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**Investigation of lanthanum impregnated cellulose, derived from biomass, as an adsorbent  
for the removal of fluoride from drinking water**

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Highlights

- Develop an effective adsorbent for the removal of fluoride with a specific limit
- Cellulose (C) impregnated with Lanthanum(La) for fluoride removal from drinking water
- Adsorption plays physical and chemical adsorption mainly ion exchange mechanism in LaC
- Higher adsorption capacity of low cost LaC for effective defluoridation efficiency

**Abstract**

High concentrations of fluoride in drinking water can cause the disease fluorosis. Our scope goal is to develop an effective biopolymeric adsorbent for the removal of fluoride to below a specific safety limit set by the World Health Organization. In this study, the natural adsorbent material cellulose was impregnated with lanthanum chloride and effectiveness in adsorbing fluoride was confirmed by FT-IR, XRD, and SEM coupled with EDX techniques. The adsorption data were analyzed by Freundlich, Langmuir, and Redlich-Peterson isotherms. The adsorption on cellulose and Lanthanum impregnated Cellulose (LaC) obeyed the pseudo second order kinetic model and thermodynamic parameters were shows the adsorption process was spontaneous and feasible. The high adsorption capacity of LaC was developed from waste materials through an easy procedure, has potential for application to efficient defluoridation. In future, the potential LaC

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