Identification of a Major Impurity in Methamphetamine

Keyphrases ☐ Methamphetamine—*N*-methyl-*N*-(α-methylphenylethyl)formamide isolated and identified as impurity in illicit samples ☐ *N*-Methyl-*N*-(α-methylphenylethyl)formamide—isolated, identified as major impurity in illicit samples of methamphetamine

Sir:

A major impurity in samples of illicit methamphetamine was isolated and identified as *N*-methyl-*N*-(α-methylphenylethyl)formamide (I).

Initial TLC investigations into the impurities present in exhibits of methamphetamine indicated I to be present in all samples. Qualitative analysis by TLC can be accomplished on silica gel plates using either of two solvent systems: A, chloroform–methanol (9:1); and B, chloroform–acetone–triethylamine (5:4:1). Both methamphetamine and I may be visualized by spraying successively with iodoplatinate[1] and *p*-dimethylaminobenzaldehyde[2] reagents. The R_f values of I in Solvent Systems A and B are 0.69 and 0.76, respectively.

Compound I was identified as the impurity by extraction from a TLC plate to yield a yellow oil. An IR spectrum of the oil showed aromatic absorption at 3050 cm.$^{-1}$ and aliphatic absorption at 2990 and 2950 cm.$^{-1}$. A weak band at 2860 cm.$^{-1}$ suggested the presence of a formyl group. The spectrum also indicated the presence of an amide carbonyl at 1675 cm.$^{-1}$ and absorption due to a monosubstituted phenyl group at 700 and 750 cm.$^{-1}$.

NMR spectrum[3] of the oil showed two singlets at 7.93 and 7.70 δ (formyl), a singlet at 6.93–7.50 δ (phenyl), two multiplets at 4.53–4.93 and 3.47–4.03 δ (methine), a multiplet at 2.66–2.83 δ (benzyl and *N*-methyl), and a pair of doublets at 1.13 and 1.27 δ (C-methyl). The duplicate NMR spectrum for the aliphatic protons is expected on the basis of restricted rotation about the C—N bond in formamides (1). A mass spectrum[4] of the oil yielded a parent peak at *m/e* 177 and a cracking pattern consistent with the proposed structure.

Further confirmation of the identity of I was obtained by formylation of methamphetamine by a modification of the method of Sheehan and Yang (2). A mixture of 10 ml. of acetic anhydride and 5 ml. of 88% formic acid was added to 1.5 g. of methamphetamine, yielding an almost quantitative yield of the *N*-formyl derivative. Comparison of the synthetic material with that isolated from exhibits by TLC, IR, and NMR showed the two to be identical.

Quantitative analysis by GLC[5] on 30 randomly selected samples indicated I to be present in amounts ranging from 10 to 39% relative to methamphetamine.

Production of illicit methamphetamine apparently is accomplished by a method involving production of I from phenylacetone and *N*-methylformamide (3) and hydrolysis to methamphetamine. The residue of I would arise due to incomplete hydrolysis.

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[1] Dissolve 1 g. platinum chloride in 10 ml. of water, mix with 250 ml. of 4% (w/v) aqueous potassium iodide, and dilute to 500 ml. with water.

[2] Dissolve 125 mg. *p*-dimethylaminobenzaldehyde in 100 ml. of 50% (v/v) sulfuric acid and add 2 drops of 10% (w/v) ferric chloride solution.

[3] Varian T-60 spectrometer.

[4] Hitachi Perkin-Elmer RMU-6 spectrometer.

[5] Bendix 2500, equipped with a 1.8-m. × 0.63-cm. (6-ft. × 0.25-in.) glass column, 5% OV-7 on Gas Chrom Q, at 165°. Phenacetin was used as an internal standard.