Anal. Calcd. for $C_{16}H_{14}O$: C, 86.45; H, 6.34. Found: C, 86.25; H, 6.15.

(b) Using Phosphorus Pentoxide in Phosphoric Acid.—The acid XVII (0.570 g.) was added to a solution of 13 g. of phosphorus pentoxide dissolved in 9 cc. of 85% orthophosphoric acid[3] and the mixture was heated on the water-bath for 7 minutes. Isolation as usual[3] gave after crystallization from methanol–water 0.49 g. (94%) m.p. 93–99°. Mixed with the compound from (a) it melted at 95–99°.

The semicarbazone was obtained in quantitative yield and melted after extensive crystallization from ethanol at 225–226° (dec.).

Anal. Calcd. for $C_{17}H_{17}ON_3$: N, 15.04. Found: N, 14.7.

1,2,8,9,10,10a-Hexahydrocyclohepta[klm]benz[e]indene (XVI).—Clemmensen reduction[12] of 0.40 g. of XVIII with a 30-hour reaction period gave an oil which formed a complex when 0.413 g. of picric acid was added. The picrate crystallized from alcohol when seeded with the picrate previously obtained and melted at 128–129°. The hydrocarbon from the picrate melted at 63–65° after 2 crystallizations from methanol–water and on mixing with XVI obtained above the m.p. was unchanged. The yield was 0.20 g. (54%). Attempts to reduce the ketone (Wolff–Kishner) failed as before.

Attempted Preparation of Pyrene from XVI.—Seventy mg. of XVI with 70 mg. of palladium–charcoal heated at 340–400° under nitrogen for 1 hour gave 70 cc. of hydrogen. The brown oil obtained could not be crystallized and addition of 90 mg. of picric acid gave a tar-like solid which resisted purification.

SALT LAKE CITY, UTAH RECEIVED JUNE 28, 1951

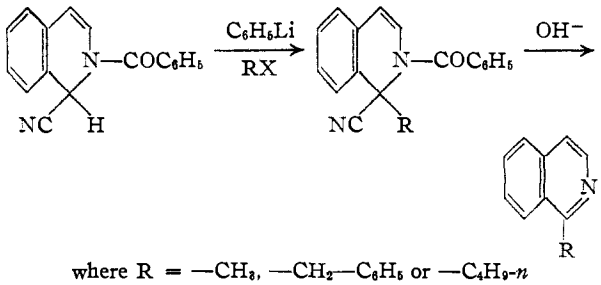
[CONTRIBUTION FROM THE DEPARTMENT OF CHEMISTRY, UNIVERSITY OF ROCHESTER]

Reissert Compounds. Further Alkylation Studies and a Novel Rearrangement[1]

BY V. BOEKELHEIDE AND JOSEPH WEINSTOCK

In a previous study it was shown that 2-benzoyl-1-cyano-1,2-dihydroisoquinoline could be alkylated using certain Mannich bases. This work has now been extended to show that Reissert compounds of both the isoquinoline and quinoline series can be readily alkylated using alkyl halides. Since these alkylated Reissert compounds can be easily hydrolyzed with aqueous base to the corresponding substituted aromatic heterocycles, this represents a convenient method of preparing various substituted quinoline and isoquinoline derivatives. In the course of this study it was discovered that Reissert compounds, on heating in the presence of strong base, undergo a rearrangement to yield the corresponding aromatic C-acyl heterocycles.

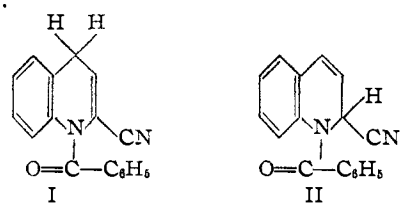
In a previous communication it was reported that 2-benzoyl-1-cyano-1,2-dihydroisoquinoline could be alkylated by treatment with certain Mannich bases and that the resultant products could readily be hydrolyzed with aqueous base to the corresponding 1-substituted isoquinoline derivatives.[2] Since this procedure would be much more useful if alkyl halides could be used as well as Mannich bases in the alkylation step, we have extended our previous study and are now able to report that, under the proper conditions, Reissert compounds are smoothly alkylated by various alkyl halides. As shown in the equations below, 2-benzoyl-1-cyano-1,2-dihydroisoquinoline has been converted by this two-step procedure to 1-methyl-, 1-benzyl- and 1-*n*-butylisoquinoline, respectively, in yields ranging from 41 to 78%.



