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Electrochemical reduction of sodium metavanadate in an equimolar KCl-NaCl melt

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Abstract

Electrochemical reduction of sodium metavanadate in an equimolar KCl-NaCl melt and the effect of acid-base properties of environment on this process are studied by a voltammetry method on a stationary platinum electrode. It is established that the limiting current of the $NaVO_3$ electroreduction process has a kinetic nature. The process proceeds via an autoinhibition scheme and its rate is limited by an acid-base reaction conjugated with an irreversible charge transfer reaction. A substantial role of cationic composition of the melt is revealed experimentally. Following acidification of the KCl-NaCl-$NaVO_3$ melt by Mg^{2+} (from $MgCl_2$), the process passes from an irreversible kinetic regime into a reversible diffusion (quasi-diffusion) process. Values of stability constants for vanadates produced with the aid of acid-base titration of

vanadium pentoxide by oxygen ions in experimental conditions are presented. These values are taken into account when calculating kinetic parameters of the $NaVO_3$ electroreduction.

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References

1. Delimarskii, Yu.K. and Shapoval, V.I., *Teor. Eksp. Khim.*, 1972, vol. 8, p. 459.

2. Shapoval, V.I. and Delimarskii, Yu.K., *Teor. Eksp. Khim.*, 1973, vol. 9, p. 748.

3. Delimarskii, Yu.K., Shapoval, V.I., Grishchenko, V.F., and Zarubitskaya, L.I., *Dokl. Akad. Nauk SSSR*, 1972, vol. 205, p. 879.

4. Shapoval, V.I., Delimarskii, Yu.K., and Grishchenko, V.F., *Ionnye rasplavy*, 1974, vol. 1, p. 222.

5. Shapoval, V.I., Avaliani, A.Sh., and Gasviani, N.A., *Elektrokhimiya*, 1976, vol. 12, p. 1097.

6. Delimarskii, Yu.K., Shapoval, V.I., Grishenko, V.F., and Zarubitskaya, L.I., *Fizicheskaya khimiya i elektrokhimiya rasplavlennykh i tverdykh elektrolitov* (The Physical Chemistry and Electrochemistry of Molten and Solid Electrolytes), Sverdlovsk, 1973, part II, p. 35.

7. Shapoval, V.I., Avaliani, A.Sh., and Gasviani, N.A., *Soobshch. Akad Nauk Gruz. SSR*, 1973, vol. 72, p. 105.

8. Gasviani, N.A., Kurdadze, M.M., Supatashvili, D.G., and Kharashvili, R.L., *Izv. Akad. Nauk Gruz. SSR, Ser. Khim.*, 1985, vol. 11, p. 247.

9. Mairanovskii, S.G., *Kataliticheskie i kineticheskie volny v polarografii* (The Catalytic and Kinetic Waves in Polarography), Moscow: Nauka, 1966.

10. Usanovich, I.M., *Zh. Org. Khim.*, 1939, vol. 9, p. 180.

11. Gasviani, N.A., *Extended Abstract of Cand. Sci. (Chem.) Dissertation*, Tbilisi, 1975.

12. Brdiçka, R. and Wiesner, K., *Natyzwissenschaften*, 1943, vol. 31, p. 24.

13. Brdiçka, R. and Wiesner, K., *Collection*, 1947, vol. 12, p. 39.

14. Koutecky, Y. and Brdiçka, R., *Collection*, 1947, vol. 12, p. 337.

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