NOMENCLATURE

**Batch process**

\[ C_o \] Initial concentration of metal in aqueous solution, mg/L
\[ C_t \] Concentration of metal in aqueous solution after ‘t’ min, mg/L
\[ C_e \] Equilibrium adsorption concentration of metal, mg/L
\[ t \] Agitation time, min
\[ T \] Absolute temperature, K
\[ w \] Biosorbent dosage, g
\[ b \] Langmuir equilibrium constant
\[ n \] Freundlich constant for metal in the aqueous solution
\[ d_p \] Biosorbent size, μm
\[ V \] Volume of aqueous solution, mL
\[ w \] Amount of biosorbent taken per 1L of aqueous solution, g/L
\[ q_e \] Mass of solute adsorbed per mass of biosorbent at equilibrium, mg/g
\[ q_t \] Mass of solute adsorbed per mass of biosorbent at ‘t’ min, mg/g
\[ q_m \] Langmuir monolayer capacity, mg/g
\[ k \] Second order rate constant, g/mg.min
\[ k_f \] Freundlich coefficient for metal in aqueous solution, L/g
\[ k_{ad} \] First order rate constant, min\(^{-1}\)
\[ R_L \] Separation factor

**Continuous process**

\[ a_1 \] Slope at concentration \( C_1 \)
\[ a_2 \] Slope at concentration \( C_2 \)
\[ b_1 \] Intercept at concentration \( C_1 \)
\[ b_2 \] Intercept at concentration \( C_2 \)
\[ C_F \] Effluent concentration at influent concentration \( C_2 \), mg/L
\[ C_B \] Effluent concentration at influent concentration \( C_1 \), mg/L
\[ C_o \] Initial concentration in aqueous solution, mg/L
\[ C_i \] Inlet concentration of the metal in solution, mg/L
$C_2$  Outlet concentration of the metal in solution, mg/L
$k$   Adsorption rate constant
$k_{1c}, k_{2c}$  Constants
$k_{AB}$  Kinetic constant (L/mg min)
$k_{Th}$  Thomas rate constant (L/mg min)
$k_{YN}$  Yoon-Nelson rate constant (L/min)
$L$   Bed height, cm
$L_o$  Minimum column height, cm
$m_s$  Mass of biosorbent, g
$N_o$  Saturation concentration,
$Q$  Volumetric flow rate, L/min
$q_t$  Amount of adsorbate adsorbed per unit mass of adsorbent at any time $t$, mg / g
$q_{cal}$  Calculated amount of adsorbate adsorbed per unit mass of adsorbent at equilibrium, mg / g
$q_{exp}$  Experimental amount of adsorbate adsorbed per unit mass of adsorbent at equilibrium, mg / g
$q_m$  Maximum adsorption capacity of the adsorbent, mg / g
$R^2$  Coefficient of determination
$t$   Time, min
$T$  Temperature, K
$\tau$ Time required for 50% adsorbate breakthrough, min