

Technical Note

The Identification of 5-Methoxy-*alpha*-methyltryptamine (5-MeO-AMT)

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ABSTRACT: The analysis of 5-methoxy-*alpha*-methyltryptamine (5-MeO-AMT) via color testing and gas chromatography/mass spectrometry is presented and discussed.

KEYWORDS: 5-Methoxy-*alpha*-methyltryptamine, Tryptamines, Designer Drug, Color Testing, Gas Chromatography/Mass Spectrometry, Forensic Chemistry.

Summary

In November 2002, an agency in northwestern Wisconsin submitted to the Wisconsin State Crime Laboratory in Wausau an exhibit of ten sugar cubes packaged together in foil, suspected to contain lysergic acid diethylamide (LSD). There was slight discoloration visible on approximately half of each of the ten cubes. A sample of the cubes was analyzed by color testing and gas chromatography/mass spectrometry. The results indicated not LSD but rather 5-methoxy-*alpha*-methyltryptamine (aka 5-MeO-AMT or “Alpha-O”; see Figure 1).

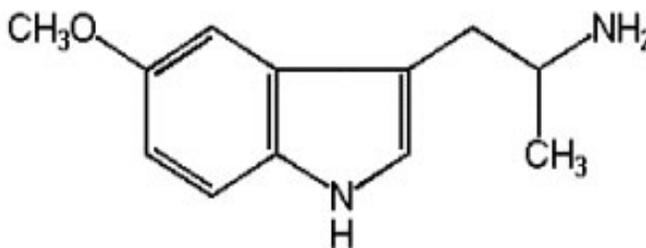


Figure 1: Structure of 5-Methoxy-*alpha*-methyltryptamine (C₁₂H₁₆N₂O; mw = 204.27)

Experimental

Color Tests

A purple color was observed when the sample was subjected to the *para*-dimethylaminobenzaldehyde (PDMAB) reagent test. [This result, along with the fact that sugar cubes were used as the supporting media, explain why the submitting agency believed the exhibits contained LSD.]

However, a cherry red color was observed when the sample was subjected to the sodium nitroprusside reagent test, suggesting a tryptamine. This result was then compared to three tryptamine standards (Table 1). The results suggested the presence of a primary amine with an *alpha*-methyltryptamine moiety (Figure 2) - and not a secondary amine with an *N*-methyltryptamine moiety (Figure 3).

Tryptamine	Sodium Nitroprusside Test
α -Methyltryptamine	Cherry Red
<i>N</i> -Methyltryptamine	Purple
5-Methoxy- α -methyltryptamine	Cherry Red

Table 1: Sodium Nitroprusside Reagent Test Results

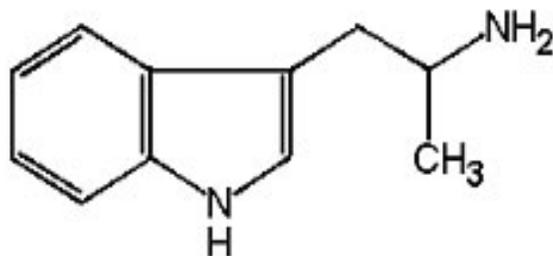


Figure 2: Structure of *alpha*-Methyltryptamine ($C_{11}H_{14}N_2$; mw = 174.24)

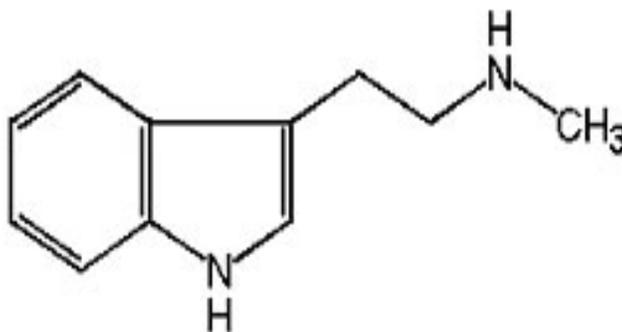


Figure 3: Structure of *N*-Methyltryptamine ($C_{11}H_{14}N_2$; mw = 174.24)

Gas Chromatography / Mass Spectrometry

A small portion of each sugar cube was combined and dissolved in one percent citric acid (the laboratory's standard solution for dissolving/extracting samples suspected to contain LSD). The extract was then made basic with sodium carbonate and extracted with butyl chloride (butyl chloride is preferred because it is less dense than water (and therefore forms the upper layer) and does not require drying prior to injection on a gas chromatograph). GC/MS analysis of the extract was performed on an Agilent 6890 Gas Chromatograph equipped with an Agilent 5973N Mass Selective Detector using a 12 m x 0.20 mm HP-1 column with a film thickness of 0.33 μ m (see Figure 4 for the mass spectrum). The GC oven was temperature ramped at 20°C per minute from 120°C to 260°C, then held for 4 minutes at 260°C. The mass spectrometer was scanned from m/z 35 to 305. The sample peak had a retention time of 4.66 minutes. Standards of α -methyltryptamine, *N*-methyltryptamine, 5-methoxy- α -methyltryptamine, and 5-methoxy-*N,N*-dimethyltryptamine were also run under the above conditions (retention times are presented in Table 2).

