the water of crystallization of the magnitude suggested by the electrical properties should be much greater than the observed value.

These tests accordingly indicate that the unusually large dielectric constant of Rochelle salt crystals, especially in the *a* direction, is not due to the polarization of the water molecules. This makes it all the more probable that rotations of polarized water molecules or other parts of the tartrate molecule must account for the electrical effects. The corresponding changes in optical properties would then lie in the far infrared or Hertzian region of the spectrum.

The experimental work herein recorded was very efficiently performed by Mr. Alan Koerner.

JOSEPH VALASEK

University of Minnesota,
April 20, 1934.

H^3 in Heavy Hydrogen

A few months ago[1] Bleakney and Gould reported the results of a search for H^3 (hereafter designated by T) in heavy hydrogen. They found none although 1 in 10^5 could have been detected. Since then we have completed the construction of a much more sensitive apparatus with which we have subjected a sample of nearly pure deuterium to a careful test. In the meantime additional evidence for the existence of a third isotope of hydrogen has been offered by Oliphant, Harteck and Rutherford,[2] Tuve, Hafstad, and Dahl[3] and Allison.[4]

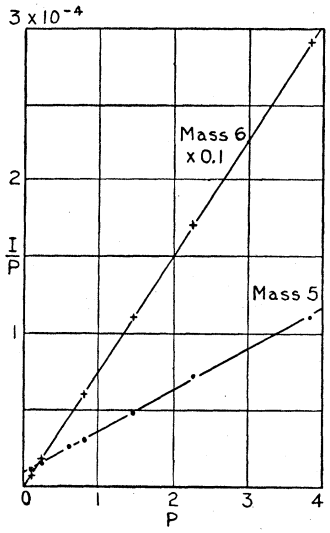

FIG. 1.

Our experimental data are represented by the curves in Fig. 1 where I as usual[1] is the intensity of a particular type of ion while the pressure p is measured by the number of D_2^+ ions. The curve for D_3^+ passes through the origin as expected since it is almost exclusively triatomic. The curve representing ions of mass 5 however has an appreciable intercept which we interpret as a measure of the ratio TD : DD. This gives for the abundance ratio T : D $= 5 : 10^6$ or one in two hundred thousand for this particular sample. This means that the ratio T : H in natural hydrogen is probably of the order of $1 : 10^9$ or smaller.

This result, we believe, confirms rather satisfactorily the existence of a third isotope of hydrogen from natural sources and gives a good measure of its abundance in this particular sample which was obtained by the electrolysis of heavy water and contained only about one percent light hydrogen.

We are indebted to Professor H. S. Taylor and his colleagues for the sample of deuterium.

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WALKER BLEAKNEY

Palmer Physical Laboratory,
Princeton, New Jersey,
April 21, 1934.

[1] Bleakney and Gould, Phys. Rev. **45**, 281 (1934).
[2] Oliphant, Harteck and Rutherford, Nature **133**, 413 (1934).
[3] Tuve, Hafstad and Dahl, Washington Meeting, Am. Phys. Soc., April, 1934.
[4] Allison, Florida Meeting, Am. Chem. Soc., March, 1934.
* National Research Fellow.

The Production of $_1H^3$ by a Canal-Ray Discharge in Deuterium

Judging from the experiments recently reported by Oliphant, Harteck and Rutherford,[1] and by Dee,[2] the production of hydrogen of mass three may occur quite frequently as the result of collisions between deutons of high energy. Furthermore, the exact mass which they deduce from their measurements of range indicates that the $_1H^3$ should be stable.* Prompted by these results we have been running a high voltage discharge in deuterium at low pressure and passing the canal rays from it into deuterium at a higher pressure, hoping in this way to accumulate an appreciable amount of $_1H^3$. We believe we have succeeded in doing so.

The apparatus consists of a discharge tube some 70 cm long and 6 cm in diameter with heavy water-cooled iron electrodes sealed in either end with de Khotinsky cement. The cathode is pierced by a canal 3 mm in diameter and 19 cm long. This leads into a glass tube 150 cm long and 3 cm in diameter. Gas is continually pumped out of the

[1] Oliphant, Harteck and Rutherford, Nature **133**, 413, March 17, 1934.
[2] Dee, Nature **133**, 564, April 14, 1934.
* Some evidence for the existence of this isotope has apparently been found also by Tuve, Hafstad and Dahl [Bull. Am. Phys. Soc. **9**, No. 2, p. 13, April (1934) (Washington Meeting)].