where R = $-CH_3$, $-CH_2-C_6H_5$ or $-C_4H_9$-*n*

In order to obtain a good yield in the alkylation step, it was necessary that the conversion of the Reissert compound to its anion be done under mild conditions. Phenyllithium in an ether–dioxane solution proved to be the most satisfactory of the reagents investigated for this purpose, although ethylmagnesium bromide could also be employed. In the conversion to the isoquinoline derivatives the isolation of the intermediate alkylation product was found to be unnecessary and, in those instances where these intermediates were oils, their isolation was not attempted. The identity of the isoquinoline derivatives was established in each case either by direct comparison with an authentic specimen or by preparation of suitable derivatives. The overall procedure would appear to have many practical applications and to be superior to previous methods of preparing such derivatives as 1-methylisoquinoline.[3]

In the case of the Reissert compound derived from quinoline, methylation followed by alkaline hydrolysis gave lepidine in good yield. Although quinaldine might have been anticipated as a product, none was isolated from the reaction mixture. This result raised the question as to whether the intermediate alkylation product (III) should be assigned a 1,2-dihydro or a 1,4-dihydro structure. Actually, of course, it was not certain whether the quinoline Reissert compound possessed structure II, as commonly written, or whether it should be written as I.



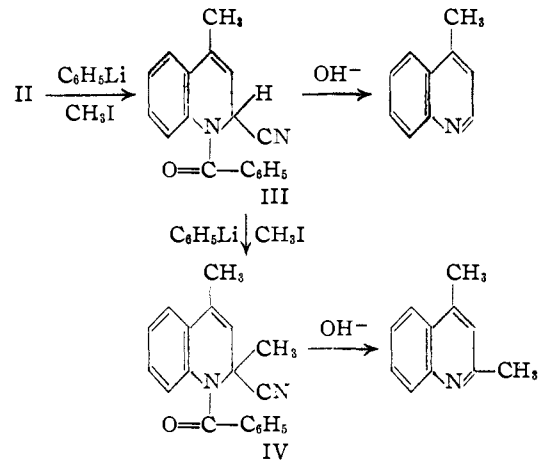
Recently Seeley, Yates and Noller have examined the two isomeric quinoline 1,2-dicyanides and by a comparison of the ultraviolet spectra of the two iso-

(1) Aided by a grant from the National Foundation for Infantile Paralysis, Inc.

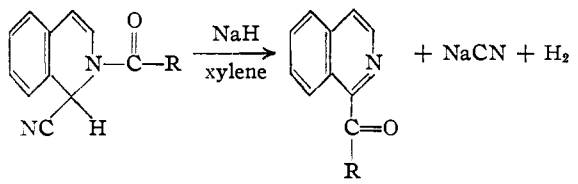
(2) V. Boekelheide and C. Ainsworth, THIS JOURNAL, **72**, 2134 (1950).

(3) R. S. Barrows and H. J. Lindwall, *ibid.*, **64**, 2430 (1942); R. Schlittler and J. Müller, *Helv. Chim. Acta*, **31**, 914 (1948).

mers with those of known compounds they were able to decide that the lower-melting isomer was a 1,4-dihydroquinoline derivative whereas the higher-melting isomer was a true 1,2-dihydro derivative.[4] Unfortunately, the spectrum of the quinoline Reissert compound was markedly different from both of the spectra of the quinoline 1,2-dicyanides and no conclusion could be made regarding the structure of the Reissert compound by reference to their work. However, evidence supporting II as the correct structure for the Reissert compound was obtained by subjecting III to a second methylation. As shown below, the dimethylated product, when subjected to alkaline hydrolysis, gave 2,4-dimethylquinoline and must therefore be represented by structure IV. Since the ultraviolet absorption spectra of III, IV and the quinoline Reissert compound (II) were found to be closely similar (see Fig. 1), it would seem most likely that all are members of the 1,2-dihydroquinoline series.



