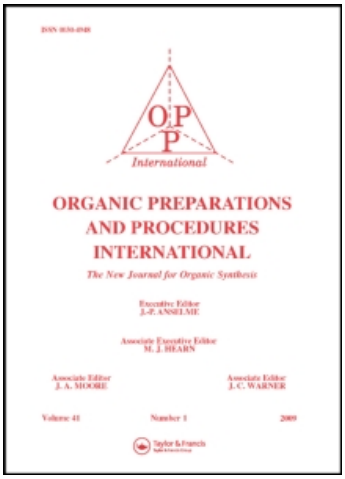

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PREPARATION OF THE ISOMERIC BENZYLQUINOLINES

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PREPARATION OF THE ISOMERIC BENZYLQUINOLINES

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In the course of our studies concerned with the electrochemical and photochemical reduction of the isomeric phenyl quinolyl ketones,[1,2] it became obvious a primary product was one with the complete reduction of the carbonyl function. These completely reduced carbonyls are the isomeric benzylquinolines and for the most part have received very little treatment in the literature as a group. The 2-isomer has been prepared several ways,[3,4,5] with the best yield being 34%. The 3-isomer has been prepared by benzylation[6], decarboxylation[7] and the Skraup reaction[8] (22%) and the four isomer by benzylation[4,9,10] (60%). The 6-isomer was obtained in 48% yield by the Skraup reaction[11] and has also been prepared in very low yield by a laborious synthetic route along with similar routes for the 5, 7, and 8 isomers.[12]

The occurrence of the benzylquinolines in our reaction products indicated the need for a facile general synthesis of these compounds preferably from our carefully purified and characterized starting materials, the phenyl quinolyl ketones. None of the existing literature methods could be applied to all isomers as a general method. We have successfully applied the Huang-Minlon[13] modification of the Wolff-Kischner reduction to the isomeric phenyl quinolyl ketones and found the method to be of excellent general application for this system. As an example of the method, the preparation and characterization of the 3-isomer is given in

the experimental. Table I gives the data for all the isomers and Table 2 gives the mass spectra of all the isomers.

EXPERIMENTAL

All the isomeric ketones were prepared by the action of the appropriate acid chloride in dry benzene using $AlCl_3$. Literature references for the ketones are as follows: 2-isomer[14], 3-isomer[15], 4-isomer[16], 5-isomer[17], 6-isomer[18], 7 and 8-isomers[19].

Preparation of 3-Benzylquinoline. Phenyl 3-quinolyl ketone (0.005 mol, 1.165 g), potassium hydroxide (0.020 mol, 0.080 g), 85% hydrazine hydrate (0.5 ml), and ethylene glycol (10 ml) were refluxed for 1 hour. The reflux condenser was replaced by a Claisen head, thermometer and distillation condenser; the excess hydrazine hydrate and water were distilled. After 100° had been reached internally, the condenser and water was turned off and the flask and Claisen head wrapped in foil. Heating was continued until the thermometer read 185°. The mixture was then refluxed under an air condenser for 3 hours. The solution was cooled and extracted with 3x35 ml portions of anhydrous ether. The ether was dried with anhydrous KOH and the solvent removed uner vacuum to give 833 mg (76.5%) of an oil which solidified in a few minutes upon standing. Recrystallization was accomplished from Skellysolve B and the material had a melting point of 66° (lit[8] 65-67°). The starting ketone melts at 75-6° and a mixture melting point of the starting material and the 3-benzylquinoline was depressed to 44-60°.

Picrate of 3-Benzylquinoline. 3-Benzylquinoline (40 mg) was dissolved in 2 mloof absolute ethanol and added to 2 ml of saturated solution of picric acid in absolute ethanol. An immediate yellow precipitate formed which was removed by filtration and washed with a small amount of cold absolute ethanol and dried. The picrate melted at 181-2°.

Table 1 Physical Data of the Benzylquinolines*

Compound	Yield	M.P.	Lit. M.P.	Picrate M.P.	Lit. M.P.
2-Benzylquinoline	71%	oil	oil[4]	155°	156°
3-Benzylquinoline	76%	66°	65-7°[7]	181	182°[7]
4-Benzylquinoline	49%	48°	52°[11]	177°	178°[10]
5-Benzylquinoline	73%	81°	81-83°[12]	204°	---
6-Benzylquinoline	49%	77°	77-79°[11]	208°	208°[11]
7-Benzylquinoline	73°	60°	63-5°[12]	181°	----
8-Benzylquinoline	34%	52°	54-55°[12]	134°	----

* All melting points are corrected.

Table 2 Mass Spectra of Benzylquinolines*

Fragment m/e	2-	3-	4-	5-	6-	7-	8-
220	7	21	18	17	14	10	15
219	44	100	100	89	81	63	94
218	100	100	95	100	100	100	100
217	34	29	23	33	36	32	26
216	10	8	13	14	15	13	7
204	3	5	20	9	8	13	8
203	8	4	5	2	1	---	1
189	--	8	9	8	--	7	--
108.5	7	17	13	11	9	13	20
91	5	8	13	6	4	3	3

* Mass spectra were obtained on a Hitachi Perkin-Elmer RMU-7 mass spectrometer and are percent relative abundances.

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