



Division of the History of Chemistry
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Citation for Chemical Breakthrough



The detection of the first isotope of hydrogen: Deuterium

Urey, H. C.; Brickwedde, F. G.; Murphy, G. M.
Phys. Rev. 1932, 39, 164-165.

A Hydrogen Isotope of Mass 2

We find that the vapor pressures for these three molecules in equilibrium with their solids should be in the ratio of $p_{11}:p_{12}:p_{13} = 1:0.37:0.29$. The theory of the liquid state is not so well understood but it seems reasonable to believe that the differences in vapor pressure of these molecules in equilibrium with their liquids should be rather large and should make possible a rapid concentration of the heavier isotopes, if they exist, in the residue from the simple evaporation of liquid hydrogen near its triple point.

Accordingly two samples of hydrogen were prepared by evaporating large quantities of liquid hydrogen and collecting the gas which evaporated from the last fraction of the last cubic centimeter. The first sample was col-

Line	H_{α}	H_{β}	H_{γ}	H_{δ}
$\Delta\lambda$ calc.	1.793	1.326	1.185	1.119
$\Delta\lambda$ obs.				
Ordinary hydrogen	—	1.346	1.206	1.135
1st sample		1.330	1.199	1.103
2nd sample	1.820	1.315	1.176	—

The distillation was carried out at the Bureau of Standards by one of us (F.G.B.), who is continuing the fractionation to secure more highly concentrated samples. The spectroscopic work was done at Columbia University by the other two (H.C.U. and G.M.M.) who are working on the molecular spectrum.

Presented to the Department of Chemistry, Columbia University
and the National Institute of Standards and Technology

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