

NOMENCLATURE

\( 1/n \)  
Heterogeneity factor, dimensionless

\( a_R \)  
Constant of Redlich-Peterson isotherm, l/mg

\( C_o \)  
Initial concentration of adsorbate in solution, mg/l

\( C_e \)  
Equilibrium liquid phase concentration, mg/l

\( h \)  
Initial sorption rate, mg/g min

\( I \)  
Constant that gives idea about the thickness of boundary layer, mg/g

\( k_f \)  
Rate constant of pseudo-first-order adsorption model, min\(^{-1}\)

\( k_{id} \)  
Intra-particle diffusion rate constant, mg/g min\(^{1/2}\)

\( k_s \)  
Rate constant of pseudo-second-order adsorption model, g/mg min

\( K_F \)  
Constant of Freundlich isotherm, \((mg/g)/(l/mg)1/n\)

\( K_L \)  
Constant of Langmuir isotherm, l/mg

\( K_R \)  
Constant of Redlich-Peterson isotherm, g/l

\( K_T \)  
Constant of Temkin isotherm, l/mol

\( q_s \)  
Constant of D-R isotherm

\( n \)  
Number of data points

\( p \)  
Number of parameters

\( q_e \)  
Equilibrium solid phase concentration, mg/g

\( q_{e,calc} \)  
Calculated value of solid phase concentration of adsorbate at equilibrium, mg/g

\( q_{e,exp} \)  
Experimental value of solid phase concentration of adsorbate at equilibrium, mg/g

\( q_m \)  
Maximum adsorption capacity of adsorbent, mg/g

\( q_t \)  
Amount of adsorbate adsorbed by adsorbent at time t, mg/g

\( R \)  
Universal gas constant, 8.314 J/K mol

\( t \)  
Time, min

\( T \)  
Absolute temperature, K
$\Delta G^\circ$ Gibbs free energy of adsorption, KJ/mol

$\Delta H^\circ$ enthalpy of adsorption, KJ/mol

$\Delta S^\circ$ entropy of adsorption, KJ/mol K

$m$ Adsorbent dose, g/l

$\lambda_{\text{max}}$ Maximum absorbency value of visible wavelength

$\text{ABS}^{\text{at}}$ average of absorbance value before the degradation process

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$C_t$ concentration of dye at time t, mg/l

$C_o$ initial concentration of dye at time t, mg/l

$C_b$ concentration at 10% break through, mg/l

$C_x$ concentration at exhaustion, mg/l

$x$ bed depth, m

$x_{\text{min}}$ minimum bed depth, m

$N_0$ adsorptive capacity of adsorbent, mg/m$^3$

$V$ linear flow velocity of feed to bed, m/hr

$t_1$ time at which no part of the bed is saturated, min

$t_2$ time at which the bed is almost saturated, min

$t_B$ time at which breakthrough point occurs, min

$t_E$ time required to each $C_t/C_0 = 0.90$ for bed, min

$L_S$ distance at which the bed is almost saturated, cm

$L_F$ distance at which bed is clean, cm

$C_F$ feed solute concentration in the feed, cm

**ABBREVIATIONS**

BG Brilliant Green

CR Congo Red

SD Saw dust

C. I. Color index

DTA Differential thermal analysis

DTG Differential thermal gravimetry
FTIR  Fourier transform infrared spectroscopy
TG    Thermal gravimetry
TGA   Thermo-gravimetric analysis
SEM   Scanning electron micrograph
XRD   X-ray diffraction spectra
SSE   Sum of the squares of the errors
SAE   Sum of the absolute errors
ARE   Average relative error
HYBRID Hybrid fractional error functions
MPSD  Marquardt’s percent standard deviation
MINAS Minimal National standards
LDLo  Lowest lethal dose
LD_{50} Lethal dose at which 50 percent of animal were killed
MTZ   Mass transfer zone