

## Determination of Ionic Mobilities of Uranium in *n*-Propanol at 25 °C

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In the *n*-propanol  $\text{UO}_2(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$ -System the limiting ionic conductance of  $(\frac{1}{2}\text{UO}_2^{2+})$  was found to be  $15,94 \text{ cm}^2 \Omega^{-1} \text{ mol}^{-1}$  at 25 °C, its association constant being  $5,2 \cdot 10^9 \text{ l}^2 \cdot \text{mol}^{-2}$ .

In order to investigate transport phenomena of the actinides in aqueous and nonaqueous solutions for possible applications in nuclear fuel reprocessing the equivalent conductivities of  $\text{UO}_2(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$  were determined in *n*-propanol at 25 °C in a concentration range of

$$4 \cdot 10^{-5} n \leq c \leq 7 \cdot 10^{-4} n$$

with high accuracy ( $\Delta A_{\text{rel}} = 0.05\%$ ).

By use of the Fuoss-Krauss-equation, modified for 2:1-electrolytes, the limiting equivalent conductivity of  $\text{UO}_2(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$  at infinite dilution was calculated to be

$$\Lambda_{(1/2\text{UO}_2(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O})}^0 = (29.55 \pm 0.02) \text{ cm}^2 \Omega^{-1} \text{ mol}^{-1}$$

the association constant being

$$K_A = (5.2 \pm 0.5) \cdot 10^9 \text{ l}^2 \cdot \text{mol}^{-2}.$$

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Using the value of the limiting ionic conductance of  $\text{NO}_3^-$  in *n*-propanol at 25 °C

$$(\lambda_{\text{NO}_3^-}^0)_{n\text{-prop.}}^{25^\circ\text{C}} = (13.61 \pm 0.02) \text{ cm}^2 \Omega^{-1} \text{ mol}^{-1}$$

and applying Kohlrausch's law the limiting ionic conductance of  $\text{UO}_2^{2+}$  was calculated in this solvent, the results being

$$(\lambda_{(1/2\text{UO}_2^{2+})}^0)_{n\text{-prop.}}^{25^\circ\text{C}} = (15.94 \pm 0.01) \text{ cm}^2 \Omega^{-1} \text{ mol}^{-1}$$

and

$$(u_{(\text{UO}_2^{2+})}^0)_{n\text{-prop.}}^{25^\circ\text{C}} = 16.52 \pm 0.02) \cdot 10^{-5} \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$$

for the corresponding mobility.

The  $\lambda_{\text{NO}_3^-}^0$ -value was obtained from conductance measurements of  $\text{NaNO}_3$ , the limiting equivalent conductivity being

$$(\Lambda_{\text{NaNO}_3}^0)_{n\text{-prop.}}^{25^\circ\text{C}} = (23.97 \pm 0.02) \text{ cm}^2 \Omega^{-1} \text{ mol}^{-1},$$

and measurements of transference numbers of  $\text{Na}^+$  in the systems  $\text{NaBr}/n$ -propanol and  $\text{NaJ}/n$ -propanol by use of the radioisotope method, which deliver the limiting ionic conductance of  $\text{Na}^+$  in this solvent to be

$$(\lambda_{\text{Na}^+}^0)_{n\text{-prop.}}^{25^\circ\text{C}} = (10.36 \pm 0.03) \text{ cm}^2 \Omega^{-1} \text{ mol}^{-1}.$$

If the unmodified Fuoss-Krauss-equation is used, negative values of  $\Lambda_{\text{UO}_2(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}}^0$  will be obtained from our data. Moreover there wasn't any minimum of the conductivity-concentration curve to be observed. Thus any pretended  $\text{UO}_2(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$  to act as 1:1-electrolyte or to form triplett-ions in this solvent could not be confirmed.



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