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journal or publication title	Science reports of the Research Institutes, Tohoku University. Ser. A, Physics, chemistry and metallurgy
volume	17/18
page range	111-111
year	1965
URL	http://hdl.handle.net/10097/27223

The Reaction of Uranium with Graphite at High Temperatures*

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Abstract

The reaction of uranium metal with graphite was studied in the temperature range of 800° to 1100°C. It was found that the reaction rate is parabolic and that the activation energy for the reaction is 59 kcal/mole. Marker experiments showed that the growth of the carbide film was due mainly to the migration of carbon. From these results the rate determining process of the reaction seems to be the diffusion of carbon through the carbide film formed on the metal surface. Hydrocarbon, yielded by hydrolysis of the carbide film, was analysed by the gas-chromatographic method. From these results it was confirmed that the film formed in this temperature range was composed of UC only. These results were confirmed by the X-ray diffraction technique. From these parabolic rate constants, the self-diffusion coefficients of carbon in UC were calculated. These values were extrapolated and found to agree well with Chubb's results by tracer technique.

* The **1180th** report of the Research Institute for Iron, Steel and Other Metals. Published in the Transactions of the Japan Institute of Metals, **5** (1964), 111.