**Experimental and Statistical approach to Understand the Adsorption Properties of Hazardous Cr(VI) on Al2O3@TiFe2O4 Nanocomposite: An efficient Adsorbent for Water Treatment**

**Kinetic, isotherm and thermodynamic study**

Kinetic (Zeinab et al., 2019; Grégorio et al., 2008; Umesh et al., 2021) isotherm, and thermodynamic investigations are used to better understand the mechanism of adsorptions. All the equations for kinetic, isothermal, and thermodynamic studies are given in supplement file:

|  |  |  |
| --- | --- | --- |
| Pseudo- first-order equation: |  | (1) |
| Pseudo- second-order equation: |  | (2) |

Langmuir isotherm (Irving et al., 1918) equation is:

qe αL/KL =KLCe/(1+KLCe) (3)

The linear form of the equation:

Ce/qe = CeαL/KL +1/KL (4)

The Freundlich (Herbert et al., 1939) isotherm model is described by:

qe = KfCe1/n (5)

The linear form of the equation

ln qe = ln Kf + lnCe/nf (6)

The Temkin (Yin et al., 2020) model is plotted between qe and lnCe

qe = Bl ln KT + Bl ln Ce (7)

**Table S1:** Wt % elemental Composition of synthesized Al2O3@TiFe2O4

|  |  |  |
| --- | --- | --- |
| **Element** | **Wt%** | **Wt% Sigma** |
| O | 39.49 | 2.65 |
| Al | 2.16 | 0.09 |
| Ti | 34.69 | 0.46 |
| Fe | 23.67 | 0.36 |
| **Total:** | **100.00** |  |

**Fig. S1:** pHpzc of Al2O3@TiFe2O4