sideration and of the ratio of the momentum transfer, the calculation of the decrease of the force is practically impossible. We can compute only whether the measured decrease of the total force *can* be caused by a decrease of the gas pressure.

For this purpose we shall take the forces at 15 amp. measured by Tanberg in vacuum and by Robertson at 1 mm Hg for a copper arc indicated in Fig. 4 of Robertson's paper. We assume that the transfer of the momentum of the stream to the gas diminishes the gas pressure to one-half. The measured forces in vacuum and at 1 mm Hg are 270 dynes and 160 dynes, respectively. The reduction is 110 dynes and the reduced gas pressure must then be effective on 0.168 cm². It naturally must be not larger than the area of the face of the cathode spot but may be larger than the area of the cathode spot. The face of the cathode in the experiments of Robertson had an area of 0.316 cm². The area of the cathode spot is 0.00105 cm² at 15 amperes if we calculate it with the ratio of 0.007 mm² amp. measured in vacuum by Tanberg and Berkey. At 1 mm Hg the current density is rather higher and the area of the cathode spot therefore smaller. We see that the calculated area lies between the two limits. The explanation seems therefore to be possible.

Lamar[4] also has pointed out that the absence of the force on the cathode in an arc at higher gas pressures may be due to the compensating effect of holding back the gas pressure from the cathode spot. But, according to his opinion this effect occurs as the result of convection currents set up around the cathode if this is of relatively small dimensions and therefore can not occur if the cathode has a large surface area.

Now, if my explanation of the effect is right the compensating effect is not confined to small cathode areas because the reduction of the gas pressure in front of the cathode spot and its near surroundings does not augment the gas pressure on areas of the cathode which lie further away from the cathode spot and because the high velocity stream is only slowed down by the gas and is not reflected back to the cathode. On the contrary for the full development of the compensating effect the area of the cathode must be larger than a certain minimum.

In conclusion I should like to thank Dr. F. Luedi for his suggestion to explain the results obtained by Robertson.

R. RISCH

Physical Laboratory,
Brown, Boveri and Company,
Baden, Switzerland,
January 18, 1940.

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Induced β-Activity of Uranium by Fast Neutrons

In the course of experiments on the fission of uranium by fast neutrons,[1] besides fission products the uranium fraction showed a β-activity with a period 6.5 days.

This activity was induced appreciably only by fast neutrons obtained by bombarding lithium with 3-Mev. deuterons from our cyclotron. The experimental procedure was as follows.

A few grams of uranium oxide, U_3O_8, carefully purified and freed from its disintegration products were exposed to fast neutrons for more than fifty hours. After the exposure, a uranium fraction (U_3O_8) was separated and purified from all possible elements produced by fission as well as from its own disintegration products. The most care was given to the removal of lanthanum from the sample, the procedure taking as long as one day. The activity of the irradiated uranium was compared with that of a nonirradiated sample, in order to subtract the growing β-activity due to disintegration products of uranium. The difference thus obtained shows a 6.5-day period. This activity is probably due to U^{237} produced from U^{238} through loss of a neutron, as in the case of the production of UY from thorium.[2] If this is the case, we have here a member of the missing radioactive family $4n+1$.

The sign of the β-rays was shown to be negative and consequently we suspected the production of a radioactive element of atomic number 93, the chemical properties of which are probably homologous to rhenium. From the decay curve it is clear that its period must be very long, if it exists. To search for such an element, the irradiated uranium oxide, which was freed from fission products as well as its own disintegration products as above mentioned, was left for about 7 days, and was then dissolved in nitric acid. The solution, after an addition of perrhenic acid, was treated with ammonium sulphide and then acidified with sulphuric acid. The precipitated rhenium sulphide, after the removal of contaminated sulphur by carbon bisulphide, was examined for β- and α-activities. Neither of them could be found within the error of our experiments. We may thus conclude, as in the case of 23-minute uranium,[3] that the 6.5-day uranium decays also into a very long-lived 93 element. The detailed accounts of the experiments will be given elsewhere.

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Y. NISHINA
T. YASAKI
H. EZOE

Nuclear Research Laboratory,
Institute of Physical and Chemical Research,

K. KIMURA
M. IKAWA

Chemical Institute,
Faculty of Science,
Imperial University of Tokyo,
Tokyo, Japan,
May 3, 1940.

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