This method of production of pregnadienolone appears to be superior to the hitherto published methods[3,4] where some by-product[10] formation is involved. The successful degradation of these steroidal alkaloids in high yields, particularly solasodine to pregnadienolone, a biologically important hormone intermediate, may be of considerable industrial importance.

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[10] The stucture and the various chemical manifestations of this substance will be published in the full report.

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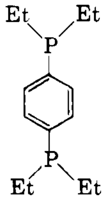
## *P,P,P',P'*-Tetraethyl-*p*-phenylenediphosphine

*Sir:*

A recent preliminary report by Clifford and Olsen[1] prompts us to record at this time our preparation of *P,P,P',P'*-tetraethyl-*p*-phenylenediphosphine (I). This substance is the phosphorus analog of the tetraalkyl-*p*-phenylenediamines, which are the precursors of the highly colored Wurster radical ions. Our studies on the behavior toward oxidizing agents of the diphosphine I and of the corresponding N-P system, will be published elsewhere.



I

The diphosphine I was obtained in *ca.* 20% yield from the reaction of diethylchlorophosphine[2] with *p*-phenylenedilithium[3] in petroleum ether at temperatures below 30°, in a nitrogen atmosphere. I was isolated by extraction into hydrochloric acid followed by the usual alkaline treatment and fractional distillation. The diphosphine I had b.p. 172–174° (9 mm.), $n_D^{25}$ 1.5666, bands at 6.85, 7.00, 7.22, 8.1, and 8.90 $\mu$. Calcd. for $C_{14}H_{24}P_2$: C, 66.2; H, 9.5; P, 24.4. Found: C, 66.2; H, 9.4; P, 23.9.

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## A New Synthesis of Serotonin

*Sir:*

The nitroethylation of indoles and substituted indoles, yielding 3-(2-nitroethyl)indoles has been previously described.[1-3] Catalytic hydrogenation of the 3-(2-nitroethyl)indoles provides a general synthetic route to tryptamine and substituted tryptamines. We wish to record the successful application of this procedure to the synthesis of serotonin.

Dropwise addition of a 1*M* excess of nitroethylene[4,5] to molten 5-benzyloxyindole at steambath temperature (total time 1.83 hr.) gave 3-(2-nitroethyl)-5-benzyloxyindole (I, hygroscopic white crystals from methylene chloride-light petroleum (b.p. 60–68°), m.p. 93.5–95°, calcd. for $C_{17}H_{16}N_2O_3$ (296.31): C, 68.90; H, 5.44; N, 9.45; found: C, 68.62; H, 5.58; N, 9.13) in 45% yield. Use of excess nitroethylene is desirable since unreacted 5-benzyloxyindole (36% by wt.) and I (64%) form a eutectic mixture, m.p. 81–81.5°. Similar reactions of 5-benzyloxyindole with equimolar portions of $\beta$-nitrostyrene (6 hr., 72% yield) and $\beta$-methyl-$\beta$-nitrostyrene (22 hr., 37% yield), both at steam bath temperature, gave 3-(1-phenyl-2-nitroethyl)-5-benzyloxyindole (II, white platelets from ethanol, m.p. 117–118°. calcd. for $C_{23}H_{20}N_2O_3$ (372.41): C, 74.17; H, 5.41; N, 7.52; found: C, 74.36; H, 5.40; N, 7.36) and 3-(1-phenyl-2-nitropropyl)-5-benzyloxyindole (III, white rod-like crystals from ethanol, m.p. 152–152.5°, calcd. for $C_{24}H_{22}N_2O_3$ (386.43): C, 74.59; H, 5.74; N, 7.25; found: C, 74.80; H, 5.61; N, 7.26).

Hydrogenation at 2 atm. over platinic oxide catalyst of the adducts I–III gave in high yields the corresponding tryptamines, isolated as the picrates: Ia (84% yield from I), very hygroscopic reddish orange crystals from ethanol, m.p. 231.5–

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