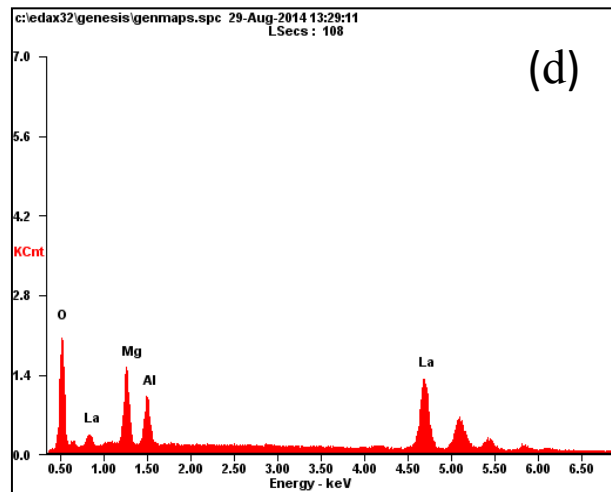
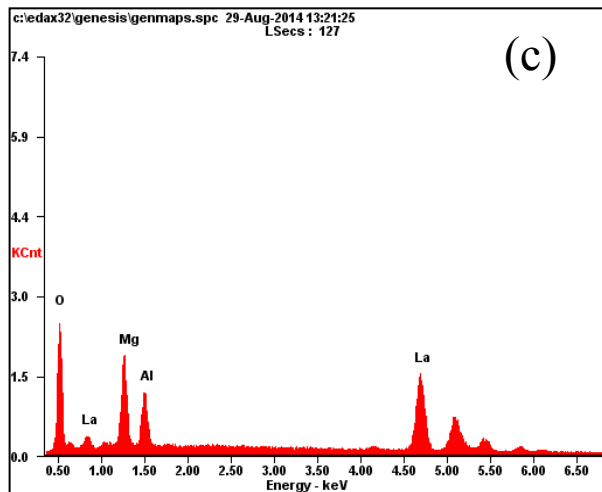


Fig 4. EDS spectra with elemental composition of virgin (a, c) and F⁻ ions sorbed (b, d).
(Conditions: 2g L⁻¹ sorbent dose, equilibrium time 40 min, room temperature, Fluoride conc. 10 mg L⁻¹ and pH 7.00 (±0.2)).