Fluoride is one of the essential elements for human health. It is beneficial if present up to 1.5 mg/L, however, it has been shown that fluoride causes serious diseases as a consequence of consuming drinking water containing excessive quantities of this chemical. The World Health Organization has set the maximum permissible limit of 1.5 mg/L in potable water. Hence, there is a need to develop effective adsorbents to bring the fluoride level to this limit and a range of adsorbents have been reviewed for defluoridation such as nanoparticles of metallic oxides and their composite forms. In this study, hybrid graphene oxide-zirconium oxocluster polymer was prepared by free radical polymerization method using graphene oxide, the oxocluster [$Zr_6(OH)_4O_4(OMcr)_{12}$] and methyl methacrylate as comonomer. The synthesized hybrid polymer was characterized using TGA, DSC, UV-vis, FT-IR and XRD studies. The prepared adsorbents were tested for the effective defluoridation of water as a function of pH, contact time, and initial concentration of fluoride ions in batch mode. Maximum fluoride adsorption (90-105 mg/g) occurred in the pH of 3 and 7 at the minimum contact time of 3 h at room temperature. The sorption data were well explained by two commonly used isotherms viz., Freundlich and Langmuir isotherms. Based on R^2 and average percentage error (APE), the best isotherm model fits follow the order: Freundlich > Langmuir. The removal of fluoride was described by the pseudo-second-order reaction kinetics.