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 twenty-eight of the preceding month; for the second issue, the thirteenth of the month. The Board of Editors does not hold itself responsible for the opinions expressed by the correspondents.

The Heat of Dissociation of Oxygen

It has recently been suggested by Gerhard Herzberg (Zeits. f. phys. Chem. **4B,** 223 (1929)) that the currently accepted value for the heat of dissociation of oxygen is too high. Herzberg concludes that the correct value is not 7.0 volts, but somewhere between 5 and 6 volts; the basis for the conclusion is a re-interpretation of the Lyman-Runge bands on the basis of a theory developed by Wigner and Witmer.

This lower value receives at least a partial confirmation from an entirely different source. The present writer has previously pointed out (Zeits. f. phys. Chem. **2B,** 264 (1929)) that it is possible to calculate a value for the heat of dissociation from the measurement by Risenfeld and Schumacher of what these authors state is a homogeneous unimolecular decomposition of ozone. The calculation is based upon the very likely assumption that the primary process in the decomposition is the step $O_3 \rightarrow O_2 + O$ and involves the not very well known heat of formation of ozone; furthermore, there is still some doubt whether the decomposition concerned is entirely homogeneous. The result of the calculation is 4.8 volts (110,000 calories) and the error can scarcely be more than 0.5 volts, if the reaction involved is homogeneous; if not, the calculations are of course of no value. In spite of this uncertainty, the agreement seems to the writer to lend support to the lower value proposed by Herzberg, and also to suggest that the correct value lies within the narrower limits of 5.0 to 5.5 volts.

Gates Chemical Laboratory
California Institute of Technology
LOUIS S. KASSEL

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On the Possibility of Nuclear Disintegration by Artificial Sources

It has been pointed out by Atkinson and Houtermans[1] that it may be easier to transmute elements by bombarding them with protons rather than with alpha-particles. It is of interest to consider the significance of their remark for protons accelerated artificially by means of high potentials. It turns out that it is reasonable to expect them to penetrate the nuclei of the lighter elements under accelerating potentials within the experimentally readily obtainable range. Before Gamow's[2] suggestion as to the possible nature of artificial nuclear disintegration it was customary to speak of the required potentials in terms of the energies of the alpha-particles expressed in electron-volts. These energies are from 5.2×10^6 for polonium to 8.8×10^6 for ThC′. Artificial sources operating at such potentials will probably require many years of development. It will be readily seen however that protons accelerated by 2.6×10^6 volts have a greater probability of penetrating the nucleus than the 5.2×10^6 "electron-volt-equivalent" alpha particles. Whether a proton inside a light nucleus will necessarily have a disintegrating effect is of course uncertain. If no disintegration results it is reasonable to expect deviations from Rutherford's inverse square law of scattering. It should be possible to get information about the dimensions of nuclei in a better way by means of protons than has been done heretofore by means of alpha-particles.

[1] Atkinson and Houtermans, Zeits. f. Physik **54,** 656 (1929).

[2] Gamow, Zeits. f. Physik **52,** 510 (1928).