The Isotopic Fractionation of Water

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LETTERS TO THE EDITOR

Editorial

In response to requests from our contributors, and after a canvass of the opinions of the editorial board, the *Journal of Chemical Physics* wishes to announce that a "Letters to the Editor" section will be carried by the Journal in the future. This section will accept reports of new work, provided these are terse and contain few figures and especially few halftone cuts. The Editorial Board will not hold itself responsible for opinions expressed by the correspondents.

Contributions to this section must reach the office of the Managing Editor not later than the 15th of the month preceding that of the issue in which the letter is to appear. No proof will be sent to the authors. The usual page charge ($3.00 per page) will not be made and no reprints will be furnished free.

HAROLD C. UREY
Managing Editor

The Isotopic Fractionation of Water*

When water is subjected to electrolysis an isotopic fractionation occurs (Washburn and Urey, Proc. Nat. Acad. Sci. **18**, 496 (1932)). It has been found that the heavier isotope of hydrogen and the heavier isotopes of oxygen are concentrated in the residual water. The specific gravity of the residual water rises continuously as the electrolysis proceeds. The rise in specific gravity is accompanied by a rise in the freezing point and in the boiling point and by a decrease in the refractive index. Thus for water of specific gravity 1.0014, the changes are; F.P., $+0.050$°C; B.P., $+0.02$°C; n_D^{25}, $-(60\pm2)\times10^{-6}$.

No indication of approach to an electrolysis equilibrium has been found and there is every reason to hope that it will be possible to obtain the various isotopes of hydrogen and oxygen in a pure state, certainly in highly concentrated form.

If the oxygen from the electrolysis of normal water is combined with normal hydrogen, the water produced has a lower specific gravity than normal water. If this water be again partially electrolyzed and the oxygen combined again with normal hydrogen, a further drop in the specific gravity of the water occurs, the total drop thus far obtained being 18 parts per million. It will consequently be possible to prepare isotopically pure water of the composition $H^1O^{16}H^1$ and hence to determine accurately the atomic weight of normal oxygen on the $O^{16}=16$ scale.

With the different isotopes of hydrogen and oxygen available in pure form, a new field of chemistry and possibly also of biology will be opened up, since the different isotopes of hydrogen, at least, may be expected to exhibit pronounced differences in chemical behavior.

A survey is being made of water from different natural sources to find out whether differences in isotopic composition occur in nature.

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Washington, D. C.
March 6, 1933

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