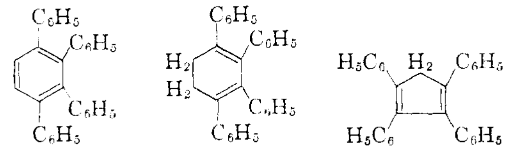
Found: C, 93.87; H, 6.07] is the product. This formulation is supported chemically by bromination of II with N-bromosuccinimide or bromine and dehydrobromination, and by dehydrogenation of II with palladium–charcoal, to 1,2,3,4-tetraphenylbenzene. The ultraviolet spectrum of II, having absorption maxima at 236 mμ, 268 mμ, and 326 mμ (ϵ = 15,600, 10,600 and 12,100) is also consistent with the cyclohexadiene structure. It is anticipated that the foregoing reaction will prove to be a general as well as a convenient method for preparing cyclohexadiene ring systems.



I II III

Mixed condensation between alkyl groups and acetylenes is shown, perhaps even more strikingly, by the reaction of trimethylchromium with tolane. In this example the organochromium(III) reagent *contributes a methyl group*, forming *1,2,3,4-tetraphenylcyclopentadiene*, III, m.p. 176–178°,[4] in addition to the normal product, hexaphenylbenzene. The oxidative potentialities of organochromium(III) are being examined in other areas of organic synthesis.

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ACTIVE PHOSPHORUS

Sir:

An early attempt to produce phosphorus atoms by a condensed discharge proved unsuccessful.[1] In view of the work of Winkler and co-workers[2] on the reactivity of active nitrogen it was felt that a comparative study with phosphorus might prove informative.

An apparatus similar to that used for nitrogen[2] was tried for phosphorus. Argon, as a carrier gas, was passed through a bulb containing phosphorus at a temperature from 25 to 100°. The flow rate of argon was about 50 micromole/sec. at a pressure of approximately 1 mm. in the reaction bulb. When only argon was allowed to flow through the discharge, no decomposition of reactants was observed. Similarly no reaction was observed when P_4 was allowed to mix with reactant with no discharge. A definite reaction was obtained between phosphorus, swept through the discharge with argon, and ethylene, propylene, butene-1, propane, methane, ammonia, and hydrazine. Phosphine was the major gaseous constituent produced in all cases. The reactions also were observed when a microwave discharge was used to generate the "active phosphorus."

Gas chromatographic analysis on the products of methane–active phosphorus reactions indicated at least six volatile products. Phosphine, methylphosphine and ethane were obtained in very small quantities. The ethane was approximately 2% of the phosphine fraction. A considerable amount of solid was deposited in the reaction zone during an experiment. This, along with red phosphorus, appears to be the solid phosphorus hydrides.

It also was found that with a new discharge tube and a clean-walled apparatus, a liquid was produced in relatively large quantities. It was shown not to be P_2H_4 from physical properties and elementary reactions.

Further work along with the identification of the "liquid" product is now being pursued.

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(1) N. M. Gopshtein and S. Z. Roginskii, *J. Phys. Chem. (USSR)*, **7**, 587 (1936).

(2) D. A. Armstrong and C. A. Winkler, *J. Phys. Chem.*, **60**, 1100 (1956).

BOOK REVIEWS

Brandlehre und Chemischer Brandschutz. Eine Einführung in die Grundlagen. Zweite Ergänzte und Erweiterte Auflage. BY LUDWIG SCHEICHL, Oberregierungsrat. Dr. Alfred Hüthig Verlag, Wilckenstrasse 3, Heidelberg, Germany. 1958. xiv + 424 pp. 16 × 23 cm. Price, DM 28.—.

This volume is not a scientific and technological treatment of ignition, combustion and explosions, as one would expect it to be if it were a technical book on "Brandlehre," but rather has as its main objective classifications and descriptions of materials in the technology of "Brandschutz," *i.e.*, of fire-proofing, fire-prevention, control and extinction. It would, therefore, have been more descriptive of the contributions of this book if the word "Brandlehre" had been omitted from the title. While technological aspects and classifications in "Chemischer Brandschutz" are well presented in the last two parts (Teil B and C) of the book, the first 207 pages, exclusive of 40 pages of classifications and definitions pertaining to "Brandlehre" (pages 19–40 and 181–207) comprise good elementary, but unnecessary, reviews of well-known principles of physical chemistry. Pages 19 to 40 present interesting, but not actually fundamental, classifications of materials of combustion and definitions pertaining to ignition, flames, combustion and explosion. Pages 181 to 207 outline and classify burning processes and mechanisms, but the classifications are incomplete as are the descriptions of burning processes. It is true, however, that attention is called occasionally elsewhere in "Teil A" to applications of particular physico-chemical principles in combustion technology.

The actual fundamental principles comprising the science and technology of ignition, combustion and even fire-proofing and the control and extinguishing of combustion are merely mentioned briefly in spite of a great deal of the book being devoted to principles one might readily apply in this technology. It is interesting in view of the many