As mentioned previously the conversion of Reissert compounds to the corresponding anions must be done carefully under mild conditions or the reaction follows a different course. Thus, when 2-benzoyl-1-cyano-1,2-dihydroisoquinoline was heated with sodium hydride in xylene, a rearrangement occurred yielding 1-benzoylisoquinoline and sodium cyanide.[5] The identity of the rearranged product was established both by reduction of the 1-benzoylisoquinoline to 1-benzylisoquinoline and by preparation of characteristic derivatives. The reaction is



where R = $-C_6H_5$ or $-CH_3$

In a similar manner, 2-acetyl-1-cyano-1,2-dihydroisoquinoline underwent rearrangement to yield 1-acetylisoquinoline, although in this case the yield was only 30% in contrast to 70% for the benzoyl

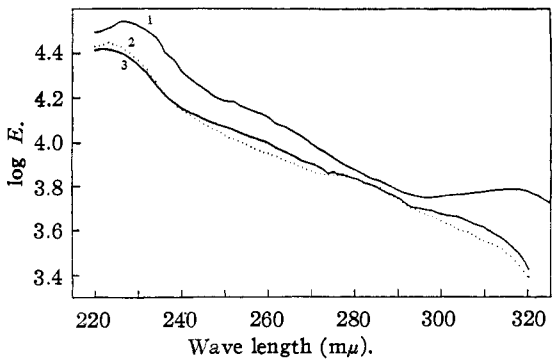


Fig. 1.—Ultraviolet absorption spectra in 95% ethanol: (1) 1-benzoyl-2-cyano-2,4-dimethyl-1,2-dihydroquinoline; (2) 1-benzoyl-2-cyano-1,2-dihydroquinoline; (3) 1-benzoyl-2-cyano-4-methyl-1,2-dihydroquinoline.

derivative. In order to prove the identity of the 1-acetylisoquinoline, an authentic sample of the ketone was prepared in the conventional manner,[6] and from this work it was apparent that, despite the low yield, the rearrangement procedure was preferable from a preparative viewpoint because of its convenience.

That the rearrangement was of general character was shown by the study of several quinoline Reissert compounds. Thus, 1-acetyl-2-cyano-1,2-dihydroquinoline and 1-benzoyl-2-cyano-1,2-dihydroquinoline were readily rearranged to 2-acetyl- and 2-benzoylquinoline, respectively.

At the time of our preliminary publication on this rearrangement,[5] McEwen, Kindall, Hazlett and Glazier reported that treatment of 1-benzoyl-2-cyano-1,2-dihydroquinoline with methylmagnesium bromide gave methylphenyl-2-quinolylcarbinol.[7] It is obvious that the rearrangement which they encountered is of the same type as that found in our own work, and the important step in both is the rearrangement of the anion of a Reissert compound to the corresponding aromatic C-acyl heterocycle. The question of how this transformation occurs is an interesting one, since plausible reaction schemes can be devised to fit either an intramolecular process (A) or an intermolecular process (B).

Thus far, experiments designed to test (A) or (B) as possible mechanisms have yielded inconclusive results. For example, if (A) were the mechanism of the reaction, it might be expected that 2-cinnamoyl-1-cyano-1,2-dihydroisoquinoline (V, R = $-CH{=}CH{-}C_6H_5$) would undergo cyclization forming a five-membered ring rather than rearrangement. Unfortunately the reaction proceeded abnormally and neither a cyclization nor rearrangement product was isolated. On the other hand it might be expected that evidence regarding mechanism B might be had by a study of compounds of the type of the postulated intermediate VIII. The preparation of VIII (R = $-C_6H_5$) was readily accomplished by benzoylation of 2-benzoyl-1-cyano-1,2-dihydroisoquinoline, but attempts to convert it to 1-benzoylisoquinoline (VI) by reaction with the

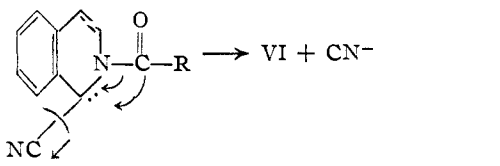
(4) M. I. Seeley, R. E. Yates and C. R. Noller, THIS JOURNAL, 73, 772 (1951).

(5) This portion of the paper was reported in the Abstracts of the 119th Meeting of the American Chemical Society, Boston, Mass., April, 1951, p. 10 M.

(6) J. J. Padbury and H. G. Lindwall, THIS JOURNAL, 67, 1268 (1945).

