than an alpha-ray emitter, such as polonium. because of the larger current (of the order of 100 times) obtainable per unit area due to the smaller absorption by the emitting substance. It seems likely that in the future the production of such materials will increase, so that they promise to be obtainable in quantities and at prices which make their use as electric voltage sources worthy of consideration from a practical standpoint.

Plans for constructing such a generator were made in this laboratory last year, and work is now progressing. It is hoped to exceed Moseley's results several-fold, with the help of the new supplies of radioactive materials, modern technique of high voltage insulation, and the use of shields to reduce the deleterious effects of secondary radiations.

Generators of this type offer a means for the direct conversion of nuclear energy into electrical energy. The practical realization of such conversion would seem to depend mainly upon a supply of suitable radioactive material, and probably (at least in the case of large power generators) upon the utilization of a controllable reaction, by means of which the emission of particles could be stopped and started at will.

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Artificial Activities Produced in Europium and Holmium by Slow Neutron Bombardment*

M. G. INGHRAM AND R. J. HAYDEN
Argonne National Laboratory, Chicago, Illinois
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A NITRIC acid solution of Ho_2O_3 was irradiated with slow neutrons in an attempt to produce the 35-hour holmium activity reported in Seaborg's table.[1] An aliquot of this irradiated sample was placed on the filament source of a mass spectrograph. By operation of the spectrograph the holmium isotopes were separated according to mass and deposited on a photographic plate. After removal from the spectrograph this plate was placed face to face with another photographic plate, for convenience called a transfer plate. With the passage of time the radioactive decay particles emitted from the active isotope on the first plate gave rise to a developable image on the second plate. After development, the first plate showed the normal holmium spectrum, a strong line at mass 165 due to Ho, and a much weaker line at mass 181 due to HoO. The transfer plate showed a single weak line corresponding to mass 166 on the original plate. A decay curve of another aliquot of the irradiated sample counted for nine half-lives during the period of transfer showed that 96 percent of the activity recorded on the transfer plate decayed with a 27.5-hour half-life, and the remainder with a half-life of approximately 3 hours. Thus we may conclude that the artificial radioactive isotope of half-life 27.5 hours has a mass of 166. This is undoubtedly the same activity given in Seaborg's table as 35 hours. At present the 3-hour activity observed in the sample is ascribed to an impurity of dysprosium.

A nitric acid solution of Eu_2O_3 was irradiated with slow neutrons to produce the 9.2-hour and 5–8-year activities reported in Seaborg's table.[1] The mass of the 9.2-hour activity has been shown to be 152 by previous mass spectrographic analysis.[2] The irradiated sample was allowed to stand for two weeks in order that the 9.2-hour activity might decay. An aliquot of this sample was then run in the mass spectrograph, and a transfer plate was made. Development of the transfer plate showed two lines at masses 152 and 154. The deposit was allowed to stand for 4 months and a second transfer taken. The lines 152 and 154 appeared at the same relative strength as previously. This proved that the mass 152 line was not caused by the 9.2-hour activity of europium. Neither line 152 or 154 can be due to neodymium, illinium, samarium, or gadolinium since these elements emit copiously as NdO^+, IlO^+, SmO^+, and GdO^+ while europium emits only as Eu^+. Thus europium must have two long lived activities, one of mass 152 and one of mass 154, as well as the established 9.2 hour at mass 152. A magnetic investigation of the activities showed no detectable positron emission. Absorption curves showed at least two betas and one gamma. The energy of the gamma was 1.4 Mev.

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The Oscillator Concept in the Theory of Solids

E. M. CORSON
The Institute for Advanced Study, Princeton, New Jersey
AND
I. KAPLAN
The Carbide and Carbon Chemical Company, New York, New York
November 18, 1946

A RECENT problem has occasioned the question as to the role which the "bounded" linear oscillator might play in the theory of the specific heats of solids. As is well known, the Debye theory on closer comparison with experiment is in many cases more qualitatively than quantitatively correct, although the Debye specific heat function has certain of the required properties. Heretofore, all attempts to improve the status of theory (anomalies excepted) have been in the direction of obtaining more accurate frequency distributions in the manner of Born, Von Karman, Blackman, *et al.* The common ground of all these analyses has been the basic *a priori* assumption that the oscillator levels are given by $(n+\frac{1}{2})\hbar\omega$; i.e., the "ideal" or "Planck" oscillator.

We do not cavil at the "formal" use of the ideal oscillator in boson theory, but we do ask the question: How is it possible to obtain even qualitatively correct results using this model in the theory of solids? Although it is quite true that the probability amplitude is large only in and near the classical region, the quantizing condition is still the vanishing at infinity so that the amplitude is non-zero (in the strict sense) over a very large region. If, as is generally done, we take the somewhat literal picture of "material" oscillators then it would seem physically reasonable that