

Kinetic and thermodynamic study of adsorption of cationic dyes (methylene blue and safranin) on artificial zeolite

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Abstract

The rejections of many industries (plastic, cosmetic, paper, and especially textile) are heavily loaded with dyes that have a toxicological impact dangerous on the environment. Methylene blue (BM) is a cationic dye widely used in the laboratory and in the textile industry. Carcinogenic and mutagenic, it is a powerful pollutant of water. And also Safranin is one of the most used synthetic cationic dyes. It is a reddish brown powder soluble in water, which is mainly used as a food coloring in flavoring candies and biscuits. Safranin is also used to dye tannin, cotton, blast fibers, wool, silk, leather and paper. The purpose of this work is the liquid-solid extraction of cationic or anionic dyes from dilute aqueous solutions of 10 mg / l of both dyes with a zeolite material. The effect of several parameters on the adsorption performances were studied (contact time, the mass of the support, pH). The results obtained are as follows: The equilibrium of the adsorption was obtained after 180 min of two cationic dyes (SF and BM) with a low mass of zeolite (0.1g) and at pH = 6.5.

The adsorption capacity of the dye by the zeolite increases slightly with the increase of the temperature from 25 ° to 55 ° C. The evolution of the adsorption capacity over time at different dye concentrations ranging from 10 to 200 mg / l with a maximum capacity of adsorption of the dye by the zeolite to.

□ $Q_{max}(SF) = 7,15 \text{ mg/g}$.

□ $Q_{max}(BM) = 7,36 \text{ mg/g}$.

The study of the kinetic models confirms, on the one hand, that the adsorption of the two dyes (SF) and (BM) on the zeolite follows the pseudo-first order model, and on the other hand, that the Langmuir isotherm is the appropriate model to explain the safranin adsorption process on the zeolite.



Biography:

Jaoud Bensala his Phd Student in chemistry, interested in organization in the field industry, Degree in chemistry and Continuing training in industrial production and project management option surface treatment in Automotive and Aeronautics industry.

Speaker Publications:

1. "Adsorption of the anionic dye methyl orange on used artificial zeolites: kinetic study and modeling of experimental data A review"; Mediterranean Journal of Chemistry, Vol- 9, 2019.

2. "Adsorption of Heavy Metals (nickel) by the Shell Powder of the Coast of Mehdiya-Kenitra (Morocco)"; Journal of Analytical and Bioanalytical Electrochemistry, Vol-11, 2019.

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