

SEAE 19P STUDY OF ANIONIC DYES ADSORPTION ON NATURAL AND MODIFIED TRIPOLI

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The subject for study was a natural sorbent (Senatovka field tripoli) which has nearly the same chemical composition as diatomite but with more impurities and different microstructure.

We investigated adsorption and extraction of methylene blue (MB) and chrysophenine (CHR) with different concentration on the original and chemically activated tripoli (for grain size grade -02 + 0 mm). When studying the influence of the MB standardized test solution concentration and the sorbent mass on the values of adsorption (a , mg/g) and the extraction ratio (ϵ , %) of methylene blue there are established the tripoli consumptions (amounts) to attain the maximum extraction of MB:

at $C_{MB}=50$ mg/l, the sorbent mass is 2g/l, $a = 23,0$ mg/g, $\epsilon = 92$ %;

at $C_{MB}=145$ mg/l, the sorbent mass is 4g/l, $a = 32,3$ mg/g, $\epsilon = 89$ %;

at $C_{MB}=200$ mg/l, the sorbent mass is 4g/l, $a = 34,0$ mg/g, $\epsilon = 68$ %.

When studying the adsorption of chrysophenine (with the dye concentration ranging from 20 to 100 mg/l) on the natural unprocessed tripoli (with the sorbent amount ranging from 2 to 8 g/l) there was observed the formation of a colloidal color solution due to the dissolution of a part of the tripoli components; no removal of the dye took place at all. Further increase in the sorbent consumption did not cause any growth in the extraction of chrysophenine from the solution. There exists no process of adsorption and extraction. Thus, the next research problem was finding an influence of the chemical activation of tripoli on its adsorptive properties to extend the application area of the natural adsorption raw material for dyes being of the same type but different in geometric structure and, consequently, properties.

The investigations concerning the modification of tripoli was carried out in the aqueous salt solution $Al(NO_3)_3 \cdot 9H_2O$. The $Al(NO_3)_3 \cdot 9H_2O$ solution concentration was calculated in accordance with the percentage of SiO_2 in the tripoli, and it was 0.5 M; 1 M; and 2 M, respectively, in a certain proportion $SiO_2 : Al^{+3}$.

The adsorption of methylene blue and chrysophenine with different concentrations was studied on the chemically activated tripoli at different amounts of the sorbent, the process times, and the solution pH.

The performed investigations showed that the processed $Al(NO_3)_3 \cdot 9H_2O$ tripoli, unlike natural one, demonstrates better adsorption properties in comparison with chrysophenine; as for the methylene blue the situation is reverse.

The increase in the absorption indices of chrysophenine by the modified tripoli might be apparently explained by the fact that there exists some electrostatic attraction between the chrysophenine molecules, charged negatively, and the Al positive ions on the tripoli surface.

Thus, the performed research work makes it possible, knowing the proportion $SiO_2 : Al^{+3}$, to calculate the optimum concentration of the aqueous salt solution used for modification of tripoli with wanted adsorption properties.

The obtained results allow to determine the conditions which can help to remove different types of dyes from sewage waters within the range of industrial concentrations of wastes using natural tripoli and its modified forms.