the properties of this interesting salt. As O. Schauberger had already stated, the yellow colour fades very quickly in daylight and also on heating. The absorption spectrum is the same as for rock salt coloured artificially by radium rays. Like the latter, the salt from Hall shows thermoluminescence. On exposure to radium rays, it colours especially quickly, and the artificial colour, too, is very sensitive to light. After plastic deformation, it shows very little tendency to recrystallise; this, too, would favour the natural colouring[2].

With the discovery of the yellow salt of Hall in Tirol the 'missing link' in the formation of the blue rock salt seems to be found; indeed, in the salt mine of Hall, blue rock salt occurs occasionally with the yellow[3].

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Nuclear Mechanical and Magnetic Moments of K^{39}

THE separation of the hyperfine structure doublets of the resonance lines of potassium was measured by us[1] by observation of the absorption of an atomic beam, and from these measurements the separation, $\Delta\nu$, of the two hyperfine structure levels of the term $4S_{\frac{1}{2}}$ of K^{39} was found to be 0·0152 cm.$^{-1}$. If the value of the nuclear spin were known, the magnetic moment could be calculated from the above value of $\Delta\nu$ by means of Goudsmid's[2] formula. In order to find the spin, it is necessary to determine accurately the intensity ratio of the hyperfine structure doublets; this, however, could not be done, it being possible only to state that the component of shorter wave-length appeared to be stronger.

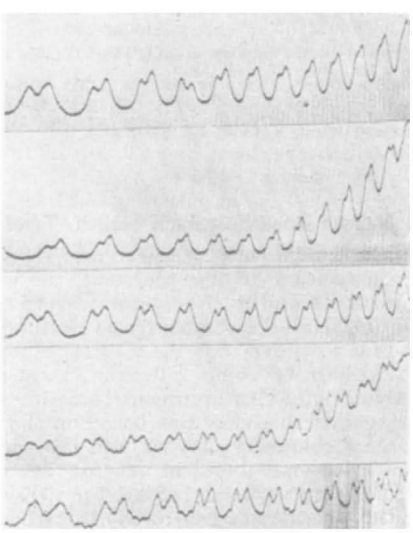

FIG. 1.

Later, Millman[3] determined the nuclear spin of K^{39} by the deflection of a beam of neutral atoms in a weak non-homogeneous magnetic field; he found the value 3/2 for the spin, and 0·0152 cm.$^{-1}$ for $\Delta\nu$, in very good agreement with our spectroscopic determination; the value 3/2 was rendered more certain by this agreement, any other value of I requiring a different value for $\Delta\nu$. Another determination of $\Delta\nu$ using the method of the deflection of an atomic beam in a magnetic field was made by Fox and Rabi[4], giving the value 0·0154 cm.$^{-1}$.

From these determinations, it is possible to calculate the magnitude but not the sign of the nuclear magnetic moment; but our observation on the intensities indicates a negative sign. It was thought desirable to ascertain these intensities more definitely, and accordingly photometer curves were made of the plates with the Zeiss photometer in the Chemical Laboratory, University College, London, by kind permission of Prof. F. G. Donnan. These are shown in Fig. 1.

Curves I, II and III show the absorption in the line $4S_{1/2}$–$4^2P_{3/2}$, I and II corresponding to a temperature of 290° of the potassium and III to 260°. In all these curves, it is quite clear that the component of shorter wave-length (on the right) is the stronger. Curves IV and V represent the absorption of the line $4S_{1/2}$–$4^2P_{1/2}$ and were made simultaneously with curves I and II. The difference in intensity is not nearly so marked, but again the shorter wave-length component is the stronger. The apparently smaller difference in intensities is probably due to the total absorption being weaker; for it can be seen that in the line $4S_{1/2}$–$4^2P_{3/2}$ the apparent difference in intensities is much smaller in III, where the density of potassium, and consequently the total absorption, is less than in I and II.

It is thus definitely established that the magnetic moment of the nucleus of K^{39} is negative, the hyperfine structure levels of the term $4S_{1/2}$ being inverted. Using Goudsmid's formula and taking $\Delta\nu$ as being 0·0152 cm.$^{-1}$, the value is $-$ 0·39 nuclear magnetons.

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Absorption Spectrum of Magnesium Hydride in the Ultra-Violet

SOME years ago, Pearse[1] reported a band spectrum in magnesium hydride (MgH) at λ 2430 having a very unusual structure. The source for production of the spectrum was a magnesium arc in hydrogen at a pressure of 1–5 cm. mercury. The band corresponds to a transition from an activated $^2\Pi^*$ state to the ground level $^2\Sigma$. The R- and P-branches in the 0–0 band are abruptly cut off at $R(9)$ and $P(11)$, due to a predissociation of the $^2\Pi^*$ state at $J = 10$, while the Q-branch proceeds to higher J-numbers in a normal way.

In the following investigation, the spectrum of MgH was studied in absorption. Magnesium metal was heated to 1,400° C. in a vacuum furnace, which was filled with hydrogen to a pressure of about 60 cm. When the continuous light from a hydrogen discharge tube passed through the vapour, two absorption bands appeared in the ultra-violet part of the spectrum. One of these bands was Pearse's band at λ 2430, the other corresponds to a transition