aqueous ethanol; it sintered at 212° and melted at 229.5–231°.

Anal. Calcd. for $C_{13}H_{14}O_2$: C, 77.20; H, 6.98; neut. equiv., 202.6. Found: C, 77.31; H, 6.70; neut. equiv., 206.2.

Octahydroanthracene-9-glyoxal Hydrate.—9-Acetyloctahydroanthracene (15 g.) was added to a stirred solution containing freshly sublimed selenium dioxide (7.3 g.), water (1.2 cc.) and dioxane (100 cc.) at 50–55°. The mixture was refluxed for four hours. Removal of the precipitated selenium, dilution with water, and cooling gave 14.1 g. of the glyoxal hydrate; m. p. 100–105° (dec.). This material although it crystallized well gave variable analytical results lying between those of the anhydrous and hydrated glyoxal. The monophenylhydrazone melted at 201.5–202.5°.

Anal. Calcd. for $C_{22}H_{24}N_2O$: C, 79.48; H, 7.28. Found: C, 79.54; H, 7.51.

Octahydroanthracene-9-carboxylic Acid.—To a solution of the glyoxal (4.0 g.) in ethanol (60 cc.) was added hydrogen peroxide (20 cc., 30%). Sodium hydroxide (10%) was added dropwise until vigorous reaction no longer occurred with each additional drop. The solution was warmed at 80° for thirty minutes, diluted with water, treated with norite, filtered, cooled, and made acidic with hydrochloric acid. The crude acid was purified by recrystallization from aqueous ethanol; wt. 2.2 g. It sintered at 186° and melted at 216.5–219°.

Anal. Calcd. for $C_{15}H_{18}O_2$: C, 78.23; H, 7.88. Found: C, 78.17; H, 8.26.

The methyl ester, prepared by treating a solution of the acid in ether with diazomethane, melted at 74.5–75°.

Anal. Calcd. for $C_{16}H_{20}O_2$: C, 78.65; H, 8.25. Found: C, 78.87; H, 8.45.

Summary

1. 4-Acetylhydrindacene in the haloform reaction behaves as if it were an unhindered ketone, whereas 9-acetyloctahydroanthracene reacts like a hindered ketone.

2. This difference in the steric influence of the methylene groups in five- and six-membered rings supports the proposal by Mills and Nixon[2] that the orthomethylene groups in hydrindene are distorted toward one another.

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Methyl 6-Iodo-6-desoxy-α-D-glucopyranoside

BY MORRIS ZIEF AND ROBERT C. HOCKETT

The methods most frequently employed to hydrolyze the acetates of sugars and sugar derivatives make use of mild alkaline agents.[1] Such agents are quite suitable for saponification of the esters of glycosides because of the extreme stability of the glycosidic link to bases. Acids, while suitable for catalysis of ester hydrolysis, are also able to attack the glycosidic link and are therefore much less selective.

However, when one acetoxyl group of an acetylated glycoside has been replaced by a halogen, the problem of selective hydrolysis of the ester linkages becomes a delicate one. The tendency of alkaline agents to attack the halogen as well as the acetyls and of acids to hydrolyze both esters and glycosides, requires dependence upon differences in the relative rates of the various reactions for selectivity.

Fischer, Helferich and Ostmann[2] obtained methyl 6-bromo-6-desoxy-β-D-glucopyranoside in an 88% yield from the corresponding triacetate by the action of a saturated solution of ammonia in methanol for five hours at room temperature. Oldham[3] obtained methyl 6-iodo-6-desoxy-β-D-glucopyranoside in a "bad yield" from the triacetate by the action of a 5% methanol solution of dimethylamine.

When Helferich and Brederick[4] subjected methyl 2,3,4-triacetyl-6-chloro-6-desoxy-α-D-glucopyranoside to the action of 10% aqueous hydrochloric acid at steam-bath temperature for three hours, both the acetyl groups and methyl were removed and the product was 6-chloro-6-desoxy-D-glucose in an unspecified yield.

