ISOTHERMS OF THE ADSORPTION OF SODIUM AND THALLIUM CATIONS ON NICKEL

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The method of radioactive tracers on cathodically reduced nickel (99.997%) was used to investigate the dependence of the stationary values of the adsorption of Na^+ and Tl^+ on the concentration ($c = 1 \cdot 10^{-6}$ - $1 \cdot 10^{-1}$ N) of solutions of Na_2SO_4 and Tl_2SO_4 (pH = 3) at the reversible hydrogen potential. For the case of Tl^+, a logarithmic dependence with saturation at $c = 10^{-4}$ N was obtained. The degree of surface coverage is equal to 0.3, calculated on the basis of the area occupied by spherical ions. The adsorption of Tl^+ is not very reversible. Their exchange with the same ions of the solution proceeds slowly and almost ceases after 20 min. On the surface ~50% of the initial amount remains. A bilogarithmic dependence of the adsorption on the concentration without a limit of saturation was detected for Na^+. The measurements were performed by two methods: at a constant specific radioactivity of the solutions with different salt concentrations and in solutions obtained by dilution of 10^{-1} N Na_2SO_4. The results of both series of experiments coincided. The same dependence was obtained on different samples of nickel: smooth rolled, electropolished, and treated with glass powder. The adsorption of Na^+ from 10^{-3} N Na_2SO_4 corresponds to 0.02 of a monolayer and is entirely reversible.

On nickel powder obtained from $Ni(OH)_2$ at 300°C in hydrogen, a bilogarithmic isotherm of the adsorption of Na^+ from NaOH ($1 \cdot 10^{-1}$ N) was found in [1]. The degree of coverage by Na^+ cations for smooth and powdered nickel and the reversibility of the adsorption in acid and alkaline solutions were close.

These results show that the shape of the isotherm does not depend on the method of preliminary treatment of the surface.

LITERATURE CITED

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