

# MICROGRAM

BUREAU OF NARCOTICS AND DANGEROUS DRUGS / U.S. DEPARTMENT OF JUSTICE

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## Hawaiian Baby Wood Rose and Morning Glory Seeds

Baby Wood Rose (Argyreia) and the related Morning Glory (Ipomoea) belong to the Convolvulaceae. Species and varieties of both have shown the presence of ergoline alkaloids.

Recently, we have received several queries about the use of the seeds of these plants by the drug abuser.

The flower of the Wood Rose contains four seeds, and the abuser may use from four to twelve seeds. He scrapes off the outer coating of the seeds before chewing them, or taking them in a capsule. He may take Dramamine or some other antinauseant at the same time, to try to prevent nausea.

Morning glory seeds, usually "Heavenly Blue" or "Pearly Gates" have been abused for a number of years. Reportedly about 350 seeds, or approximately one pound, will make about 25 doses. The abuser washes the seeds to remove pesticides, grinds the seeds in a pepper mill and puts the powder in gelatin capsules. He may soak the powder in cold water for about 45 minutes, then squeeze out the liquid from the mash and drink it.

Micro-Gram, Vol. I, No. 4 contains some information, with references, on these plants and the lysergic acid amide found in them.

The following references may also be of value:

Marderosian, Ara Der, "Psychotomimetic Indoles in the Convolvulaceae," Amer. Jour. Pharm. January-February, 1967, 19-25.

Hylin, J.W., and Watson, D.P., "Ergoline Alkaloids in Tropical Wood Roses," Science, 148, 499-500 (1965)

Rice, W.B., and Genest, K., "Acute Toxicity of Extracts of Morning Glory Seeds in Mice," Nature, 207, 302-303 (July 17, 1965).

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**CAUTION:** Use of this publication should be restricted to forensic analysts or others having a legitimate need for this material.

### Clandestine Laboratories

Our Agents have raided over 80 clandestine drug producing "laboratories," in the past two years. These "laboratories" had a combined potential for producing drugs that staggers the imagination.

A recent raid by police in a Western city closed down a laboratory which used a battery of galvanized garbage cans as cooling jackets; was well stocked with laboratory equipment, including an Ainsworth balance; had scores of books and library reprints; and the chemist maintained a detailed notebook, like any good legitimate chemist would. A clue to the size of the operation is the fact that some solvents were bought in 55 gallon drums.

### Tetrahydrocannabinol (THC)

We have reports that THC is allegedly being sold in various parts of the country. Our Agents have purchased capsules which were promoted as THC, however, on analysis, these have proven to be some other drug, the most recent being phencyclidine, HCl.

We know that the illicit producers are interested in THC, because several of the raided labs have contained literature on the synthesis of THC, as well as chemicals which could be used in that synthesis. Reprints of "Total Synthesis of...Tetrahydrocannabinol, a Biologically Active Constituent of Hashish (Marijuana)" J. Am. Chem. Soc., 89 17 (August 16, 1967) is being advertised for sale as the "Legal Hash Formula" in the underground press.

The Attorney General has proposed that synthesized tetrahydrocannabinols be placed under control. The initial proposal was published in the Federal Register July 9, 1968, and a reprint is attached. The final order was published August 21, 1968 (33 FR 11814). The effective date bringing THC under control will be September 22, 1968, unless objections arise to the proposal.

### Changes to "Comprehensive list of DACA drugs" (Micro-Gram Vol. 1, No. 7)

#### ADD:

Nembu - Donna  $\frac{1}{2}$  (Abbot)  
Desbutal (Abbot)

#### DELETE

Dex Ob (Burroughs-Wellcome)  
Pama (Conal)

#### CHANGE

Hy-Val-Flora  
w/Phenobarbital (Warren-Teed)

"IDENTIFICATION OF STP"

Albert R. Sperling

Division of Pharmaceutical Sciences  
Food and Drug Administration

In the analysis of STP (2,5,dimethoxy,-4 methyl amphetamine) tablets by the method of Alexander (1), the material is identified by scanning the infrared spectrum of the free base. A problem has arisen however, in obtaining reproducible spectra from the free base, due to an inability to obtain the free base in a crystalline form. Most of the material was amorphous and the small amount that was crystalline was also polymorphic, thus giving different spectra each time an analysis was performed. The hydrochloride salt on the other hand is a highly crystalline material and the optical properties are constant and dependable.

