An additional check was made on the potassium by precipitating calcium as $CaCO_3$ and chlorine as $AgCl$ from a potassium salt solution to which small amounts of $Ca(NO_3)_2$ and $NaCl$ had been added and attempting to detect an initial activity of the $CaCO_3$ and $AgCl$ precipitates. The residual potassium salt was also checked for a decrease in activity. All of the results were negative and make a secondary of half-life greater than 30 sec. very improbable.

The author wishes to thank Professor W. M. Latimer for valuable suggestions and advice given him during this work. He is also indebted to Mr. D. E. Hull for carrying out the chemical separations described. Professor J. R. Oppenheimer was also kind enough to discuss the problem of the effect of scattering of low energy β-particles on their being absorbed by the sample.

W. F. Libby

Department of Chemistry,
University of California,
Berkeley, California,
September 24, 1934.

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Radioactive Sodium Produced by Deuton Bombardment

In the course of a general experimental investigation of artificial radioactivity in our laboratory, I have discovered an unusually interesting case of radioactivity induced in sodium by deutons. The radioactive substance has a half-life of 15 ± 0.5 hours and gives off beta- and gamma-rays in equal numbers. The beta-rays are reduced to one-half by 0.1 g/cm^2 Al. The absorption of the gamma-rays in Pb is, within experimental uncertainty, exponential, indicating monochromatic radiation. The absorption per electron of the radiation in Al, Cu and Pb is approximately 0.84×10^{-25}, 1.2×10^{-25} and 1.7×10^{-25}, respectively, indicating[1, 2] about 5.5 m.e.v. radiation. The estimated saturation activity produced by 1 microampere of 1.75 m.e.v. deutons bombarding sodium metal is about 3×10^7 disintegrating atoms per second. The yield of radioactive atoms rises very rapidly with voltage of bombarding deutons, roughly in accord with the Gamow formula. Thus it appears that by increasing both the current and the voltage of the deutons, sodium can be activated in the laboratory with an intensity expressible in terms of many millicuries.

The fact that beta-particles, rather than positrons, are emitted from the activated sodium suggests at once that the radioactive substance is ${}_{11}Na^{24}$ which decays to ${}_{12}Mg^{24}$. Chemical tests confirmed this supposition. It perhaps should be mentioned that many uses for radio-sodium will probably be found. In the physical laboratory it provides a presumably monochromatic source of high energy gamma-radiation of great intensity. In the biological field radio-sodium has interesting possibilities that hardly need be emphasized here.

Dr. Edwin McMillan and I have also been studying the radioactivity induced in aluminum by deuton bombardment. Here also electrons, rather than positrons, are given off from a radioactive isotope, ${}_{13}Al^{28}$, which decays with a half-life of $2'\,33''$.

Radio-sodium and radio-aluminum have been produced also by neutron bombardment first by Fermi[3] in his pioneer experiments and later by Curie, Joliot and Preiswerk[4] and in our laboratory.[5]

The details of these experiments will shortly be submitted for publication in the *Physical Review*.

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Ernest O. Lawrence

Radiation Laboratory, Department of Physics,
University of California,
Berkeley, California,
September 29, 1934.

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Band Spectrum of LiH and LiD

The observations previously reported by us[1] on the $^1\Sigma\rightarrow{}^1\Sigma$ bands of Li^7H have been greatly extended by absorption photographs at temperatures up to 900°C. On these plates some 2300 lines have been assigned including 45 bands of Li^7H and 13 of Li^6H.

Photographs taken under the same conditions with an atmosphere of deuterium of high purity have resulted in excellent plates of the corresponding heavy hydride bands. The new spectrum extends from about 3175A to the absorption limit of the Li_2 molecule in the red and though similar to that of the light hydride is considerably richer in lines. Some 34 bands including, however, only a fraction of the new lines present, have been identified as belonging to Li^7D. Plates taken at the highest temperatures show many faint lines which do not correspond with any lines of Li^7H or Li^6H and are undoubtedly due to LiD, though quantum assignments have not yet been made.

The isotope shifts for Li^7H and Li^7D are the largest to be expected for any hydride molecule other than HD itself. In the case of the (17, 0) band this amounts to about 147A. Although the ultimate values of the molecular constants for LiH have not been determined our results indicate that the observed isotope bands (LiD) lie slightly to the *high* frequency side of those calculated from the ordinary isotope theory. The (14–0) band for which the best data are at hand gives a discrepancy in this direction which is