MICROGRAM

Laboratory Operations Division
Office Of Science And Drug Abuse Prevention

BUREAU OF NARCOTICS & DANGEROUS DRUGS / U.S. DEPARTMENT OF JUSTICE / WASHINGTON, D.C. 20537

Vol. V, No. 2 February, 1972

Benactyzine and Strychnine in combination is presently being encountered in #4 opaque, orange, standard shape, hard gelatin capsules (average filled weight 223 mg.) The excipients encountered with this combination have been identified as lactose monohydrate and corn starch. Quantitation of the active ingredients shows the presence of 7.4 milligrams benactyzine hydrochloride and 0.6 milligrams strychnine (calc. as free base) per capsule. Ballistics examination revealed that these capsules are like exhibits submitted previously containing either Benactyzine HCl, lactose monohydrate and corn starch or Benactyzine HCl and lactose monohydrate alone. If you have information on any of the above combinations, we would appreciate your contacting us.

Attached are methods of analysis recently developed for the above combination, plus a separate method for strychnine in various mixtures.

LSD "Micro Dots" have been reported from the Chicago area. These "Dots" measure approximately 1.5 - 2.0 millimeters across, have an average weight of 4.7 milligrams and contain approximately 85 micrograms of LSD. Ballistics examination found these to be identical to Micro Dots submitted by the Central Research Establishment, Aldermaston Reading, Berkshire, England.

LSD pink Micro Dots are being reported as we go to press.

Another Clandestine Tableting Machine was recently seized in the San Francisco, California area. This was a single station machine equipped with 1/4 inch punches. A ballistics examination revealed this machine to be the source of an exhibit of approximately 12,000 tablets seized in the Berkeley, California area in June, 1971. The seized tablets contained approximately 4.9 milligrams of STP each.

Hashish is continuing to be found in items received through the mail. The latest being chocolate candies received from Holland. Recent reports indicate that many items such as cheese and gift wrapped food packages may be used to transport controlled substances.

Methylenedioxyamphetamine (MDA) 83%, methamphetamine 7.2%, and sodium chloride in combination are being found in the New York, New York area.

THC (tetrahydrocannabinol) is being encountered in a new form known as "Liquid Hashish" or "Marihuana Oil". It is reportedly about five times as potent as "good grade" hashish and 30 - 50 times as strong as "common" marihuana.

The technique used in obtaining the "oil" has not been established. Some reports state that it is produced by grinding hashish into fine particles and extracting three times with ethyl alcohol. Other reports indicate that various solvents are used and the active ingredients in the hashish are separated by distillation techniques. In either case, after extraction, the solvent, is evaporated until a dark brown, viscous liquid is obtained. An oil, such as vegetable oil may be added to serve as a base. The finished material is reported to have a THC content of 20 - 56% and sells for about $10.00 per milliliter.

All of the uses for this new substance are not yet known. However, marihuana cigarettes treated with "Liquid Hashish" or "Marihuana Oil" have been reported, with the THC content as high as 29.9% by weight. One drop of the "oil" is reported to be a useable quantity.

We would appreciate any information you may have or encounter on this material.

LSD in powdered tea has been reported from Florida. Analysis reveals approximately 125 milligrams of LSD per gram of material. This is the first time this mixture has been encountered.

BNDD LABORATORY NOTES

DATE

NO. 29

DRUG TYPE Mixture

METHODOLOGY Gas Chromatography

ANALYSIS OF BENACTYZINE-STRYCHNINE MIXTURES

by

Victor A. Folen
Special Testing and Research Laboratory

Recent samples have been found to contain benactyzine hydrochloride (2% to 7%) in combination with strychnine (less than 1%). Presented below are methods for the identification of these components, and gas chromatographic procedures for their quantitation.

Identification of Strychnine and Benactyzine

Transfer about 200 mg. of sample to a 125 ml. separatory funnel containing ca. 20 ml. 0.5N H_2SO_4. Shake to dissolve all soluble components. Make basic by the addition of small quantities of Na_2CO_3. Extract twice with 20 ml. portions of $CHCl_3$, filtering extracts through glass wool into a 100 ml. beaker. Evaporate solvent in beaker to near-dryness on a water bath, under a stream of air. Dissolve residue in beaker in 0.5-1.0 ml. $CHCl_3$. Spot 3 microliters of sample and standard solutions (a suitable standard would be 2 mg. strychnine base/ml. $CHCl_3$), using 100 mm. glass plates, prescored to widths of 25 mm., and coated with silica gel GF, 250 microns in thickness.* Develop plate in concentrated NH_4OH-methanol solution (1.5:100)[1], and visualize under short wave ultraviolet irradiation. Delineate areas on plate covered by strychnine spots (sample and standard). Treat spots with small drops of a saturated solution of ammonium vanadate in concentrated H_2SO_4 (Mandelin's reagent). Observe color changes (sample and standard).

