STUDY OF FERRITE ADSORBENTS

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Ferrites of transition metals possess high magnetic properties and low electrical conductivity; therefore they are widely used in modern technologies of electronics, materials science, construction, medicine, etc. It is also known that, having a relatively developed specific surface area, ferrites can be successfully used in adsorption processes of water purification and water treatment. In this regard, the study of the sorption characteristics of ferrites is relevant today.

In the present work, the adsorption properties of pure and composite ferrites relative to methylene blue dye were studied. Detailed information about the synthesis and structural characteristics of these materials is described in [1].

During the experiment, the dye was adsorbed from an aqueous solution of 25 cm^3 in volume with an initial concentration of C_0 = 5 mg/dm^3 until reaching adsorption equilibrium. The mass of the sorbent in each experiment was 0.1 g. The separation of the sorbent from the solution was carried out by magnetic separation, after which the residual concentration (C_r, mg/dm^3) of the dye was determined photocolorimetrically. The oadsorptiondegree (a, %) and the adsorption capacity (G, mg /g) were calculated using the appropriate formulas:

$$a = \left(\frac{C_0 - C_0}{C_0}\right) \cdot 100; \qquad G = \frac{(C_0 - C_r) \cdot V}{m}$$

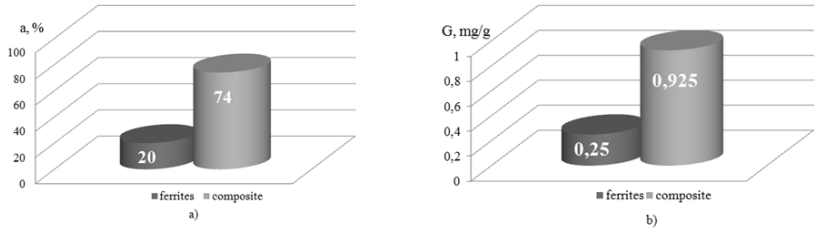

Fig. 1. The adsorption degree (a) and the adsorption capacity (b) of the studiedferrites

It is shown in Fig. 1 that the adsorption activity of the composite ferrite toward methylene blue is almost 4 times higher in comparison with pure ferrite. From our point of view, this can be explained by more developed specific surface area of composite ferrite, which includes active carbon. Also, the functional composition of the surface of studied samples, namely: the surface carboxyl and phenolic functional groups which are on the surface of the composite ferrite, are cation-exchange centers promoting the addition of the dye cation by the ion-exchange mechanism.

[1] Lesik S., Ivanenko I.M., Perecos A.O. Magnetically Separable Catalysts for the Hydrolysis of Borohydrides / Proceedings of the 2018 IEEE 8th International Conference on Nanomaterials: Applications & Properties (NAP-2018), 2018, Part 4. – P. 80-83.