Prediction of optimum adsorption isotherm: comparison of chi-square and Log-likelihood statistics

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ABSTRACT

A comparison of chi-square (X^2) and Log-likelihood (G^2) statistics of 19 adsorption isotherm models—seven two-parameter models (Langmuir, Freundlich, Dubinin–Radushkevich, Temkin, Jovanovic, Harkins–Jura and Halsey) and 12 three-parameter models (Koble–Corrigan, Langmuir–Freundlich, Tóth, Redlich–Peterson, Radke–Prausnitz (three models), Fritz–Schlunder, Jossens, Khan, UNILAN, Vieth–Sladek) have been applied to the experiment of two dyes (Acid Blue 113, Acid Black 1) sorption onto Granular PineCone derived Activated Carbon (GPAC) and three dyes (Acid Blue 80, Acid Red 114, Acid Yellow 117) sorption onto Granular Activated Carbon type Filtrasorb 400 (GAC F400). The study has focused on the assessment of the adequacy and goodness of the fitted models, using two well-known—X^2 and G^2—statistics. The results showed that G^2 could be better than X^2 statistic when the number of model parameters is three.

Keywords: Adsorption; Isotherm models; Chi-square statistic; Log-likelihood statistic