It is therefore recommended that the infrared identification be performed on the hydrochloride salt. This can be prepared by simply dissolving the free base in 2 ml of methanol, adding one drop of concentrated hydrochloric acid and evaporating to dryness. The hydrochloride salt thus formed gives constant reproducible spectra.

On very rare occasions it may be necessary to treat the salt with a mixture of chloroform (1 part), heptane (3 parts) and again evaporate to dryness.

(1) T. G. Alexander, Microgram 1 (No. 1) November, 1967

ANALYSIS AND IDENTIFICATION OF N-METHYL-3-PIPERIDYL  
BENZILATE (LBJ, JB 336)

Paul DeZan and Richard Fox  
New York District  
U.S. Food and Drug Administration

Physical Properties:

Hydrochloride - white powder  
Molecular Weight - 361  
Melting Point -214 - 217°C (decomposition)  
Free Base - Clear Liquid  
Molecular Weight - 325

Ultraviolet Absorption Spectrum:

Maxima - 257, 251, 261, 263 mu.  
Concentration - 45.6 mgs. per 100 mls of 0.1N HCl  
Abs. 257 - 0.613  
 $E_{1\%}^{1\text{cm}}$  - 13.4

Infrared Absorption Spectrum:

Both the hydrochloride and the free base exhibit strong bands at 1745  $\text{cm}^{-1}$  and 1210  $\text{cm}^{-1}$  characteristic of ester stretching frequencies.

Spot Test:

Place a small amount of sample powder in a spot plate. Add a few drops of Marquis Reagent. LBJ gives a blue color with this reagent.

Sample Preparation:

Weigh, accurately, one half dosage unit (usually equivalent to 3-8 mgs of LBJ). Transfer to a separatory funnel containing about 10 mls of 0.1N HCl. Extract with three 5 ml portions of chloroform. Discard the chloroform extracts. Add sufficient 1N NaOH to render the aqueous solution basic to litmus paper. Extract with two 10 ml and one 5 ml portions of chloroform. Evaporate the combined chloroform extracts almost to dryness on a steam bath with the aid of a current of air, leaving a clear liquid residue of the free base.

A) Determination by Ultraviolet Spectrophotometry:

Dissolve the residue in 0.1N HCl and transfer quantitatively to a 10 ml volumetric flask. Scan the solution on a recording UV spectrophotometer from 300 m $\mu$  to 240 m $\mu$ , comparing the resulting spectrum to that of a standard. Utilize the 257 m $\mu$  peak for quantitation.

B) Determination by Infrared Spectrophotometry (Alternate Procedure)

To the residue add 1.0 ml of chloroform. Immediately transfer the solution into a 1.0 mm liquid IR cell. Scan from 1900 cm<sup>-1</sup> to 1550 cm<sup>-1</sup> on a recording IR spectrophotometer and compare to a standard of similar concentration (ca 4 mgs/ml). Quantitation is based on the peak at ca. 1725 cm<sup>-1</sup> using base line technique.

(NOTE: Solution remaining from either determination can be reextracted, or reevaporated to dryness and used for identification).

C) Identification by Infrared Spectrophotometry:

To the free base add a few drops of conc. HCl. Evaporate on a steam bath to dryness. Prepare a KBr disc of the dry residue. Obtain the infrared absorption curve and compare to that of a standard curve.

