AC Conduction Mechanism in Perovskite-like Dimers $(C_2H_8NO)_2M_2X_6$, M=Co/Cu, X=Cl/Br

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Z. Naturforsch. **55a,** 945–956 (2000); received October 9, 2000

AC conductivities at 5 Hz–10 kHz and 78 K up to room temperature of bis- (ethanolammonium) Co_2X_6, and bis- (ethanolammonium) Cu_2X_6, X=Cl and Br are reported. At high temperatures, band type conduction prevails for all dimers. In the low temperature range $T < 200$ K the $(Co_2Br_6)^{-2}$ dimer conducts via small polarons and the other three dimers conduct via quantum mechanical tunneling. The obtained relaxation times for the different dimers were found to be $1.1 \cdot 10^{-14}$ s. The frequency dependence follows the universal power law $\sigma_{ac}(\omega) = A\omega^s$. The exponent s and the pre-factor A were found to be very sensitive to the phase transitions, with s showing a minimum or maximum at the transition temperature. Changes in the conduction mechanism are reflected by abrupt changes in the variation of the pre-factor A vs $1/T$ relation. The conduction is found to depend on the type of the halide ion rather than on the transition metal ion.

PACS #76, 74.

Key words: AC Conductivity; Phase Transition.