Tryptamine	Retention Time (Minutes)
α -Methyltryptamine (AMT)	3.54
<i>N</i> -Methyltryptamine (NMT)	3.65
5-Methoxy- α -methyltryptamine (5-MeO-AMT)	4.67
5-Methoxy- <i>N,N</i> -dimethyltryptamine (5-MeO-DMT)	4.84

Table 2: Retention Times for Tryptamine Standards

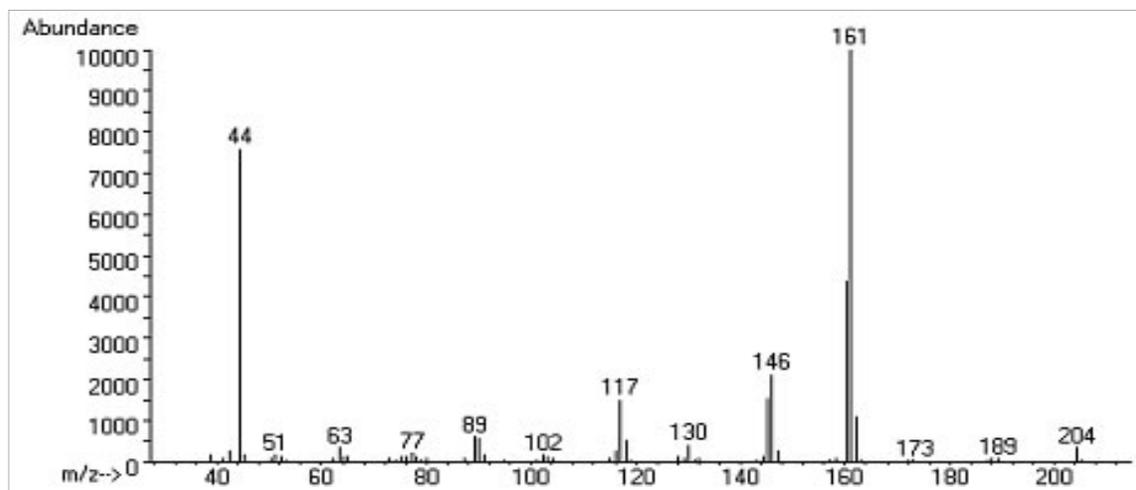


Figure 4: Mass Spectrum of 5-Methoxy-*alpha*-methyltryptamine

Results and Discussion

Upon initial review, the mass spectrum of the sample (Figure 4) was similar to those of both *N*-methyltryptamine (NMT) [1] (Figure 5a) and *alpha*-methyltryptamine (AMT) (Figure 6a), but had a molecular ion thirty mass units greater than either, which suggested the presence of a methoxy substituent. However, closer inspection of the expanded fragmentation patterns showed a loss of 15 mass units (i.e., a methyl group) in the sample spectrum (see the peak at *m/z* 189, Figure 4), similar to the fragmentation pattern of AMT (*m/z* = 159, Figure 6b) but not NMT (Figure 5b). In addition, the spectrum was clearly different versus that of 5-methoxy-*N,N*-dimethyl-tryptamine (Figure 7), and had a molecular ion 14 mass units lower. The collective results suggested a methoxylated *alpha*-methyltryptamine.

There have been several recent reports of appearances of 5-methoxy-*alpha*-methyltryptamine (5-MeO-AMT) in *Microgram Bulletin* [2]. The synthesis of 5-MeO-AMT is described in Shulgin's TIHKAL [3], along with anecdotal remarks on its pharmacological effects. Several illicit drug-related Internet sites, including a message board, also have information on 5-MeO-AMT, including usage testimonials [4]. A standard of 5-MeO-AMT was obtained from a commercial source (details withheld per *Journal* policy). The mass spectra of the sample and the standard were internally consistent, and both matched the mass spectrum of 5-MeO-AMT provided by the DEA Special Testing and Research Laboratory (Dulles, Virginia) [2a]. 5-MeO-AMT is not currently listed in the U.S. Controlled Substances Act; however, it is considered to be a controlled substance analogue, and can be prosecuted as such in Federal Courts.

