densed out frequently, but the appearance and properties were no different from those observed before applying the discharge. It was noted that the side tube was appreciably attacked after some time, and this might be due to the action of a reactive xenon fluoride (compare rhenium hexafluoride) or to the presence of a small amount of moisture in the xenon. It cannot be said that definite evidence for compound formation was found. It does not follow, of course, that xenon fluoride is incapable of existing. It is known, for example, that nitrogen and fluorine do not combine in an electrical discharge, but when prepared indirectly nitrogen trifluoride is a very stable compound.

We are greatly indebted to Dr. F. J. Allen, who kindly supplied the xenon used in the experiments.

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## PREPARATION OF PURE 1-BUTENE AND ISOBUTENE

*Sir:*

Recently [*Compt. rend.*, **196**, 973 (1933)] Matignon, Moureu and Dode reported that pure aluminum oxide yields only 85% of 1-butene, the remainder being 2-butene.

This is not in agreement with the results previously obtained in our laboratories where it has been found that 1-butene without a trace of 2-butene can be prepared by the dehydration of *n*-butyl alcohol with aluminum oxide. The procedure is as follows: *n*-butyl alcohol is passed with a speed of 75 g. per hour through a glass tube (length, 50 cm.; inner diameter, 2 cm.), filled with 6–8 mesh aluminum oxide and maintained at a temperature of 375–425°. The butenes formed are collected and subjected to distillation in a low-temperature Podbielniak precision distilling apparatus [*Ind. Eng. Chem., Anal. Ed.*, **5**, 172 (1933)].

The aluminum oxide was prepared by the precipitation of aluminum nitrate with ammonium hydroxide; activated alumina received from Alcoa Ore Company, St. Louis, Missouri, gives 1-butene 99.6% pure.

The discrepancy between these results and those of Matignon, Moureu and Dode lies probably in the fact that these authors analyzed the product by converting it into dibromide and subjecting the dibromide to distillation. This method of analysis is not a very reliable one, since isomerization of dibromide can readily take place during the distillation.

V. N. Ipatiev [*Ber.*, **36**, 2011 (1903)] obtained pure isobutene by the dehydration of isobutyl alcohol using aluminum oxide. This work has been repeated in our laboratories and isobutene 100% pure is obtained by this method.

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## REMARKS CONCERNING THE PAPER OF G. P. BAXTER AND C. M. ALTER "THE ATOMIC WEIGHT OF LEAD FROM KATANGA PITCHBLENDE"

*Sir:*

G. P. Baxter and C. M. Alter [THIS JOURNAL, **55**, 2785 (1933)] discuss the theory of the origin of the actinium series [Grosse, *Phys. Rev.*, **42**, 565 (1932)] on the basis of their careful and thorough experimental investigations of the atomic weight of uranium lead from Katanga pitchblende. They find that the lead extracted from the altered yellow portions of the mineral has a lower atomic weight than the lead from the original pitchblende and see in this fact a contradiction to the theory.

We consider that their findings support the theory and think the following the most plausible explanation of the facts.

It is usually considered by mineralogists and geologists [see for instance A. Holmes, "The Age of the Earth," pp. 207–217; G. Kirsch, "Geologie and Radioaktivitat," Chapter III] that lead is leached out from pitchblendes with much greater difficulty than uranium. This is due (1) to its much smaller concentration; (2) to the fact that it forms an insoluble uranate, and generally, because of its chemical nature, lead is much less soluble in acid and alkaline waters than uranium, which easily gives soluble uranyl complex salts. It is, therefore, natural to conclude that the uranium, leached out of the original mineral and redeposited in its veins and crevices, will be, to a great extent, free from U-Pb and being of a younger age, will produce, according to the actino-uranium theory, U-Pb containing less AcD and which therefore will have a lower atomic weight, as was actually found by Baxter and Alter. Furthermore, since this secondary uranium mineral is much more exposed to further leaching, its Pb/U ratio might be easily higher than the true ratio and lead to a wrong estimate of its age.

All of these considerations are only valid in the absence of ordinary lead. A strong indication that such is the case here is given by the low atomic weight figures of Baxter and Alter and is definitely proved by F. W. Aston's mass analysis of Katanga lead [*Nature*, **129**, 649 (1932)].

In conclusion we may state that the actino-uranium theory offers new possibilities for checking geological age determinations and elucidating the phenomena of leaching and other alterations of uranium minerals.

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