Synthesis of Pyridine Analogs of Cumyl Chloride-2-Chloro-2-(pyridyl)propanes

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Chlorination of the isomeric isopropylpyridines with *t*-butyl hypochlorite affords the tertiary α-chloroalkylpyridines in good yield.

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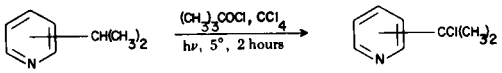
In connection with other work we required pure 2-chloro-2-(pyridyl)propanes. A survey of the literature revealed that only one of the three isomers, 2-chloro-2-(4-pyridyl)propane had been obtained in high yield by Traynelis and Rieck (1) from 4-isopropylpyridine and trichloromethanesulfenyl chloride. However, the reaction of the isomeric 2-(pyridyl)-2-propanols with thionyl chloride in methylene chloride has been reported (2) to lead to mixtures consisting of the tertiary chlorides and the dehydration product, propenylpyridines. Our attempts to separate these mixtures afforded the pure chlorides only in low yields (20-30%).

We have found that the direct free radical chlorination of the isomeric isopropylpyridines with *t*-butyl hypochlorite (3) affords 2-chloro-2-(4-pyridyl)propane, 2-chloro-2-(3-pyridyl)propane and 2-chloro-2-(2-pyridyl)-propane in yields of 70%, 55% and 59%, respectively. The structure of these compounds was confirmed by spectral data and elemental analyses.



EXPERIMENTAL

Preparation of *t*-Butyl Hypochlorite.

To 500 ml. of "Clorox" (4) (NaOCl) were added 36 ml. of *t*-butyl alcohol and 25 ml. of acetic acid. The solution was stirred for 3 minutes at 10°. The aqueous layer was separated, the *t*-butyl hypochlorite was washed successively with 50 ml. of 10% sodium carbonate and 50 ml. of water, then dried with calcium chloride and used without further purification.

2-Chloro-2-(4-pyridyl)propane.

In a 250 ml. pyrex test tube were placed 6.05 g. (0.05 mole) of 4-isopropylpyridine, 10.85 g. (0.10 mole) of *t*-butyl hypochlorite and 50 ml. of carbon tetrachloride. The test tube was placed in a constant temperature bath at 5° and photolyzed under nitrogen with a 275 watt General Electric Sun Lamp. After 2 hours the reaction mixture was poured into 50 ml. of water, washed with 2 x 50 ml. portions of 10% sodium carbonate and 50 ml. of water, dried (calcium chloride), and concentrated *in vacuo*. The crude product was chromatographed on neutral alumina with ether as the eluent to afford 5.5 g. (70%) of pure 2-chloro-2-(4-pyridyl)propane (1), b.p. 56° (0.8 mm); n_D^{20} 1.5218; ir (neat): 1605 (C=N) and 755 cm^{-1} (C-Cl); nmr (deuteriochloroform): δ 1.98 (s, 6, CH_3), 7.42 (m, 2, pyr C_3H, C_5H) and 8.58 (m, 2, pyr C_2H, C_6H).

The analytical sample was further purified by glpc using an A-700 Autoprep with 10 feet QF-1 on Chromosorb W column at 120°.

Anal. Calcd. for $C_8H_{10}ClN$: C, 61.74; H, 6.43; N, 9.00; Cl, 22.83. Found: C, 61.96; H, 6.38; N, 8.93; Cl, 22.63.

2-Chloro-2-(2-pyridyl)propane.

2-Isopropylpyridine (6.05 g., 0.05 mole) and *t*-butyl hypochlorite (10.85 g., 0.1 mole) gave 4.65 g. (59%) of 2-chloro-2-(2-pyridyl)propane, b.p. 49-50° (0.8 mm); n_D^{20} 1.5153; ir (neat): 1600, 1582 (C=N) and 745 cm^{-1} (C-Cl); nmr (deuteriochloroform): δ 1.96 (s, 6, CH_3), 7.44 (m, 3, pyr C_3H, C_4H, C_5H) and 8.45 (m, 1, pyr C_6H).

Anal. Calcd. for $C_8H_{10}ClN$: C, 61.74; H. 6.43; N, 9.00; Cl, 22.83. Found: C, 61.94; H, 6.60; N, 8.76; Cl, 22.75.

2-Chloro-2-(3-pyridyl)propane.

3-Isopropylyridine (6.05 g., 0.05 mole) and *t*-butyl hypochlorite (10.85 g., 0.1 mole) gave 4.40 g. (55%) of 2-chloro-2-(3-pyridyl)propane, b.p. 49° (0.3 mm); n_D^{20} 1.5232; ir (neat): 1595, 1575 (C=N) and 760 cm^{-1} (C-Cl); nmr (deuteriochloroform): δ 1.98 (s, 6, CH_3), 7.24 (m, 1, pyr C_5H), 7.80 (m, 1, pyr C_4H), 8.49 (m, 1, pyr C_6H) and 8.80 (m, 1, pyr C_2H).

Anal. Calcd. for $C_8H_{10}ClN$: C, 61.74; H, 6.43; N, 9.00; Cl, 22.83. Found: C, 62.00; H, 6.66; N, 9.11; Cl, 22.59.

Acknowledgment.

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REFERENCES AND NOTES

(1) V. J. Traynelis and J. N. Rieck, *J. Org. Chem.*, 38, 4334 (1973).

(2) D. S. Noyce, J. A. Virgilio and B. Bartman, *ibid.*, 38, 2657 (1973).

(3) M. L. Poutsma in "Free Radicals", Vol. II. J. K. Kochi, Ed., John Wiley and Sons, Inc., New York, N.Y., 1973, p. 204.

(4) Clorox was obtained from the Clorox Company, Oakland, CA.