numbers by weak satellites due to the isotopic molecule $B^{10}H$. The frequencies of the principal lines, emitted by the molecule $B^{11}H$, may be represented with good approximation by writing for the rotational terms of the ${}^1\Pi$ -state

$$T' = r_0 + B'(J + \frac{1}{2})^2 + D'(J + \frac{1}{2})^4,$$

for the rotational terms of the ${}^1\Sigma$ -state

$$T'' = B''(J + \frac{1}{2})^2 + D''(J + \frac{1}{2})^4,$$

with

$$\nu_0 = 23073.60, \quad B' = \begin{cases} 11.938, \\ 11.908, \end{cases} \quad D' = -0.00147,$$

$$B'' = 11.798, \quad D'' = -0.00114.$$

The two values of B' in the upper state arise from the fact that its rotational levels consist of two components each on account of Λ -doubling. Their difference increases proportional to $(J + \frac{1}{2})^2$ or practically proportional to $J(J+1)$ as required by the theory for ${}^1\Pi$ -states.² The lines of the Q -branch start from the lower, the lines of the P - and R -branch from the higher ones of these components. From the above values of B one finds for the moments of inertia $I' = 2.32 \times 10^{-40}$ gm.cm.², $I'' = 2.35 \times 10^{-40}$ gm.cm.², for the internuclear distances $r_0' = r_0'' = 1.23 \times 10^{-8}$ cm. Although the moment of inertia is slightly smaller in the upper state, so that one expects at first that the bands would be shaded toward the violet and that the P -branch would form the head, the fourth power terms in the formulæ for the term values reverse this behaviour and cause the R -branch to form a head in the neighbourhood of $J = 24$. Since the moments of inertia differ so slightly in the two states, the lines of the Q -branch lie at first extremely close together and only become resolvable for $J = 18$ on our photographs. The band just discussed very likely is the $0 \rightarrow 0$ band of the system. Two weaker bands of the same general appearance with origins at 4367 Å. and 3696 Å. we believe to be the $1 \rightarrow 1$ and the $1 \rightarrow 0$ bands. Full particulars, also as regards the analysis of these weak bands, will be published elsewhere.

We wish to express our thanks to Dr. Kronig for many valuable suggestions during the course of this investigation.

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¹ *Zeit. f. Phys.*, **34**, 775; 1925.

² See Kronig, *Zeit. f. Phys.*, **50**, 347; 1928. Hill and Van Vleck, *Phys. Rev.*, **32**, 250; 1928.

Spectra of Te IV and Te VI.

FOLLOWING the identification of the doublet system of Se IV (reported in *NATURE* of Oct. 11, 1930, p. 568, and recently communicated to the Royal Society), the corresponding spectrum of tellurium, of the same chemical group, has been examined. Vacuum spark spectra of the element, taken at Uppsala, in the region $\lambda 1400$ - $\lambda 400$, have indicated the existence, among the lines of Te IV, of several pairs with separation 9222 cm.⁻¹, which could be easily assigned to the configurations $5s^25p$, $5s^25d$, . . . and $5s5p^2$ of trebly ionised tellurium.

Three pairs with $\Delta\nu = 11,814$ cm.⁻¹ have also been identified as being 5^2S - 5^2P , 5^2P - 6^3S , and 5^2P - 5^2D of Te VI.

Further details will be published shortly.

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Change of the Electric Polarisation of Ethyl Ether with Temperature.

ONE of us has recently determined the changes of the dielectric constant E and density D with temperature T (J. Mazur, *NATURE*, **126**, 649; 1930).

Starting from these data, we have computed, with the aid of the Clausius-Mossotti formula

$$P = \frac{1}{D} \frac{E - 1}{E + 2},$$

the values of the dielectric polarisation of ethyl ether for the interval of temperatures between -118° C. and $+35^\circ$ C. The results of the computation are represented on the accompanying graph (Fig. 1).

Fig. 1.

The value of the dielectric polarisation increases slowly with the lowering of temperature from 0.5858 at 35° C. up to the maximum value 0.9209 at -105.4° C. At this temperature there is a sharp decrease of the value of the polarisation.

This very marked change suggests that at the transition point -105.4° C. previously found by us (M. Wolfke and J. Mazur, *NATURE*, **126**, 684; 1930), the structure of the molecule of ethyl ether undergoes some modification. The behaviour of ethyl ether at the point of change -105.4° C. would thus differ from that of the helium (M. Wolfke and W. H. Keesom *Comm.*, Leyden, No. 1, 92^a). A further study of this phenomenon is being made.

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