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ISOTHERMAL ADSORPTION OF ANIONIC DYE ONTO IMPREGNATED SILICA GELS WITH ALUMINIUM

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Abstract

Impregnation of aluminium ion onto silica gel (SG) surface (Al/SG) is to increase the adsorption capacity of an anionic dye such as Indigo carmine (IC). The impregnation was carried out using wetness impregnation. The change of the functional group was evaluated by FTIR, crystallinity was determined using XRD, surface morphology were studied by SEM-EDX, while surface area and pore size using N_2 gas adsorption-desorption analyzer. Meanwhile, the best of IC adsorption condition onto SG and Al/SG occurred consecutively at pH 2 and 3. The optimum adsorption of both adsorbent was 25.707 and 88.143 $mg.g^{-1}$ with the adsorption efficiency 21.82% and 80.47%, respectively. Whereas, isothermal adsorption model of SG and Al/SG consecutively followed Langmuir and Freundlich model. The equilibrium adsorption was achieved in 60 min of contact time following pseudo-second order kinetic model. This study provides information about the replacing negative charge in the surface of the adsorbent with cation would increase the adsorption capacity of the anionic adsorbate.

Key words: adsorption isotherm, aluminium impregnation, anionic dye indigo carmine, modified silica gels

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