$B = 40$ G. Parameter ist die Entfernung x der Außenspulen II und III von der Mittelspule I.

Die Ergiebigkeit ist hier ($v = 20$ m/s)

$$\eta_2 = 0{,}18\ \mu\text{V/A}\,. \qquad (7\,\text{b})$$

Das beschriebene Verfahren gestattet die Messung der über den Querschnitt gemittelten Geschwindigkeit v bei bekannter elektrischer Leitfähigkeit σ. Ist das Leitfähigkeitsprofil über dem Querschnitt gegeben, so kann mittels eines modifizierten Verfahrens auf das Geschwindigkeitsprofil geschlossen werden. Darüber sind Untersuchungen im Gange.

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The Electrical Conductivity of Solid and Molten $^6Li_2SO_4$ and $^7Li_2SO_4$

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The electrical conductivity of Li_2SO_4 with different concentrations of ^6Li and ^7Li has been measured from 575 to 930 °C. The ratio of the specific conductivity of $^6Li_2SO_4$ and $^7Li_2SO_4$ is 1.042 ± 0.002 and within the experimental errors independent of the temperature. A comparison with the mass effect found in electromigration experiments show that there is a cooperative motion of the cations in α-Li_2SO_4.

In the cubic high temperature modification of lithium sulphate, the cation is highly mobile and for this reason the electrical conductivity is almost the same as in the molten salt [1]. The transference number of the cation in α-Li_2SO_4 is unity [2] and the cations are moving in a pseudo-lattice of sulphate ions. Deviations from the Nernst–Einstein equation found by Kvist and Lundén [1] can be explained by assuming a coupled transport mechanism.

The mass effect μ is defined as the ratio of the relative difference of the mobilities and the relative difference of the masses of the two cations

$$\mu = \frac{\Delta b}{b} \Big/ \frac{\Delta m_+}{m_+} \qquad (1)$$

Lundén [2] hat from electromigration experiments in α-Li_2SO_4 calculated the mass effect of ^6Li and ^7Li and obtained the value $-\mu_c = 0.14$, which was almost independent of the temperature.

It is also possible to calculate a mass effect μ_c by comparing the electrical conductivity of $^6Li_2SO_4$ and $^7Li_2SO_4$. We have measured the conductivity of Li_2SO_4 with 0.008, 12.6, and 96.2 per cent ^6Li in quartz capillary cells. The experimental technique and cells are described elsewhere [3]. The salt was reagent grade (Oak Ridge National Laboratory) and was used without further purification.

An extrapolation of the experimental data (Table 1) gives the electrical conductivity of pure $^6Li_2SO_4$. If it is assumed that the structure of the lattice is not influenced by the isotopic composition, the relative difference in mobility equals the relative difference in conductivity and thus

$$\mu_c = \frac{\Delta \varkappa}{\varkappa} \Big/ \frac{\Delta m_+}{m_+}\,. \qquad (2)$$

This gives $-\mu_c = 0.28$.

Since $\Delta m/m$ is constant, $(\Delta b/b)_c$ and $(\Delta b/b)_e$ must be different. If there is a cooperative motion of a small number of ions we can write

$$(\Delta b/b)_c = (n\, b^{6}\text{Li} - n\, b^{7}\text{Li})/(n\, b) = (b^{6}\text{Li} - b^{7}\text{Li})/b\,.$$

n is the mean value of the number of ions taking part in the same movement.

In natural lithium sulphate the number of ^6Li ions is small compared with the number of ^7Li ions and this gives

$$(\Delta b/b)_e = (b^{6}\text{Li} + (n-1)\, b^{7}\text{Li} - n\, b^{7}\text{Li})/(n\, b) = (\Delta b/b)_c/n\,.$$

The mean value of the number of ions taking part in the same movement is thus 2.0.

The difference in electrical conductivity of molten ^6LiCl and ^7LiCl has recently been discussed by Lenke and Klemm [4].

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T °C	$\varkappa$ Ω^{-1} cm^{-1}	T °C	$\varkappa$ Ω^{-1} cm^{-1}
96.2 % ^{6}Li		12.6 % ^{6}Li	
915.0	4.646	906.5	4.424
904.8	4.582	892.2	4.356
871.3	4.402	866.2	4.194
822.8	3.025	856.8	3.587
806.4	2.887	820.0	2.857
768.2	2.565	802.5	2.718
756.5	2.463	784.2	2.562
716.5	2.053	730.8	2.117
702.0	1.958		
646.2	1.495	12.6 % ^{6}Li	
624.4	1.318	929.5	4.539
		910.8	4.451
100.0 % ^{7}Li		891.0	4.340
889.5	4.321	838.0	3.017
880.5	4.276	832.0	2.968
873.8	4.236	811.3	2.797
864.8	4.199	802.5	2.718
861.0	4.169	786.8	2.594
840.8	3.011	730.0	2.099
823.2	2.872	714.4	1.973
789.2	2.587	691.5	1.793
771.4	2.448	670.4	1.614
747.6	2.251	630.8	1.308
714.6	1.978	610.0	1.146
687.8	1.763	582.2	0.946
679.8	1.690	579.2	0.913
634.2	1.339		

Table 1. The electrical conductivity of Li_2SO_4 with different concentrations of ^6Li. Melting point of Li_2SO_4: 860 °C.

[1] A. Kvist and A. Lundén, Z. Naturforschg. **20 a**, 235 [1965].
[2] A. Lundén, Z. Naturforschg. **17 a**, 142 [1962].
[3] A. Kvist and A. Randsalu, to be published.
[4] R. Lenke and A. Klemm, Z. Naturforschg. **20 a**, 1723 [1965].