ANIONIC ADSORPTION IN METAL OXIDE-SOLUTION SYSTEMS

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Abstract

Although the adsorption process of single cationic specie has been extensively studied, a small attention has been given to removal of anionic species from their solutions or contaminants. Anionic complexes from solutions are effectively bound on the adsorbent surface. The industrial activities such as mining, metallurgy, energy etc., have a lot of problems with anionic complex (such as chromate, CrO_4^{2-}, seleniate, SeO_4^{2}, vanadate, VO_4^{3-}, nitrite, NO_2^- or nitrate, NO_3^- from their solutions).

In this study a non-competitive adsorption of NO_2^- ions to alumina surface was studied in an aqueous system. To express the magnitude of the process, we used Langmuir and Freundlich adsorption models and it was seen that the equilibrium data fitted well to both models in the concentration range studied. Different volumes (20 to 100 cm^3) of $NaNO_2$ solution of 10^{-3} to 10^{-1} M were used in experiments. Also, we used activated alumina (0.2 to 1.0 g) and a pH values around 4, mentioned with drops of either HCl or NaOH 0.1 N. The values of the constants obtained from graphical forms of the equations were used in the assessment of the adsorption intensity of the process. The results show that the maximum adsorption appears in the case of the more concentrated solution of $NaNO_2$ (10^{-1} M) and to small quantities of adsorbant material, both for Langmuir and for Freundlich isotherms (with some exceptions). The value of k constant from Langmuir equation shows a better affinity of mineral substratum for NO_2^- in

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diluted solutions comparable with the concentrated solutions of analyzed anion. In the same time, the value of n constant from Freundlich equation shows (with one exception) a better affinity for medium concentration of analyzed anion, comparable with the other solutions.