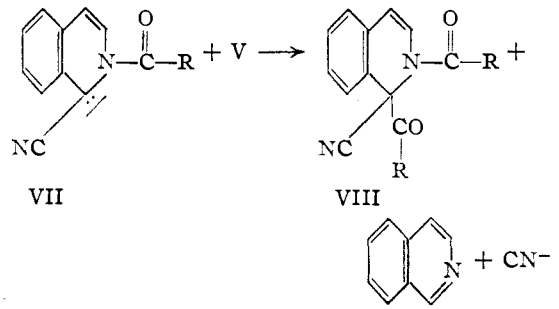
(7) W. E. McEwen, J. V. Kindall, R. N. Hazlett and R. H. Glazier, Abstracts of the 119th Meeting of the American Chemical Society, Boston, Mass., April, 1951, p. 11 M.

(A)



(B)

(1)



VII VIII

(2) VII + VIII ⟶ VI + VIII + CN^-

anion of a Reissert compound were unsuccessful. The only product identified from this attempted rearrangement was 2-benzoyl-1-cyano-1,2-dihydroisoquinoline.

Experimental[7a]

2-Benzoyl-1-cyano-1-methyl-1,2-dihydroisoquinoline.—To a prepared solution of 83.5 g. (0.32 mole) of 1-cyano-2-benzoyl-1,2-dihydroisoquinoline[6] in 350 ml. of dry dioxane and 100 ml. of dry ether maintained at −10° under an atmosphere of nitrogen with stirring there was added dropwise 450 ml. of a 0.78 *N* ethereal solution of phenyllithium (0.35 ole). To the deep red reaction mixture there was then slowly added 56.2 g. (0.40 mole) of methyl iodide. The reaction mixture was stirred in the cold for two hours and then overnight at room temperature. After the mixture had been washed successively with 50-ml. portions of water, 0.5 *N* hydrochloric acid, and water, it was filtered and the solvent was removed *in vacuo*. Crystallization of the residue was aided by cooling and scratching the sides of the flask. After recrystallization from ethanol there was obtained 62.9 g. (72%) of white crystals, m.p. 119–121°. An additional 10 g. of impure material could be obtained from the mother liquor, but, since this contained starting material, it was not desirable to use it in the preparation of 1-methylisoquinoline.

Anal. Calcd. for $C_{18}H_{14}N_2O$: C, 78.81; H, 5.14. Found: C, 79.14; H, 5.05.

1-Methylisoquinoline.—A solution of 62.2 g. (0.23 mole) of 2-benzoyl-1-cyano-1-methyl-1,2-dihydroisoquinoline in 50 ml. of ethanol was added to a solution of 32.0 g. (0.57 mole) of potassium hydroxide in 100 ml. of water and the mixture was boiled under reflux for one-half hour. The homogeneous solution was then cooled and extracted four times with 75-ml. portions of ether. The combined ethereal extract was washed with water and dried over anhydrous magnesium sulfate. After removal of the solvent, the residual oil on distillation yielded 26.0 g. (80%) of a colorless oil; b.p. 81° at 1 mm., $n^{25}D$ 1.6102. The identity of the 1-methylisoquinoline was established by preparation of the corresponding picrate, m.p. 229–232° (lit.[8] m.p. 230–232°), and methiodide, m.p. 204–208° (lit.[3] m.p. 208°).

1-Benzylisoquinoline and 1-Butylisoquinoline.—To a solution prepared by adding 25 ml. of 0.9 *N* ethereal phenyllithium solution to 5.2 g. of 2-benzoyl-1-cyano-1,2-dihydroisoquinoline there was added 4.5 g. of benzyl bromide. When the reaction mixture was treated as described above in the preparation of 2-benzoyl-1-cyano-1-methyl-1,2-dihydroisoquinoline, a residual oil was obtained which did not crystallize. The crude material was, therefore, hydrolyzed directly by heating for one hour with a mixture of 4.0 g. of potassium hydroxide in 20 ml. of water and 10 ml. of ethanol. The mixture was extracted with ether and the ethereal extract was washed with water. When the ethereal extract was treated with a 0.5 *N* solution of hydrochloric acid, the hydrochloride of 1-benzylisoquinoline precipitated and was collected by filtration. There was obtained 3.9 g. (78%) of crystalline hydrochloride whose identity was established by its conversion to the free amine, m.p. 53–55° (lit.[8] m.p. 56°) and to the corresponding picrate, m.p. 181–182° (lit.[8] m.p. 184°). Also, these samples showed no depression of melting point on admixture of authentic specimens prepared through the Wolff–Kishner reduction of 1-benzoylisoquinoline (*vide infra*).