D) Identification by Thin Layer Chromatography:

|                     |   |
|---------------------|---|
| Adsorbent           | -Silica Gel G (250u) prepared according to Stahl on 20 x 20 cm glass plates.  |
| Mobile Solvent      | -Chloroform: Acetone: conc. Ammonium Hydroxide (80 : 20 : 1)  |
| Chromogenic Reagent | -Iodoplatinate solution -10 mls of 10% platinum chloride to which is added 250 mls of 4% potassium iodide, the mixture being diluted to 500 mls with water. |

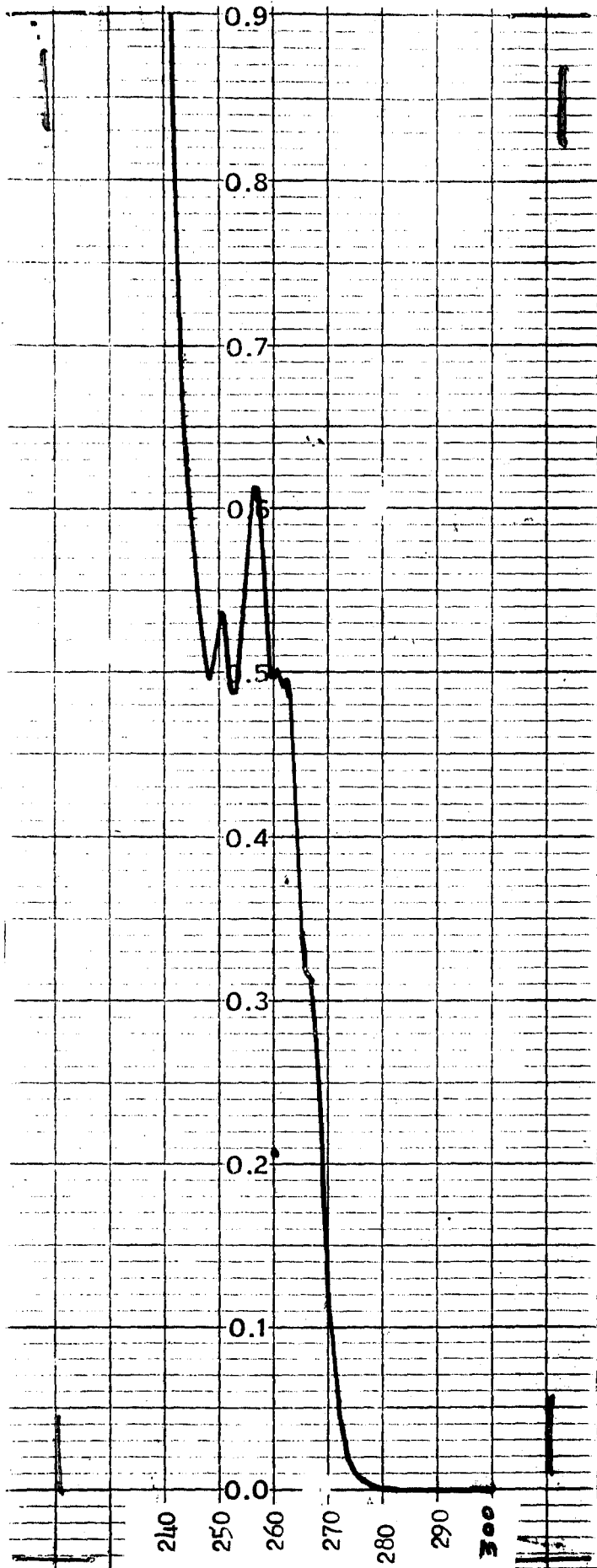
Procedure

Spot ca 5 to 10 mcgs. of the free base (dissolved in chloroform) on the plate. Develop chromatogram to 12 cm in a tank saturated with the mobile solvent. Air dry the plate and spray with the chromogenic reagent. Blue spots appear against a pink background. Two other related compounds were spotted on the same plate. Their Rf values

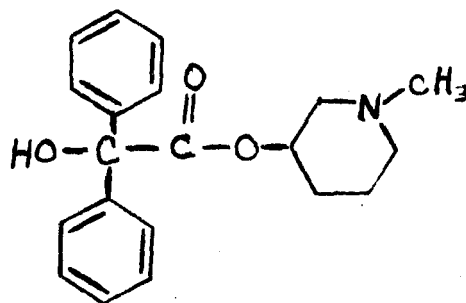
are tabulated below:

| <u>Compound</u>                                      | <u>Rf Value</u> |
|--|-----------------|
| N-Methyl-3-Piperidyl Benzilate (JB 336, LBJ)         | 0.52            |
| N-Ethyl-3-Piperidyl (cyclopentyl Mandelate) (JB 329) | 0.71            |
| N-Ethyl-3-Piperidyl Benzilate (JB 318)               | 0.64            |

