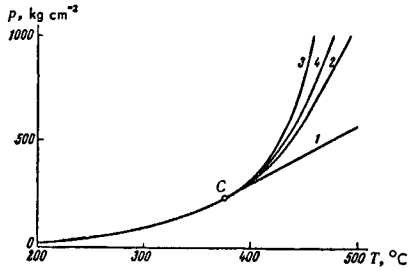


Fig. 2. Critical curves for water: 1) isochore; 2) constant-entropy curve; 3) constant-enthalpy curve; 4) U = constant curve; v_c = 3.26 cm^3 × ×g^{-1}; S_c = -1.058 kcal kg^{-1} deg^{-1}; U_c = 484.3 kcal kg^{-1}; i_c = 501.5 kcal kg^{-1}.

The relations are illustrated graphically in Fig. 2, using the experimental data for water as an example.

It must also be mentioned that the equations obtained, including of course Eqn. (1), hold for any point within the two-phase range of parameters describing the state of a substance.

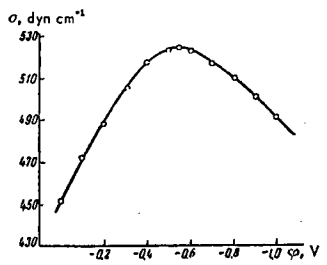
THE ZERO CHARGE POTENTIAL OF INDIUM

V. A. Kuznetsov and L. S. Zagainova

This paper describes a determination of the zero-charge potential of indium by measurement of the potential at the maximum of the electrocapillarity curve. The metal was of grade B-4. Analysis showed that the total content of impurities was less than 2×10^{-4}%. The electrolyte used was a fused LiCl–KCl eutectic mixture, prepared from the carefully purified salts. Potentials of the capillary electrode were measured at 450° relative to a fused-lead electrode in the LiCl–KCl mixture. The experimental method has been described previously[1].

The electrocapillarity curve of indium in the Figure shows that the zero-charge potential of indium is -0.52 V with respect to the lead electrode. This is 0.05 V more negative than the zero-charge potential of lead but 0.11 and 0.13 V more positive than that of cadmium and thallium (-0.47†, -0.63 – -0.65 V respectively[2]). Since the difference in zero-charge potentials of metals changes little on passing from melts to solid metals in aqueous solutions, it may be expected that the potential of indium in an aqueous solution would be -0.75 to -0.80 V with respect to the normal hydrogen electrode.

† -0.67? (Ed. of Translation).



It is well known that the zero-charge potentials of metals φ^0 can be related to the work function ψ by the approximate relation $\varphi^0 = \psi - 4.78$.[3] Tsarev[4] gives ψ_{In} a value of 4.0 V, emphasising its unreliability. If this is substituted in the above equation, -0.78 V is obtained for the zero-charge potential of indium, relative to the normal hydrogen electrode, *i.e.* near to our value. It may therefore be assumed that the value of ψ_{In} quoted by Tsarev is not far wrong.

It may be observed further that the surface tension σ_{In} at the zero-charge potential of indium is 523 dyn cm^{-1}. Timofeevicheva and Pugachevich[5] find that σ_{In} in a vacuum at the same temperature is 531 dyn cm^{-1}.

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Received 28th July 1960

THE MECHANISM OF THE CATHODIC REDUCTION OF ZINC OXIDE LAYERS ON A ZINC ELECTRODE

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The cathodic reduction of zinc oxide layers on a zinc electrode in alkaline solutions may take place in two ways: (1) via the solution, with the participation of zincate ions formed by dissolution of zinc oxide in alkali, and (2) in the solid phase, due to the slight electronic conductivity of zinc oxide or to diffusion or surface displacement of zinc ions through the zinc oxide. That the reaction can take place by the first mechanism is obvious, in view of the ready solubility of zincate ions in alkali and the ease of their cathodic reduction.