When the above reaction was carried out in the same fashion except that 25 ml. of a 1.1 *N* ethereal solution of ethylmagnesium bromide was substituted for the phenyllithium solution and tetrahydrofuran was substituted for dioxane, 1-benzylisoquinoline was again obtained but in poor yield.

When the procedure described above for 1-benzylisoquinoline was repeated on the same scale using 4.0 g. of *n*-butyl bromide in place of the benzyl bromide, it was found necessary to heat the alkylation mixture at 60° for six hours to bring about complete reaction. The crude oil from the alkylation in this case, also, could not be crystallized and was hydrolyzed directly by heating with aqueous ethanolic potassium hydroxide. The yield of crude 1-butylisoquinoline was 1.52 g. (41%) which was identified by its conversion in excellent yield to the picrate, m.p. 183–185° (lit.[9] m.p. 185.5°).

1-Benzoyl-2-cyano-4-methyl-1,2-dihydroquinoline (III).—This was prepared on a 0.04 molar scale from 1-benzoyl-2-cyano-1,2-dihydroquinoline by methylation with methyl iodide as described in the preparation of 2-benzoyl-1-cyano-1-methyl-1,2-dihydroisoquinoline. The product, after recrystallization from ethanol, consisted of 3.3 g. (29%) of white crystals, m.p. 159–161.5°.

Anal. Calcd. for $C_{18}H_{14}N_2O$: C, 78.79; H, 5.14. Found: C, 78.84; H, 5.07.

Hydrolysis of 1.0 g. of III in the same manner as described for 1-methylisoquinoline gave 0.32 g. of oil which formed a yellow picrate, m.p. 216.5–218.5° (lit.[10] m.p. 220°) and a yellow styphnate, m.p. 226–227.5° (lit.[10] m.p. 237°). Samples of the picrate and styphnate, on admixture of samples of these derivatives prepared from an authentic sample of lepidine, did not show any depression of melting point.

1-Benzoyl-2-cyano-2,4-dimethyl-1,2-dihydroquinoline (IV).—This was prepared from III in the same manner described for the preparation of 2-benzoyl-1-cyano-1-methyl-1,2-dihydroisoquinoline. From 5.1 g. of III there was obtained 2.5 g. (47%) of crude product, m.p. 130–135°. On recrystallization from ether, this gave white crystals, m.p. 134–136°.

Anal. Calcd. for $C_{19}H_{16}N_2O$: C, 79.14; H, 5.59. Found: C, 79.37; H, 5.72.

Basic hydrolysis of 1.0 g. of IV gave a crude oil which was identified as 2,4-dimethylquinoline by means of the picrate, m.p. 194–195.5° (lit.[10] m.p. 196°), and its methiodide, m.p. 257° dec. (lit.[11] m.p. 252–253°).

Rearrangement of 2-Benzoyl-1-cyano-1,2-dihydroisoquinoline.—A mixture of 31.2 g. of 1-cyano-2-benzoyl-1,2-dihydroisoquinoline,[6] 2.9 g. of sodium hydride and 300 ml. of dry xylene was placed in a flask connected through a condenser to a gas buret and heated under reflux with stirring until the expected amount of hydrogen evolved. Then the mixture was heated an additional two hours on the steam-bath. After the mixture had been filtered and cooled, it was washed successively with portions of water, 0.5 *N* hydrochloric acid, and water. Most of the xylene was then removed under vacuum and the residue was allowed to crystallize. There was collected 19.6 g. (70%) of solid, m.p. 74–77°. Recrystallization from hexane gave white crystals, m.p. 76–77°, as previously reported.[12]

Anal. Calcd. for $C_{16}H_{11}NO$: C, 82.38; H, 4.75; N, 6.01. Found: C, 82.38, 82.08; H, 5.09, 5.01; N, 6.33.

(7a) Analyses by Miss Claire King. All melting points are corrected.

(8) R. Forsyth, I. Kelly and F. L. Pyman, *J. Chem. Soc.*, **127**, 1662 (1925).

(9) K. Ziegler and H. Zeiser, *Ann.*, **485**, 174 (1931).

(10) R. H. F. Manske, L. Marion and F. Leger, *Can. J. Research*, **20B**, 133 (1942).

(11) A. Ferratini, *Ber.*, **26**, 1813 (1893).

(12) A. Kaufmann, P. Dandliker and H. Burkhardt, *ibid.*, **46**, 2935 (1913).

The oxime of 1-benzoylisoquinoline was obtained from ethanol as white crystals, m.p. 214–216° dec.