Place a drop of freshly-prepared Marquis reagent (conc. H_2SO_4-formaldehyde solution 10:1) on a microscope slide and sprinkle a small amount of intact sample over the drop. If benactyzine is present, isolated particles will show a flash of yellow-orange, which changes quickly through green to intense blue; color changes are best observed under a wide field microscope.

Dilute extract used in the strychnine identification to 2-3 ml. with $CHCl_3$. Spot 3 microliters of sample and standard solutions (standard solution: 2 mg. benactyzine base/ml. $CHCl_3$) on TLC plate such as those described above. Develop plate in concentrated NH_4OH-methanol solution (1.5:100) and visualize by spraying with acidified iodoplatinate solution.[1]

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*Obtained from Analtech, Inc., Newark, Delaware.

Quantitation of Strychnine

Sample Preparation

Use approximately 250 mg. of sample, accurately weighed into a 125 ml. separatory funnel containing ca. 20 ml. 0.5N H_2SO_4. Make alkaline using small portions of Na_2CO_3. Extract 3 times with 20 ml. aliquots of $CHCl_3$, filtering extracts through glass wool into a 100 ml. erlenmeyer flask (fitted with a glass stopper). Evaporate solvent in flask to dryness on a water bath, under a current of air. To the residue in the flask, pipette exactly 5 ml. of internal standard solution (triacontane*, 0.5 mg./ml. in $CHCl_3$). Stopper and swirl contents of flask.

Standard Preparation

Transfer approximately 25 mg. strychnine alkaloid, accurately weighed, to a 50 ml. volumetric flask. Pipette exactly 25 ml. of internal standard solution (triacontane, 1.0 mg./ml. in $CHCl_3$) into flask and fill to volume with $CHCl_3$.

Standard and sample, approximately 5 microliters, are injected into a gas chromatograph operated under the following conditions:

Column - 6 feet by 1/4 inch i.d. glass column packed with 3% OV1 on Chromosorb WHP (80-100 mesh)

Temperature - column 270°C., injector and detector 275°C.

Carrier gas - nitrogen at flow rate of ca. 80 ml./minute

Detector - flame ionization detector.

The internal standard will elute prior to strychnine.

Calculation:

$$\frac{(C_{std})(P_{spl})(P_{std\ int\ std})(V_{spl})(100)}{(P_{std})(P_{spl\ int\ std})(W_{spl})} = \text{strychnine base (\%).}$$

Where

C_{std}: concentration of standard strychnine solution, mg./ml., as the free base.
P_{spl}: sample peak area or net peak height (strychnine)
P_{std}: standard peak area or net peak height (strychnine)
$P_{std\ int\ std}$: standard peak area or net peak height (triacontane internal standard)
$P_{spl\ int\ std}$: sample peak area or net peak height (triacontane internal standard)
V_{spl}: final volume of sample
W_{spl}: weight of sample aliquot

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*Obtained from Applied Science Labs., State College, Pennsylvania.

Quantitation of Benactyzine

Sample Preparation

Benactyzine can be quantitated using the same sample aliquot involved in the strychnine analysis. Quantitatively transfer the solution from the erlenmeyer flask to a 25 ml. volumetric flask. Pipette 10 ml. of internal standard solution (n-eicosane*, 1.0 mg./ml., in $CHCl_3$) into the flask and fill to volume with $CHCl_3$.

Standard Preparation

Transfer approximately 25 mg. benactyzine hydrochloride, accurately weighed, to a 125 ml separatory funnel containing a small amount of H_2O. Make alkaline with a small amount of Na_2CO_3. Extract 3 times with 20 ml. aliquots of $CHCl_3$, combining extracts in a 100 ml. beaker. Evaporate solvent in beaker to near-dryness on a water bath, under a stream of air. Quantitatively transfer residue in beaker to a 50 ml. volumetric flask with $CHCl_3$. Pipette 20 ml. of internal standard solution (n-eicosane, 1.0 mg./ml., in $CHCl_3$) into the flask and fill to volume with $CHCl_3$.

Approximately 5 microliters of sample and standard are injected into a gas chromatograph under operational conditions which are the same as those for the strychnine quantitation, except for the column temperature, which is reduced to 210°C.

Eicosane elutes first after approximately 3 minutes, followed by benactyzine (R_t ca. 7 minutes). Per cent benactyzine hydrochloride is calculated using the equation shown above for strychnine.

Discussion

Strychnine is preceded by a small shoulder in its elution from the column, which occurs with freshly-prepared standards as well as with all samples containing strychnine which have been analyzed thus far. The presence of the shoulder is corroborating evidence for the presence of strychnine.

During the strychnine quantitation, the benactyzine present elutes immediately after the solvent. When the column temperature is reduced to 210°C. for the benactyzine analysis, no interference from triacontane or strychnine, also present in the sample preparation, is encountered, since they remain on the column for the duration of the analysis of benactyzine.

