ACTION OF RADON ON SOME UNSATURATED HYDROCARBONS

Sir:

In continuing the study of the "Action of Radon on Some Unsaturated Hydrocarbons" [Heisig, THIS JOURNAL, **53,** 3245–3263 (1931)] it is found that vinylacetylene condenses to a white solid which becomes orange as the exposure to the action of alpha particles continues. About eleven molecules of the hydrocarbon polymerize per ion pair formed. There is practically no hydrogen and methane evolved.

Propylene condenses to a light mobile liquid. Slightly less hydrogen and methane is given off than in the case of the condensation of ethylene. Somewhat less than three molecules of propylene condense per ion pair formed. The experimental $-M/N$ values agree with those calculated by the method given in the previous paper.

An examination of the heats of formation (from hydrogen and diamond or graphite) of the substance whose action in the presence of radon has been studied shows that the $-M/N$ ratio is higher where the heat of formation is negative and lowest for those substances having a positive or low negative heat of formation.

A calculation of the energy relations using Fajans' atomic linkages [Fajans, *Ber.*, **53,** 643 (1920); **55,** 2836 (1922); *Z. physik. Chem.*, **99,** 395 (1921); Taylor, "Treatise on Physical Chemistry," D. Van Nostrand Co., New York, **1931,** p. 323] shows that the condensation of the saturated hydrocarbons is endothermal while that of the unsaturated compounds is exothermal. The exothermal condensations have a higher $-M/N$ ratio than do the endothermal.

SCHOOL OF CHEMISTRY
UNIVERSITY OF MINNESOTA
MINNEAPOLIS, MINNESOTA
G. B. HEISIG

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ROTENONE. XVIII. CLEAVAGE OF THE OXIDE RING IN TUBAIC ACID

Sir:

It has been shown that tubaic acid ($C_{12}H_{12}O_4$), the only methoxyl-free cleavage product of rotenone thus far obtained, contains a free hydroxyl group, an indifferent oxygen atom and a five-membered side chain. It also contains a double bond, which is easily reduced by catalytic hydrogen to form dihydrotubaic acid. In preparing dihydrotubaic acid it was observed that the amount of hydrogen absorbed was more than the theoretical quantity required for one molecule. Repeated fractional crystallization of the dihydrotubaic acid yielded a small quantity of an acid ($C_{12}H_{16}O_4$) melting at 206° with decomposition. This tetrahydrotubaic acid was found to be practically insoluble in cold chloroform; in alcohol solution it