fragments in the ionization process
\[ e + H_2O \rightarrow H + OH + e^{-} + 2e. \]  
(1)

It has been found by Stevenson that a necessary condition for zero kinetic energy in such a process is that \( I(H) > I(OH) \), a condition which is satisfied. On the assumption that the ionization fragments have zero kinetic energy we find \( D(H - OH) = 5.03 \pm 0.2 \, ev = 116 + 5 \, kcal/mole \) and combining this with thermochemical data\(^{11} \) obtain \( D(OH) = 4.47 \pm 0.2 \, ev = 103.5 \, kcal/mole \). This derived value for \( D(OH) \) falls between the value of Dwyer and Oldenberg,\(^{12} \) 100.1 \pm 0.9 \, kcal/mole and the recently determined value of Hornbeck,\(^{13} \) 106.71 \, kcal/mole.\(^{14} \) Both of these spectroscopically determined values fall within the limits of error of our measurement. It should be noted that if the ionization fragments in process (1) possessed any kinetic or excitation energy, the correction required in our value of \( D(OH) \) would bring it closer to Hornbeck's value.

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\(^{g} \) Mann, Huttunen, and Tate, Phys. Rev. 88, 340 (1949).
\(^{k} \) D. E. Stevenson, Discussions Faraday Soc. 10, 35 (1951).
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\(^{p} \) 6V sulfuric acid, 2 g of sodium nitrite were added to the solution, and again extracted with 200 ml of carbon tetrachloride.

The iodine isotopes were transferred into an aqueous solution of sodium sulfite, 10 mg of iron carrier was added, the solution was boiled, and the iron was precipitated with ammonia. The addition and removal of iron carrier were repeated several times, until the decontamination was complete. The solution was finally acidified with sulfuric acid, and the iodine was precipitated as silver iodide. The silver iodide precipitate was filtered, dried, and mounted on aluminum for measurement with an end-window Geiger tube. Recovery of the iodine carrier was about 75%. The spontaneous fission yield rate of uranium-238 can be obtained from the equation,
\[ I/U(curie/curie) = T_{1/2}/T_{1/2} \cdot y, \]  
where \( T_{1/2} \) is the 2-decay half-life, \( T_{1/2} \) is the spontaneous fission half-life of uranium-238, and \( y \) is the spontaneous fission yields of the iodine isotopes, provided the slow neutron-induced fission contribution is negligible. Since it is well known that the slope of the spontaneous fission yield curve is different from that of the slow neutron-induced fission yield,\(^{5,6} \) only an approximate value for the spontaneous fission half-life of \( U^{238} \) can be obtained by assuming certain values for the spontaneous fission yields of iodine isotopes. Wetherill\(^{7} \) gives the following yields for xenon isotopes: \( Xe^{131}, 0.455, Xe^{132}, 3.57, Xe^{134}, 4.99 \) relative to an assumed value (6.00\% for \( Xe^{132} \)). If an average fission yield for \( I^{121}, 131 \), and \( I^{122} \) is taken to be 3.0\%\( \pm \)3\%, the spontaneous fission half-life of \( U^{238} \) may be calculated from \( t_{1/2} \) yielding \( 1.03 \times 10^{8} \) yr, which is higher than the value of Segré\(^{8} \) (8.04\%\( \pm \)3\%)\( \times 10^{8} \) yr, but lower than the value of Perfilov\(^{9} \) (2.3\%\( \pm \)3\%)\( \times 10^{8} \) years.

The spontaneous fission yields for the chains of 131, 133, and 135 can be calculated, if Segré's value is taken to be correct, with the further assumption that interchange between the fission iodine and the added iodine carrier was complete in the extraction procedure used. The results of these calculations are shown in Fig. 1 together with the mass-spectroscopic data obtained by Wetherill\(^{10} \) for xenon isotopes.

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