Anal. Calcd. for $C_{16}H_{12}N_2O$: C, 77.39; H, 4.87. Found: C, 77.40; H, 5.18.

The phenylhydrazone of 1-benzoylisoquinoline was prepared in absolute ethanol and was obtained as yellow crystals, m.p. 153–155°.

Anal. Calcd. for $C_{22}H_{17}N_3$: C, 81.71; H, 5.30. Found: C, 81.61; H, 5.37.

The identity of the 1-benzoylisoquinoline was further established by its reduction to 1-benzylisoquinoline as follows. A solution of 4.66 g. of 1-benzoylisoquinoline, 3.8 g. of potassium hydroxide, 4 ml. of 100% hydrazine hydrate and 60 ml. of trimethylene glycol was heated at 130° for 1.5 hours. Then the temperature was raised to 195° and the heating continued for another three hours. The reaction mixture was cooled, diluted with water, and ether extracted. The ethereal layer was extracted in turn with 2 *N* hydrochloric acid. This caused the precipitation of 3.5 g. (75%) of the hydrochloride of 1-benzylisoquinoline. The free base was obtained, after sublimation, as white crystals, m.p. 54–56°. The corresponding picrate melted at 181–183°.[8]

1-Cyano-2-acetyl-1,2-dihydroisoquinoline.—This was prepared according to the procedure of Grosheintz and Fischer.[13] From 64.0 g. of isoquinoline and 15.5 g. of acetyl chloride there was obtained 33.7 g. (85%) of 1-cyano-2-acetyl-1,2-dihydroisoquinoline as white crystals, m.p. 119–121°, after recrystallization from ethanol.

Anal. Calcd. for $C_{12}H_{10}N_2O$: C, 72.71; H, 5.08. Found: C, 73.04; H, 5.18.

Rearrangement of 1-Cyano-2-acetyl-1,2-dihydroisoquinoline.—A solution of 4.0 g. of 1-cyano-2-acetyl-1,2-dihydroisoquinoline, 0.5 g. of sodium hydride and 200 ml. of xylene was heated at 160° until the expected quantity of hydrogen had evolved. The mixture was then heated on the steam-bath for three hours, cooled, filtered, and washed with water. After removal of the xylene, the residue was heated for two hours on the steam-bath with 2 ml. of phenylhydrazine and 20 ml. of absolute ethanol. When the solution was cooled, there was obtained 1.55 g. (30%) of yellow crystals, m.p. 160–164°. A benzene solution of this material was chromatographed using activated alumina and from the benzene eluate there was obtained a sample of yellow crystals, m.p. 163–167°, which did not depress the melting point of an authentic sample of 1-acetylisoquinoline phenylhydrazone.[14]

Rearrangement of 1-Benzoyl-2-cyano-1,2-dihydroquinoline.—When 2-cyano-1-benzoyl-1,2-dihydroquinoline[14] was treated in the same manner as described under the rearrangement of 2-benzoyl-1-cyano-1,2-dihydroisoquinoline, there was obtained a 54% yield of white crystals, m.p. 109–110° (lit.[12] m.p. 110–111°).

The phenylhydrazone of 2-benzoylquinoline was obtained from absolute ethanol as golden yellow crystals, m.p. 126.5–128.5°.

Anal. Calcd. for $C_{22}H_{17}N_3$: C, 81.71; H, 5.30. Found: C, 81.83; H, 5.21.

Rearrangement of 1-Acetyl-2-cyano-1,2-dihydroquinoline.—When 1-acetyl-2-cyano-1,2-dihydroquinoline[13] was treated in the same manner as described for the rearrangement of 1-cyano-2-acetyl-1,2-dihydroisoquinoline, there was obtained a 31% yield of the phenylhydrazone of 2-acetylquinoline. Recrystallization of the crude material from ethanol gave yellow crystals, m.p. 151–154.5° (lit.[12] m.p. 154°).

2-Cinnamoyl-1-cyano-1,2-dihydroisoquinoline (V, R = —CH=CH—C_6H_5).—This was prepared according to the method of Grosheintz and Fischer.[13] From 34.0 g. (0.2 mole) of cinnamoyl chloride there was obtained 52.0 g. (91%) of yellow crystals, which melted at 160–162° dec. after recrystallization from ethanol.

Anal. Calcd. for $C_{19}H_{14}N_2O$: C, 79.73; H, 4.93; mol. wt., 286. Found: C, 79.75; H, 4.94; mol. wt. (Rast), 273.

