Whether the hexachlorobenzene is formed by the explosion or by a pyrolysis, the $\rightarrow CCl$ radical seems an obvious intermediate between it and chloroform.

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The Fluorescence of Double Salts of Calcium Phosphate

BY JULIAN GLASSER AND GORTON R. FONDA

Ox teeth are known to consist of 1% of organic matter combined with calcium phosphate in an apatite structure. Their fluorescence under ultraviolet radiation is destroyed by burning out their organic content at 600° or higher, but is increased by firing at an optimum temperature of 400°. After solution in acid and precipitation in alkali, the fluorescence is fully restored by refiring at 400°.

A similar product can be made synthetically by coprecipitating a calcium salt with a mixture of sodium phosphate and tartrate and firing at 400°. An optimum fluorescence bluish-white in color is obtained when the solution of sodium phosphate contains 11 molar per cent. of sodium tartrate. The 400° treatment is effective only when carried out in the presence of oxygen. It burns off most of the tartrate but leaves an oxidized residue at a concentration of about 2% by weight combined with the phosphate. The fluorescence under 3650 Å. is double that of teeth and is about 4% of the theoretical, on the basis of complete quantum conversion. The product again has the apatite structure but with an apparently slight contraction of the lattice. Its fluorescence is retained after solution in acid and reprecipitation with alkali. It is destroyed by firing at temperatures above 400°.

A fluorescent product also results by firing at 400° the coprecipitate of calcium phosphate contaminated with some other organic radical, such as succinate or lactate. In fact it appears that the contaminant may even be the calcium salt of an inorganic acid radical, such as borate or chromate. The fluorescence of solids is generally associated with the presence of a small amount of metallic impurity as activator. In this case, however, it appears that the activator may be a foreign acid radical. The possibility of such a type of fluoreseence is being studied further.

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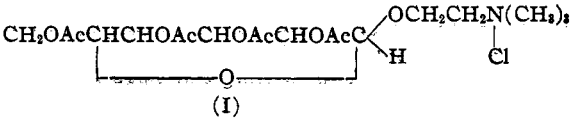
beta-Tetraacetylcholine-*d*-glucoside[1,2]

BY ERNEST L. JACKSON

Schroeter and Strassberger[3] prepared 2-chloroethyl-*d*-glucoside by the reaction of glucose with ethylene chlorohydrin containing hydrogen chloride, condensed their impure 2-chloroethylglucoside with trimethylamine, and from the products prepared a phosphomolybdate of cholineglucoside. The chloride of cholineglucoside, showing $[\alpha]^{15}D + 49.5°$ in water, was obtained in crystalline condition from the phosphomolybdate.

By the reaction of trimethylamine with pure crystalline beta-tetraacetyl-2-chloroethyl-*d*-glucoside[4] in benzene solution the writer has prepared the crystalline chloride of tetraacetylcholine-*d*-glucoside (I) which has a melting point of 230° and a specific rotation[5] of −25.6° in water and −13.5° in chloroform.



(I)

This compound must be a beta-pyranoside, since the parent tetraacetyl-2-chloroethylglucoside was prepared from ethylene chlorohydrin, acetobromoglucose and silver carbonate, a reaction which in the case of other alcohols is known generally to produce beta-pyranosides. Although the chloride of beta-cholineglucoside has not been prepared in crystalline condition, its rotation as determined by an indirect method is near −27° in water. The dextrorotation of Schroeter and Strassberger's product indicates it to be an alpha form which was separated from the mixture of glycosides expected to result from their method of preparation.

(1) Publication authorized by the Surgeon General, U. S. Public Health Service.

(2) The pharmacological properties of this compound are under investigation by Dr. M. I. Smith of this Institute.

(3) G. Schroeter and L. Strassberger, *Biochem. Z.*, **232**, 454 (1931).

(4) Walter Schoelier and Hans-Georg Allardt, German Patent 527,036 (1926); *Chem. Zentr.*, **102**, II, 1452 (1931).

(5) Except where otherwise stated, all rotations in this article are specific rotations at 20° for sodium light.