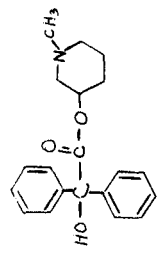
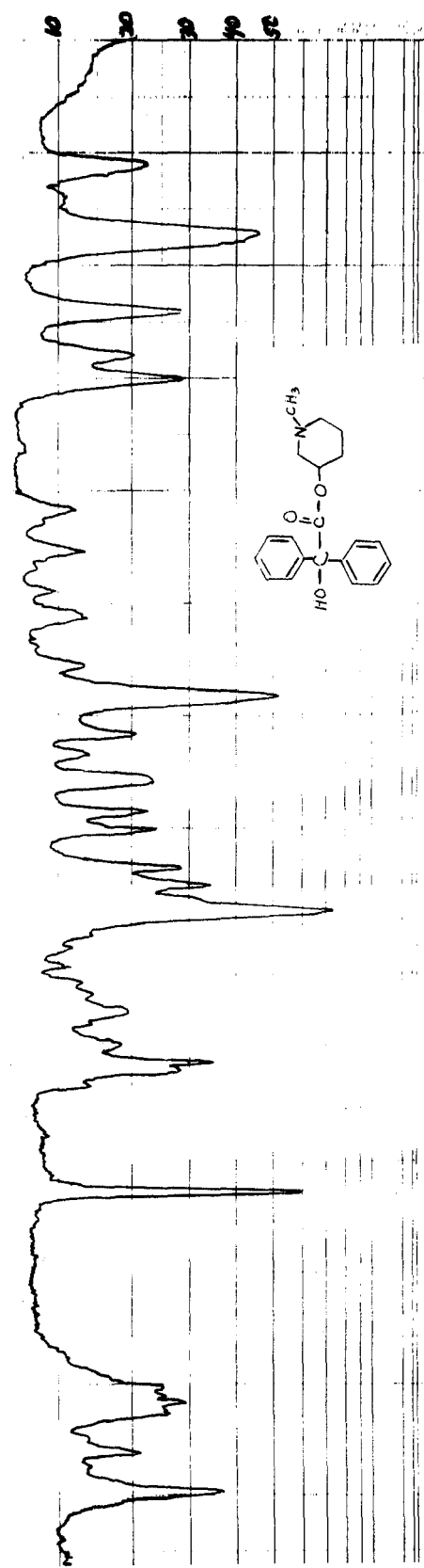
As little as 1 mcg. of LBJ can be detected by the above procedure.



SAMPLE NUMBER .....  
STANDARD USED N-METHYL-3-PIPERIDYL  
BENZILATE·HCl (LBT, JB 336)  
STANDARD CONCENTRATION 4.56 mg./1.0 ml.  
REFERENCE SOLVENT 0.1 N HCl  
CELL PATH 1.0 cm  
INSTRUMENT CARY 15  
DATE 6/26/68 N.Y. DISTRICT  
OPERATOR RICHARD FOX / P. DeZan



C-26-C8  
(STANDARD) N-METHYL-2-PIPI  
BENZYLATE-HCl (78394, L63)



PATH: mm  
SOLVENT: KBr  
CONCENTRATION: ~ 0.5%  
PHASE: SOLID  
COMMENTS: vs. AIR

ANALYST: R. Fox, R. DeZan

PREPARED BY: PHOTOMETER

RECORDING CHART NO. BK 8 (4888)



## ULTRAVIOLET ABSORPTION DATA OF PHARMACEUTICALS

By Carolyn N. Andres and Susan W. Snow, Food and Drug Administration

With the advent of the Drug Abuse Control Act, many previously unknown drug substances have been encountered. A rapid procedure for detecting and identifying the drug is essential. The use of ultraviolet spectra, while not specific, is a good preliminary screening technique.