We were therefore rather surprised to discover that methyl 2,3,4-triacetyl-6-iodo-6-desoxy-α-D-glucopyranoside can be deacetylated without rupture of the glucosidic linkage by heating under reflux for two hours at steam-bath temperature with a mixture of two parts of 95% alcohol and five parts of 5% aqueous hydrochloric acid.

Our thanks are due to Hoffmann–LaRoche, Inc., for a fellowship under which the present investigation was carried out.

Experimental

Methyl 2,3,4-Triacetyl-6-tosyl-α-D-glucopyranoside.—The sirupy compound was prepared exactly as described by Compton[5] from a 10-g. sample of methyl α-D-glucopyranoside.

Methyl 2,3,4-Triacetyl-6-iodo-6-desoxy-α-D-glucopyranoside.—In the conversion of the tosyl to the iodo derivative the conventional sealed tube reaction with sodium iodide in acetone was eliminated. The entire sample of sirupy tosyl compound was dissolved in 250 cc. of methyl isobutyl ketone, which boils at 119°. A quantity of 22 g.

(1) Ammonia in methanol: Fischer and Bergmann, *Ber.*, **50**, 1047 (1917). Liquid ammonia: Fischer and Strauss, *ibid.*, **45**, 2467 (1917). Alcoholic dimethylamine: Irvine, Oldham and Skinner, THIS JOURNAL, **51**, 1279 (1929). Barium methylate: Weltzien and Singer, *Ann.*, **448**, 104 (1925). Sodium methylate: Fischer and Bergmann, *Ber.*, **52**, 830 (1919); Zemplén, *ibid.*, **59**, 1258 (1926); Zemplén and Kunz, *ibid.*, **56**, 1705 (1923); Zemplén and Pacsu, *ibid.*, **62**, 1613 (1929).

(2) Fischer, Helferich and Ostmann, *Ber.*, **53**, 876 (1920).

(3) Oldham, *J. Chem. Soc.*, **127**, 2844 (1925).

(4) Helferich and Brederick, *Ber.*, **60**, 1995 (1927).

(5) Compton, THIS JOURNAL, **60**, 397 (1938).

of sodium iodide was added and the mixture was refluxed for three hours at atmospheric pressure. After cooling, the precipitate of sodium *p*-toluenesulfonate and excess sodium iodide was separated by filtration. The filtrate was concentrated *in vacuo* and worked up according to Compton.[5] Our product weighed 8.5 g., representing 38.3% of the theoretical yield from the methyl glucoside used. It melted at 148.5–150° (cor.).

Methyl 6-Iodo-6-desoxy-α-D-glucopyranoside.—Methyl 2,3,4-triacetyl-6-iodo-6-desoxy-α-D-glucopyranoside (6 g.) was dissolved in 20 cc. of 95% ethyl alcohol. Fifty cc. of approximately 5% HCl (6 cc. of concd. HCl diluted to 50 cc.) was added and the mixture was heated under reflux on the steam-bath for two hours. After cooling, the solution was shaken with eleven grams of freshly prepared silver carbonate. The precipitate was filtered off and the solution was gassed with hydrogen sulfide, filtered, decolorized, and concentrated at reduced pressure to a thick sirup which immediately crystallized. The solid was heated on the steam-bath with 15 cc. of ethyl acetate to which absolute ethyl alcohol was added dropwise until complete solution occurred. The solution was decolorized and filtered. On cooling, colorless crystals (2.5 g.), melting at 136.9–137.4° (cor.) and rotating[6] +93.9° (*C*, 0.3192; H_2O; 20.9°) were obtained.

Anal. Calcd. for $C_7H_{13}O_5I$: C, 27.6; H, 4.28; I, 41.77. Found: C, 27.9; H, 4.47; I, 41.7.

Summary

A method is described for removal of the acetyl groups from methyl 2,3,4-triacetyl-6-iodo-6-desoxy-α-D-glucopyranoside without other changes. Methyl 6-iodo-6-desoxy-α-D-glucopyranoside is described and the use of methyl isobutyl ketone as a vehicle for the replacement of *p*-toluenesulfonate groups by iodide is recorded.

(6) Rotations refer to specific rotations of the D line of sodium. Concentrations refer to the weight of sample in one hundred cubic centimeters of solution.