Reference

1. Clarke, E.G.C. (1969) Isolation and Identification of Drugs, The Pharmaceutical Press, London, p. 46 and 801.

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*Obtained from Applied Science Labs., State College, Pennsylvania.

STRYCHNINE AND BENACTYZINE CAPSULES

Aaron E. Rash, Chemist
State Laboratories Department
Bismarck, North Dakota

Our Department has recently received capsules from three different cases which have been found to contain strychnine in combination with benactyzine. All capsules were orange and clear and contained a white powder. In two of the cases, the capsules were sold as THC. The strychnine was low level (2.0 - 2.4 mg/capsule, calculated as the sulfate); the benactyzine was not quantitated due to the lack of sufficient standard, but was estimated at approximately 15 mg/capsule.

Procedure Used

Extraction: The capsule content was dissolved in 1% citric acid, made basic with sodium carbonate, and extracted three times with chloroform.

Ultra Violet Spec.: The ultra violet spectrum of the chloroform soln. showed no evidence of LSD. The $CHCl_3$ soln. was evaporated to dryness in the presence of one drop of HCl and the residue dissolved in 0.1 N HCl. The UV spectrum of this soln. showed a max of 245nm with shoulders at 280 & 290 mu. The max at 254 was flat topped indicating the presence of more than one compound.

Thin Layer Chromatography: The $CHCl_3$ extract was chromatographed on silica gel GF using two solvent systems.

	$CHCl_3$-MeOH (9-2)		$CHCl_3$(sat $\underline{w}NH_4OH$)-MeOH (18-2)
top spot:	Rf=0.75	-------	Rf=0.66
lower spot:	0.31	-------	0.44
strychnine:	0.31	-------	0.44

Spots were visualized with iodoplatinate spray

Preparative Thin Layer Chromatography: Useable quantities of the two compounds were separated on Silica Gel GF using the chloroform-methanol (9-2) system, removed from the plate and rechromatographed.

Top band from prep. TLC

UV Spectrum (HCl form in 0.1 N HCl) max at 257.5, 252, 261, 263 & inflex, at 267.5

IR Spectrum: Identical with spectrum of Benactyzine HCL
Marquis Test: Rust changing to blue
Frohdes Test: Rust changing to blue

Lower band from prep. TLC

UV Spectrum: Max at 254 with shoulders at 279 & 289 mu.
IR Spectrum of free base identical with spectrum of Strychnine base
Frohdes Test: Blue
Sulfuric Acid-Dichromate Test: Blue
Microcrystal Tests:
Gold Chloride: Rosettes
Picric Acid: Rosettes

BNDD LABORATORY NOTES

DATE

NO. 28

DRUG TYPE Mixture

METHODOLOGY Gas Chromatography

THE ANALYSIS OF MIXTURES CONTAINING SMALL QUANTITIES OF STRYCHNINE

by

Victor A. Folen
Special Testing and Research Laboratory

During the past year samples have been submitted to the Special Testing and Research Laboratory which were purported to contain small quantities of strychnine. However, such samples were found to contain no detectable quantities of strychnine until a month prior to the submission of this paper, at which time several samples have been received which did contain small amounts of strychnine in combination with other active ingredients.

Presented below is a general method for the identification of small quantities of strychnine, and a gas chromatographic procedure for the quantitation of that substance.

Identification of Strychnine

Transfer 100 to 200 mg. of sample into a separatory funnel containing about 20 ml. 0.5N H_2SO_4. Shake to dissolve soluble components. Make basic by the addition of small quantities of powdered Na_2CO_3. Extract twice with $CHCl_3$ and filter extracts through glass wool into a beaker. Evaporate solvent to ca. 1 ml. on a water bath, under a stream of air. Prepare a standard strychnine alkaloid solution (about 2 mg./ml.). Spot 3 to 4 microliters of standard and sample on TLC plate, 10 cm. by 25 mm., coated with silica gel GF, 250 microns in thickness.* Develop in concentrated NH_4OH-methanol (1.5:100[1]). Visualize by placing developed plate under iodide in 100 ml. of water; add 2 ml. conc. HCl to solution). Place small drops of standard and sample solutions on microscope slides and allow the solvent to evaporate. Treat slides with platinic chloride solution[1] (5% aqueous), which produces characteristic crystals in the presence of strychnine. Observe under a polarizing microscope.

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*Obtained from Analtech, Inc., Newark, Delaware

Quantitation of Strychnine

Sample Preparation.

