Re-evaluation of thermodynamic parameters using dimensionless Langmuir constants from published data on glyphosate adsorption onto activated carbon loaded with manganese and iron

ABSTRACT

Effect of temperature on the adsorption process will be reflected in the thermodynamic parameters. These data provide information on the efficiency of the adsorption process. Thus, an appropriate calculation for the thermodynamic parameter is crucial in adsorption research. In this paper, thermodynamic parameter data from a previously published paper on glyphosate adsorption onto AC/Mn/Fe was re-evaluatedusing the newly proposed method based on dimensionless equilibrium constant (Kc) derived from Langmuir sorption method. The recalculated results are as follows; entropy, ΔS° =224.04 J mol-1, enthalpy, ΔH° =39.97 kJ mol-1and the range of Gibs fee energy for the five investigated temperature (5 °C, 15°C, 25°C, 35°Cand 45 °C) were ΔG° 278.15K = -22.26 kJ mol-1 and ΔG° 318.15K = -32.52 kJ mol-1. Recalculated value of thermodynamics presented in this paper is mostly beyond the original data. Significant differences were observed in the sign and magnitude of ΔS° and the value of ΔG° of the tested temperature. Interestingly, the actual experiment was well represented by the recalculated results. Here we suggested the alternative calculation for thermodynamic parameters using the dimensionless equilibrium constantKc.