The above considerations are further supported by the results on BeO molecule which, produced once from metallic beryllium and another time from beryllium oxide gives different temperatures for the same arc including one above 4000°, not available in AlO.

The results of BeO taken along with AlO go to show that temperatures intermediate between 6200° (center of the arc) and 2570° (periphery of the arc) also exist in the arc which prove the existence of temperature gradient in it, a conclusion unlike the one reported by Coheur and Coheur. Visually also, the band systems were identified differently with respect to the center of the arc by their colors. Hence the dissociative or formative processes leading to the particular molecular radical, control the resulting temperature of the molecule which adjusts itself in the temperature gradient.

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Paramagnetic Losses in Two Manganous Salts*

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THE general method used by Gorter[1] and Zavoisky[2] for the study of paramagnetic losses, and by Purcell, Torrey, and Pound[3] for the study of nuclear magnetic moments has been extended to higher frequencies and applied to two manganous salts. The salt under investigation was placed in a cavity which was coupled by means of a coaxial line to a klystron oscillator operating at 2930 mc/sec., the resonant frequency of the cavity. The cavity was placed between the pole pieces of an electromagnet in such a way that the magnetic field was everywhere perpendicular to the high frequency oscillating magnetic field in the salt. Figure 1 shows the power absorbed in the cavity as a function of the field of the electromagnet for 173 g of the salt $MnSO_4 \cdot 4H_2O$. The measurement was made at room temperature.

Assuming that the maximum of the absorption curve corresponds to a simple magnetic resonance phenomenon[3] involving the manganous ion Mn^{++}, for which $J = 5/2$ and for which the theoretical effective Bohr magneton number is 5.92,[4] one expects a peak at 1046 oersteds. The observed peak occurs at 1100±20 oersteds. A theory of relaxation losses, developed by Frenkel,[5] predicts a shift of the maximum to higher fields by an amount depending on the relaxation time. To account for the observed shift of 54 oersteds a relaxation time of the order of magnitude of 1×10^{-9} second is required. The absorption peak represents a decrease in the power level at the output of the cavity from about 0.15 mw to about 0.13 mw. The power level at the input to the cavity was about 2.5 mw. Most of the energy absorption by the salt is presumably electrical rather than magnetic in nature. Approximate calculations show that the ordinates of the power absorption curve minus the ordinate of the flat portion of the curve are very nearly proportional to the paramagnetic losses.

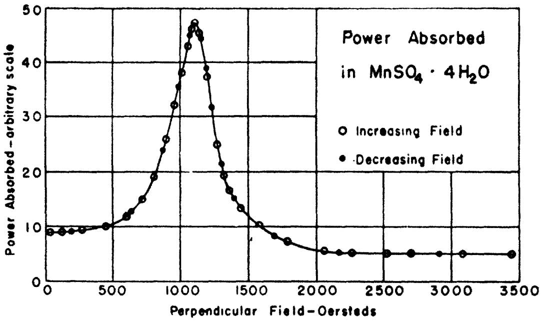

FIG. 1. Paramagnetic losses in $MnSO_4 \cdot 4H_2O$.

The transfer of a 10-db attenuator from a position between the oscillator and the cavity to a position between the cavity and the power measuring equipment did not appreciably alter the shape of the absorption curve. At a temperature of −65°C the absorption maximum was reduced to about half. This maximum occurred at a field of 1070±20 oersteds which suggests that at this temperature the relaxation time is increased somewhat over that at room temperature.

Preliminary data on $MnCl_2 \cdot 4H_2O$ at room temperature indicate that the absorption peak is much broader and that the maximum occurs at a somewhat greater field than was the case in the corresponding experiment with $MnSO_4 \cdot 4H_2O$. Both effects suggest a shorter relaxation time for the chloride than for the sulfate.

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Thermodynamic Equilibria of Higher Order

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IN a paper with the above title[1] E. F. Lype finds remarkable agreement between experimental results of Keesom and others on phases of helium, methane, nickel, and steam, and certain theoretical considerations based on Taylor's expansions of functions. As the following argument will show, certain errors in Lype's theoretical considerations account for this agreement. Actually, there are discrepancies in the experimental results quoted by this paper which further investigation may rectify so that experimental data will match the correct mathematical theory.

We let the equations

$$f(x, y) = 0, \quad g(x, y) = 0 \tag{1}$$