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[CONTRIBUTION FROM THE NICHOLS LABORATORY, NEW YORK UNIVERSITY]

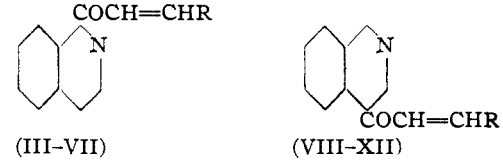
Syntheses and Certain Reactions of 1-Isoquinolyl and 4-Isoquinolyl Methyl Ketones

BY JOHN J. PADBURY[1] AND H. G. LINDWALL

1-Isoquinolyl methyl ketone (I) was prepared by two methods. It was obtained by the method of Kaufman[2] from 1-cyanoisoquinoline and methylmagnesium iodide. However, since 1-cyanoisoquinoline could be obtained pure only with difficulty, another method was sought. The ethyl ester of isoquinaldinic acid was condensed with ethyl acetate under Claisen conditions, and the ketone (I) was obtained by hydrolysis of the intermediate β-keto ester. Grosheintz and Fischer[3] have observed that in the preparation of aldehydes from 1-acyl-1,2-dihydroquinaldonitriles by treatment with sulfuric acid quinaldinic acid can be obtained in good yield as a by-product. Using a similar procedure, 1-cyano-2-benzoyl-1,2-dihydroisoquinoline[4] gave isoquinaldinic acid which was then converted to the ethyl ester.

4-Isoquinolyl methyl ketone (II) was prepared in an analogous manner by condensation of ethyl 4-isoquinolinecarboxylate with ethyl acetate.[5] This ketone could not be obtained from 4-cyanoisoquinoline and methylmagnesium iodide.

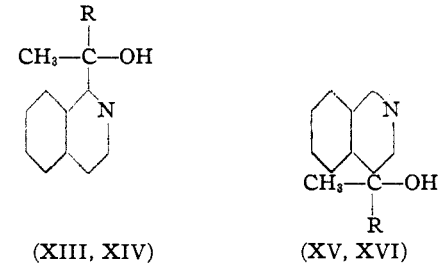
The condensation reactions of I and II with a series of aromatic aldehydes were studied. Using sodium hydroxide or diethylamine as catalysts condensation products of the unsaturated type were obtained (III–XII).



(III–VII) (VIII–XII)

III, VIII, R = C_6H_5—
IV, IX, R = 4-$CH_3OC_6H_4$—
V, X, R = 3,4-$(CH_2O_2)C_6H_3$—
VI, XI, R = 2-ClC_6H_4—
VII, XII, R = 2,3-$(OCH_3)_2C_6H_3$—

The Grignard reagent was found to react normally with I and II to give tertiary alcohols (XIII–XVI).



(XIII, XIV) (XV, XVI)

XIII, XV, R = CH_3—
XIV, XVI, R = C_6H_5—

Experimental[6]

1-Cyano-2-benzoyl-1,2-dihydroisoquinoline.—This compound was prepared by a modification of the procedure used by Reissert.[4] To a solution of 294 g. (6 moles) of sodium cyanide in 2.5 liters of water was added 258 g. (2 moles) of isoquinoline, and the mixture was stirred rapidly

(1) Present address: American Cyanamid Co., Stamford, Connecticut.

(2) Kaufman, Dändliker and Burkhardt, *Ber.*, **46**, 2934 (1913).

(3) Grosheintz and Fischer, THIS JOURNAL, **63**, 2021 (1941).

(4) Reissert, *Ber.*, **38**, 3427 (1905).

(5) Since this work was completed the preparation of 4-isoquinolyl methyl ketone has been reported by Koelsch (*J. Org. Chem.*, **10**, 34 (1945)) who obtained the ketone (II) by the same reaction. As he has pointed out, the ethyl ester of 4-isoquinolinecarboxylic acid undergoes the Claisen condensation comparatively poorly. This observation finds confirmation in our work. The lesser activity of the carbethoxy group in the 4-position is demonstrated by a comparison of the yields of 4-isoquinolyl methyl ketone (40%) and 1-isoquinolyl methyl ketone (85%).

(6) All melting points are corrected. Boiling points are uncorrected.