J Pet Environ Biotechnol 2017, 8:5 (Suppl)
DOI: 10.4172/2157-7463-C1-038

Benzene uptake onto modified tea waste: Perspective applicability of empirical sorption kinetic models

Daniel C Emeniru, Adubazi Momohjimoh O and **Wodu Douye Pere-ere**
Federal Polytechnic, Ekowe

The uptake of benzene onto modified solid materials has been reported most commonly with abrupt peripheral application of the defining models based chiefly on regression parameter validation. This paper considered a perspective application of mainly the empirical kinetics models of predetermined applicability as well as their parent nature to contemporary kinetic models. Verification of the applicable kinetics mechanisms defined by the models was based mainly on interpretations of the model parameters other than the statistical regression parameters. The tea waste used was modified by impregnation using iron salt and carbonized at 500°C. The modified tea waste (TW) of average particle diameter of 0.09 mm was used in the batch sorption of benzene dissolved in methanol. The Z(t) plot predetermined the applicability of the diffusion, Elovichian and quasi first order models. The linearity change in the Elovich plot illustrated the energetic heterogeneity typical of heterogeneous sorbents. Though the PFO showed lower error and lesser deviation of the estimated and observed uptake, the authentication coefficient ($\alpha = 1.6$) indicates that the PFO may not really be applicable at the process time (60 minutes). However, the PSO gave higher correlation (0.999), significantly low error and deviation and a higher rate constant hence based on time effect of rate constant and the equilibrium coefficient ($f_2 \rightarrow 1$), the Langmuirian uptake is better in the PSO domain. The transfer of benzene sorption for uptake was complementarily controlled first by internal diffusion then by film diffusion.

emenirudaniel4114@gmail.com