LETTERS TO THE EDITOR

Prompt publication of brief reports of important discoveries in physics may be secured by addressing them to this department. Closing dates for this department are, for the first issue of the month, the twentieth of the preceding month, for the second issue, the fifth of the month. The Board of Editors does not hold itself responsible for the opinions expressed by the correspondents.

On the Predissociation in the Sulphur Bands

The phenomenon of predissociation was observed for the first time by V. Henri[1] in the sulphur bands and studied later by several authors. The principal feature consists in the fact that the emission band system abruptly stops at a definite value v', namely, $v'=8$, and also that the last observed band (8,0) is much shorter than the others. The upper limit for the dissociation energy which may be derived is $D=4.41$ ev; G. Herzberg[2] has shown, by considering the character of predissociation, that the right value of the heat of dissociation, is in this case, probably not much lower than this limit.

It is, however, impossible to determine the right value of D from spectroscopic data if the abrupt break of rotational structure has not been observed at least in two successive vibrational levels; the overlapping in the ultraviolet bands makes such a study difficult. We have tried to solve the problem by analyzing the bands (6,28), (6,29), (6,30), (7,29), (7,30), (7,31), (8,30), (8,31) and (8,32). The value of B_{30}'' being lower than that of B_0'' and much nearer to that of B_8' the overlapping in the red region of the band system will not be so important. The dispersion used by us up to the present was not sufficient for a rotational analysis; however, it gave good evidence for the abrupt termination of the rotational structure at 35 cm^{-1} from the head in the $v'=8$ progression and at 92 cm^{-1} in the $v'=7$ progression. The bands of the $v'=6$ progression were almost too broad and the high rotational lines were blended by other bands.

In the (8,0) band at 2829A we have observed the termination of rotational structure at 150 cm^{-1} from the head; according to Naudé and Christy[3] this corresponds to the rotational line $K=37$. Considering the widths of the bands (8; 30,31,32) and (7; 29,30,31), and still using the data of Naudé and Christy we may conclude that there is a predissociation in the $v'=7$ level at about $K=60$.

If we apply the reasoning established by G. Herzberg[2] in the case of P_2 it is easy to show that we have to deal with the I_b case of predissociation, i.e., the perturbing curve producing predissociation has a minimum; the heat of dissociation which may be derived in this case with great precision is equal to 4.41 ± 0.02 ev.

Recent investigations by Badger,[4] Van Dijk and Lameris[5] seem to show that Naudé and Christy's values of B' and B'' are too large. If this is correct, the values derived by us for K should be modified, but the results concerning the shape of the perturbing curve and the energy of dissociation should be the same. Our observations give an approximative determination of $\alpha=(B_v''-B_0'')/v$; we find $\alpha=0.002$. This value may be noticeably in error but the value $\alpha=0.0007$ given by Naudé and Christy is certainly much too low.

A high dispersion analysis is in progress.

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[1] V. Henri, *Structure des Molécules* (Paris, 1925), p. 93.
[2] G. Herzberg, Ann. d. Physik **15**, 677 (1932); note on p. 701.
[3] S. M. Naudé and A. Christy, Phys. Rev. **37**, 490 (1931).
[4] R. M. Badger, Phys. Rev. **46**, 1025 (1934); see also A. Christy, ibid. **47**, 251 (1935).
[5] E. W. Van Dijk and A. J. Lameris, Physica **2**, 785 (1935).

After Effect of Aluminum Bombarded by Electrons

Using a high voltage Lenard tube, J. J. Livingood and A. H. Snell[1] have searched for the radioactivity induced by electron bombardment, and having been unable to observe it they have attributed the fact to the following four cases: (a) The range of the radiation is less than 4 cm of air, or the periods are either (b) a small fraction of a second or else (c) many hours, or (d) the effect does not exist at the potential used. (In their experiment the voltage applied was 845 kilovolts.) The present investigation has been done with 250–300 kilovolts tube voltage and 1 milliampere tube current. The high speed electrons produced were bombarded upon an aluminum foil placed in high vacuum. After the bombardment, the tube potential was removed and the after effect of aluminum was examined with a Geiger counter. A certain kind of radiation was then observed which decayed with half-value periods of about 7 seconds, 40 seconds and 10 minutes. This radiation was determined later to be an electron radiation, and in the case of 40-second period, the maximum energy was 2.5 kilo-electron volts. These results are not inconsistent with those of Livingood and Snell whose investigation has not been extended to the range of present investigation as mentioned above. The similar effect has also been observed in the case of many elements including Ni, Cu and Ag. It is under investigation whether these are nuclear phenomena or extra-nuclear ones. This investigation has been started by the suggestions of Dr. Y. Nishina, and the author's thanks are due to him and to Professor S. Nishikawa for their kind advice.

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[1] Livingood and Snell, Phys. Rev. **48**, 485 (1935).