Use approximately 250 mg. of sample, accurately weighed into a 125 ml. separatory funnel containing ca. 20 ml. 0.5N H_2SO_4. Shake to dissolve soluble components. Make alkaline by the addition of small amounts of powdered Na_2CO_3. Extract 3 times with 20 ml. portions of $CHCl_3$, combining extracts in a 100 ml. erlenmeyer flask fitted with a glass stopper. Evaporate contents of erlenmeyer flask to dryness on a water bath, under a current of air. To the residue in the flask, pipette exactly 5 ml. triacontane internal standard solution (0.5 mg./ml. in $CHCl_3$)*. Stopper and swirl contents of flask.

Standard Preparation.

Use approximately 25 mg. standard strychnine base, accurately weighed, into a 50 ml. volumetric flask. Pipette exactly 25 ml. triacontane internal standard solution (1.0 mg./ml. in $CHCl_3$) into flask and fill to volume with $CHCl_3$. Final concentrations will be 0.5 mg./ml. internal standard and 0.5 mg./ml. strychnine base.

Inject approximately 5 microliters of standard and sample into a gas chromatograph operating under the following conditions:

Column - 6 feet by 1/4 inch i.d. glass column packed with 3% OV-1 on Chromosorb WHP (80-100 mesh)
Temperature - column 270°C., injector and detector 275°C.
Carrier gas - nitrogen at flow rate of ca. 80 ml./minute
Detector - flame ionization detector

The internal standard will elute prior to strychnine.

Calculate % strychnine (as the free base) using the following equation:

$$\frac{(C_{std})(P_{spl})(P_{std\ int\ std})(V_{spl})(100)}{(P_{std})(P_{spl\ int\ std})(W_{spl})} = \%\ \text{strychnine base},$$

where

C_{std}: concentration of standard strychnine solution, mg./ml. as the free base;

P_{spl}: sample peak area or net peak height (strychnine);

P_{std}: standard peak area or net peak height (strychnine);

$P_{std\ int\ std}$: standard peak area or net peak height (triacontane internal standard);

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*Obtained from Applied Science Laboratories, State College, Pennsylvania.

V_{spl}: final volume of sample (5 ml.);

W_{spl}: weight of sample aliquot.

Discussion

1. Strychnine is preceded by a small shoulder in its elution from the column, which occurs with freshly-prepared standards as well as with all samples containing strychnine which have been analyzed thus far. The presence of the shoulder is corroborating evidence for the presence of strychnine.

References

1. Clarke, E. G. C., ed., Isolation and Identification of Drugs, 1969, The Pharmaceutical Press, London, p.46 and p.545.

FEDERAL REGISTER
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Chapter II—Bureau of Narcotics and Dangerous Drugs, Department of Justice

[BNDD Decision No. 1]

PART 308—SCHEDULES OF CONTROLLED SUBSTANCES

Control of Propiram

By letter dated November 17, 1971, the Secretary-General of the United Nations advised the Secretary of State of the United States that the Commission on Narcotic Drugs has decided that the drug Propiram should be added to Schedule II of the Single Convention on Narcotic Drugs, 1961. Therefore, under the provisions of section 201(d) of the Comprehensive Drug Abuse Prevention and Control Act of 1970 (21 U.S.C. 811(d)), the Attorney General is required to control Propiram in the schedule deemed appropriate. The Bureau of Narcotics and Dangerous Drugs has determined that inasmuch as there is currently no accepted medical use for Propiram in treatment in the United States it should be controlled in Schedule I.

Therefore, under the authority vested in the Attorney General by section 201 (d) of the Comprehensive Drug Abuse Prevention and Control Act of 1970 (21 U.S.C. 811(d)) and delegated to the Director, Bureau of Narcotics and Dangerous Drugs, by § 0.100 of Title 28 of the Code of Federal Regulations and in accordance with § 308.49 of Title 21 of the Code of Federal Regulations, the Director hereby orders that: Section 308.11(b) of Title 21 of the Code of Federal Regulations be amended as follows: Items (41) and (42) are renumbered (42) and (43), and a new item (41) is added:

§ 308.11 Schedule I.

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(b) * * *

(41)	Propiram	9649
(42)	Racemoramide	9645
(43)	Trimeperidine	9646

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This order will take effect 30 days from the date of the publication in the FEDERAL REGISTER.

§ 308.13 [Amended]

In another matter, by order appearing in the FEDERAL REGISTER of November 6, 1971 (36 F.R. 21336), § 308.13(b)(1) of Title 21 of the Code of Federal Regulations was amended. At the time of this amendment, a Bureau Controlled Substances Code Number was not assigned. Therefore, the Director hereby orders that: Section 308.13(b)(1) of Title 21 of the Code of Federal Regulations be further amended by adding after the period "1405."

This order will take effect upon publication in the FEDERAL REGISTER (1-29-72).

Dated: January 25, 1972.

JOHN E. INGERSOLL,
Director, Bureau of Narcotics and Dangerous Drugs.

[FR Doc.72-1368 Filed 1-28-72;8:50 am]