the same time the number of large changes becomes less. The probable error in the measured azimuth of a single $\Delta\mathbf{I}$ may be set at $\pm 5°$. This was estimated by picking up the $\Delta\mathbf{I}$ from a small rod of the same silicon iron rotated about a transverse axis in the same field and search coils. We know that each $\Delta\mathbf{I}$ in such a specimen must lie very close to its axis of figure. The angular resolving power in the earlier work[1] was not so high as that now attained and we suggest that the results then obtained were inconclusive mainly for this reason.

The work of Sixtus and Tonks[2] affords an explanation for the effect here observed. We suppose that Barkhausen discontinuities are propagated through a considerable volume only if they result in substantial and favorable changes of $\mathbf{H}$ in front of an advancing boundary. Since reversal of magnetization in any domain best meets this condition discontinuities which arise and proceed in this way have the best chance to grow to a size here observable. We have already pointed out that the largest Barkhausen discontinuities here observed may transcend this condition in their later stages.

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² K. J. Sixtus and L. Tonks, Phys. Rev. **35**, 1441 (1930); **37**, 930–958 (1931); **39**, 357–358; **42**, 419–435 (1932); L. Tonks and K. J. Sixtus, Phys. Rev. **41**, 539–540 (1932); **43**, 70–80, 931–940 (1933).

The Heat of Dissociation of N_2

The observation[1] of the long sought intercombination band system $A^3\Sigma \rightarrow X^1\Sigma$ in N_2 has made possible a new determination[2] of the energy of dissociation of N_2. This value $D(N_2) = 7.4$ v seems at first glance to be in disagreement with either my[3] electron impact measurements or those of Tate, Smith and Vaughan.[4] This however is not the case. My results were that it requires 8.62 ± 0.02 v to form $N^+ + N$ from N_2^+. The question involved is the determination of the state of excitation of the N^+ and N formed by electron impact. Possible interpretations are listed below, where I.P. represents the energy necessary to form N_2^+ from N_2. The data in the last column are the result of using for I.P. the accurate value 15.65 ± 0.02 v obtained by Tate, Smith and Vaughan[4]

$N^+ + N$		$D(N_2^+)$	$D(N_2)$	$D(N_2)$
^3P	$^4S^0$	8.62 v	I.P.—5.86 v	9.79 v
^1D	$^4S^0$	6.73	I.P.—7.75	7.90
^3P	$^2D^0$	6.25	I.P.—8.23	7.42
^3P	$^2P^0$	5.06	I.P.—9.42	6.23
^1S	$^4S^0$	4.59	I.P.—9.89	5.76

As already discussed[3] $D(N_2) = 9.79$ v is certainly too great. The last two values, 6.23 v and 5.76 v seem unreasonably low and the decision rests between 7.90 v and 7.42 v. In my paper 7.90 v was chosen because it was in agreement with Birge's[5] extrapolation of the vibration levels of the A' state of N_2^+ obtaining $D(A') = 3.67$ v and $D(N_2^+) = 6.82 \pm 0.1$ v. If the extrapolation of $D(A')$ is too high and can be lowered to 3.1 v, $D(N_2^+)$ becomes 6.25 v and $D(N_2) = 7.42$ v in agreement with Kaplan and with our third possibility listed in the table. However if Birge's estimate of $D(A')$ and Kaplan's value of $D(N_2)$ are both correct, the value of I.P.[4] for N_2 must be incorrect. My results are in agreement with either alternative and cannot discriminate between the two possibilities.

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May 2, 1934.

¹ L. Vegard, Zeits. f. Physik **75**, 43 (1932).
² J. Kaplan, Washington Meeting Am. Phys. Soc. 1934, Paper 92. The conclusions presented at the Meeting were different from those contained in the Abstract.
³ W. Wallace Lozier, Phys. Rev. **44**, 575 (1933).
⁴ J. T. Tate, P. T. Smith and A. L. Vaughan, Phys. Rev. **43**, 1054A (1933).
⁵ R. T. Birge, *Molecular Spectra and Molecular Structure*, Faraday Society, p. 713 (1929).

A Stable Hydrogen Isotope of Mass Three

The unexpected announcement at the Physical Society meeting last week by Bleakney and his colleagues from Princeton that they had now found evidence that their deuterium samples contain hydrogen atoms of mass three to the extent of a few parts per million, makes it desirable that we place on record the evidence which had led us to announce a similar conclusion in an abstract (on another subject) submitted for the same program.[1] Using the Allison magneto-optic method, Latimer and Young[2] last autumn announced the detection of a mass-three hydrogen isotope in a sample of heavy water, however, without being able to give a quantitative estimate.

The method we used depends on the simple fact, theoretically predicted and already verified by the comparison of proton and deuton ranges in air, that the rate of loss of energy by any high speed hydrogen nucleus of a given velocity projected into a gas (ion-pairs per millimeter path) is approximately the same irrespective of its mass, whereas

¹ Abstract No. 35, Bull. Am. Phys. Soc., April 10, 1934 (Program of the Washington Meeting). The qualifying phrase "but not proof" was inserted in the abstract, not by reason of any uncertainty in our observations or concerning the reality of the effect, but because we feel that adequate scientific proof of the existence of a new isotope cannot be obtained by any one method. We had not found time to verify our result by collision experiments and we wished to forestall the type of emphatic overstatement so usual in press and magazine reports of scientific news.
² W. M. Latimer and H. A. Young, Phys. Rev. **44**, 690 (1933).