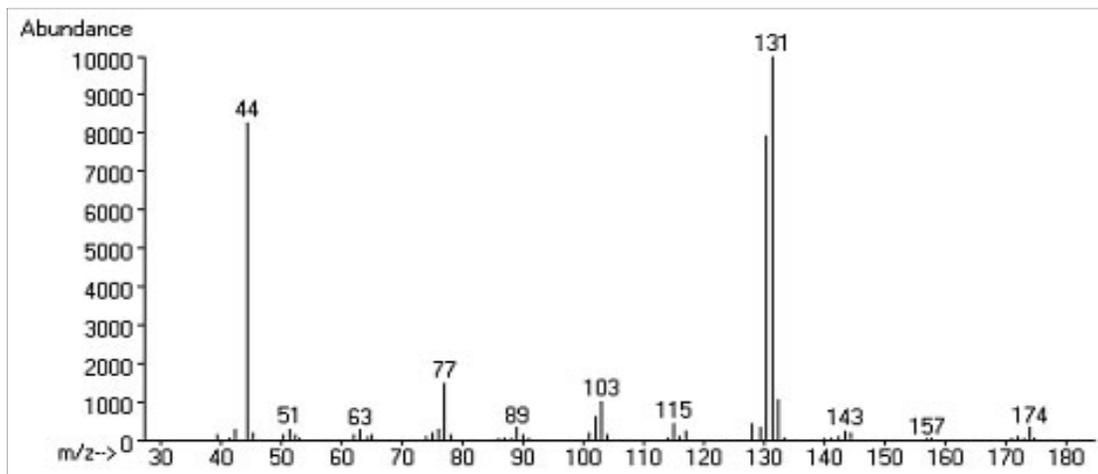


Figure 5a: Mass Spectrum of *N*-Methyltryptamine

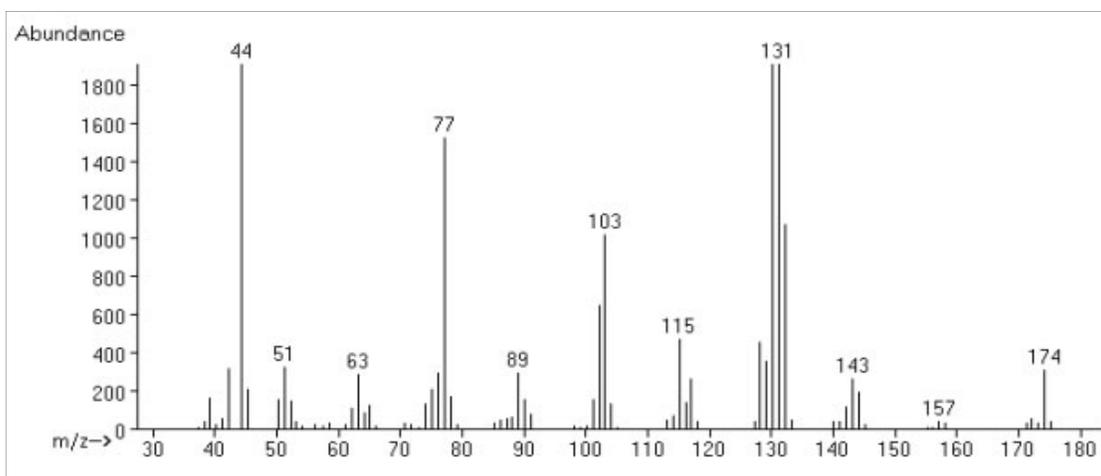


Figure 5b. Expanded Mass Spectrum of *N*-Methyltryptamine

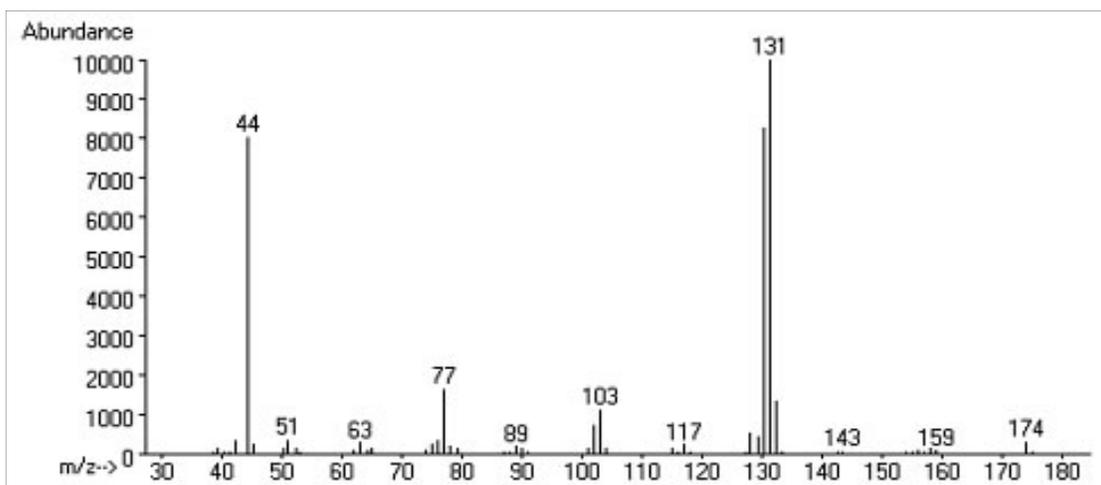


Figure 6a: Mass Spectrum of *alpha*-Methyltryptamine

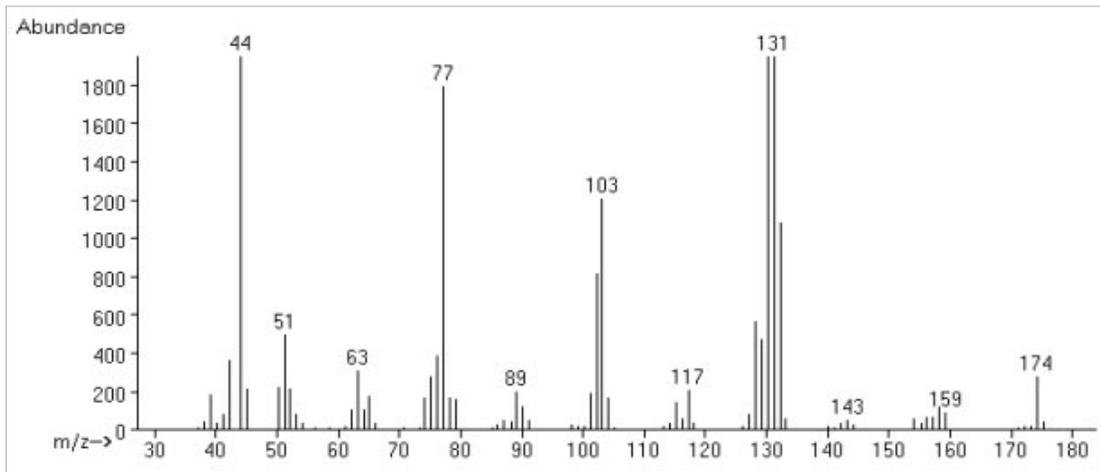


Figure 6b. Expanded Mass Spectrum of *alpha*-Methyltryptamine