Attempted Rearrangement of 2-Cinnamoyl-1-cyano-1,2-dihydroisoquinoline.—A mixture of 6.0 g. of 2-cinnamoyl-1-cyano-1,2-dihydroisoquinoline, 0.5 g. of sodium hydride and 250 ml. of xylene was heated under reflux until hydrogen evolution ceased (one-half hour) and then was warmed on a steam-bath for three hours. After the reaction mixture had cooled it was washed successively with water, 0.5 *N* hydrochloric acid and water. Concentration of the xylene solution caused the separation of 2.25 g. of starting material. In addition the mother liquor gave a small amount of material which, after two recrystallizations from ethanol, was obtained as white crystals, m.p. 185–186° dec. This material was found to have the correct composition (*Anal.* Calcd. for $C_{28}H_{20}N_2O_2$: C, 80.75; H, 4.84; N, 6.72. Found: C, 80.93; H, 4.94; N, 6.90) for 1,2-dicinnamoyl-1-cyano-1,2-dihydroisoquinoline. Since this would correspond to the intermediate VIII postulated in mechanism B, it was of interest to try to establish the structure of this material by independent synthesis. However, all attempts to effect acylation of 2-cinnamoyl-1-cyano-1,2-dihydroisoquinoline using cinnamoyl chloride have been unsuccessful.

1-Cyano-1,2-dibenzoyl-1,2-dihydroisoquinoline (VIII, R = $-C_6H_5$).—To a solution of 5.2 g. of 1-cyano-2-benzoyl-1,2-dihydroisoquinoline in 90 ml. of dry tetrahydrofuran and 30 ml. of dry ether there was added 25 ml. of a 1.1 *N* ethereal solution of ethylmagnesium bromide. After the gas evolution was complete, a solution of 4.5 g. of benzoyl chloride in 15 ml. of ether was added dropwise with stirring After the reaction mixture had been allowed to stand overnight, it was washed successively with a saturated aqueous solution of ammonium chloride, 0.5 *N* hydrochloric acid and water. The solvent was then removed under vacuum and a small quantity of absolute ethanol was added. This caused the separation of 3.8 g. (52%) of crystals, m.p. 183–184°. After treatment with charcoal and recrystallization from ethanol, the product was obtained as white crystals, m.p. 184–184.5°.

Anal. Calcd. for $C_{24}H_{16}N_2O_2$: C, 79.10; H, 4.43. Found: C, 79.17; H, 4.40.

Rearrangement of 1-Cyano-2-acetyl-1,2-dihydroisoquinoline in the Presence of 1-Cyano-1,2-dibenzoyl-1,2-dihydroisoquinoline.—A mixture of 2.0 g. of 1-cyano-2-acetyl-1,2-dihydroisoquinoline, 4.8 g. of 1-cyano-1,2-dibenzoyl-1,2-dihydroisoquinoline and 0.25 g. of sodium hydride in 150 ml. of xylene was heated at 170° for three hours and then at 100° for two hours. The reaction mixture was washed with successive portions of water, dilute hydrochloric acid, and water. The acid extracted a small quantity of an oil which did not produce a phenylhydrazone. The solvent was then removed *in vacuo* and the residue was treated with hot hexane. The hexane soluble portion upon sublimation yielded no 1-benzoylisoquinoline. The hexane insoluble portion yielded 0.5 g. of 1-cyano-2-benzoyl-1,2-dihydroisoquinoline.

The isolation of 1-cyano-2-benzoyl-1,2-dihydroisoquinoline was somewhat surprising and an aqueous basic hydrolysis of 1-cyano-1,2-dibenzoyl-1,2-dihydroisoquinoline was therefore carried out to see whether 1-benzoylisoquinoline would result under these conditions. When the basic hydrolysis was conducted as previously described for the preparation of 1-benzylisoquinoline, it was found that from 1.8 g. of VIII (R = $-C_6H_5$) only 70 mg. of 1-benzoylisoquinoline were obtained, the main product being isoquinoline. It would thus appear that an acyl group at the 1-position is more subject to attack by an anion than an acyl group at the two position. Although inconclusive, these results would argue against mechanism B.

ROCHESTER, NEW YORK RECEIVED AUGUST 13, 1951

(13) J. M. Grosheintz and H. O. L. Fischer, THIS JOURNAL, 63, 2021 (1941).

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