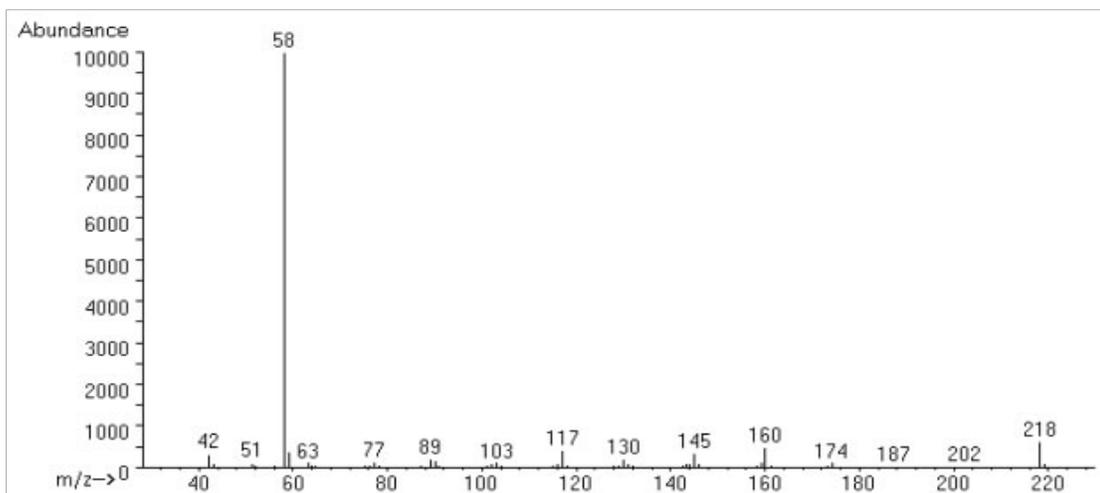


Figure 7. Mass Spectrum of 5-Methoxy-*N,N*-dimethyltryptamine

Acknowledgements

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References

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3. Shulgin A, Shulgin A. TIHKAL: The Continuation, Transform Press, Berkeley, CA, 1997.
4. The Vaults of Erowid; The Lycaenum; and The Hive.

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