Quite often the distinctive absorbance exhibited in the ultraviolet region of the spectrum is characteristic of some substance or specific functional group. To obtain a satisfactory ultraviolet spectrum, a simple, rapid dilution procedure may be sufficient. In other instances, however, it may be necessary to isolate the active constituent by more refined methodology, such as the classical alkaloid extraction technique.

Without a central source of spectra correlation data, a time-consuming search may be necessary for the identification of any one specific compound or structural class of compounds. This compilation of ultraviolet absorption maxima is given as an aid in the elucidation and/or exclusion of pharmacological constituents.

Table 1 is arranged according to maxima wavelengths; the solvent system code is tabulated below. When more than one maximum is listed for a compound, the maxima are listed in decreasing order of intensity. When more than one compound is listed at the same wavelength(s), the compounds are listed alphabetically first and then by solvent. When known, absorptivities are also listed.

### Code for solvent system given in Table 1

|   |                            |
|---|----------------------------|
| A - chloroform (reagent grade)          | J - 0.1N sodium hydroxide  |
| B - ethanol (absolute)                  | K - 0.01N sodium hydroxide |
| C - ethanol (95%)                       | L - 1N sulfuric acid       |
| D - dilute hydrochloric acid (10%, v/v) | M - 0.5N sulfuric acid     |
| E - 0.1N hydrochloric acid              | N - 1% tartaric acid       |
| F - 0.01N hydrochloric acid             | O - 0.5% tartaric acid     |
| G - methanol                            | P - 0.01M tartaric acid    |
| H - 0.5N sodium hydroxide               | Q - water                  |
| I - 0.2N sodium hydroxide               |                            |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals

| Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                             | 1%<br>A <sub>1</sub> cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                              | 1%<br>A <sub>1</sub> cm | Ref. |
|------------------------|--------------|----------------------------------|-------------------------|------|------------------------|--------------|-----------------------------------|-------------------------|------|
| 203, 225               | E            | Cyclizine                        | 990, 440                | (1)  | 227, 290               | H            | Cinchonidine                      | 1200, ---               | (4)  |
| 203, 225               | E            | Cyclizine HCl                    | 990, 440                | (1)  | 228                    | B            | Tolbutamide                       | 500                     | (2)  |
| 205, 310               | Q            | Ergonovine maleate               | 730, 180                | (2)  | 228                    | M            | Phenocaine                        | 530                     | (4)  |
| 209, 285               | E            | Morphine tartrate                | 613, 40                 | (2)  | 228, 262               | M            | Berberine                         | 630, ---                | (4)  |
| 211                    | Q            | Protoveratrine A &<br>B maleates | 148                     | (1)  | 228, 264               | E            | Berberine                         | ---                     | (1)  |
| 219                    | E            | Cycloserine                      | 341                     | (2)  | 228, 264               | H            | Berberine                         | 610, ---                | (4)  |
| 220                    | E            | Metharbital                      | ---                     | (3)  | 228, 276               | C            | Dienestrol                        | 1200, 160               | (2)  |
| 220, 272               | M            | Yohimbine                        | 1076, ---               | (4)  | 228, 282               | L            | Emetine HCl                       | 241, 104                | (2)  |
| 220, 278               | E            | Epinephrine<br>bitartrate        | ---                     | (3)  | 228, 287               | C            | Dichlorophen                      | 540, 165                | (2)  |
| 220, 281,<br>288       | C            | Tyrothricin                      | ---                     | (3)  | 228, 292,<br>310       | J            | Chlorothiazide                    | ---                     | (5)  |
| 221, 281,<br>289       | C            | Gramicidin                       | ---                     | (3)  | 229, 294               | C            | Iophenoxic acid                   | 520, 56                 | (2)  |
| 222                    | H            | Strophanthin                     | 200                     | (4)  | 230                    | Q            | Amylocaine HCl                    | 540                     | (1)  |
| 222                    | Q            | Lobeline HCl                     | 50                      | (2)  | 230                    | Q            | Aniline                           | ---                     | (1)  |
| 223, 237,<br>247, 343  | E            | Amodiaquine HCl                  | ---                     | (3)  | 230                    | C            | Benzodiazepinone                  | ---                     | (6)  |
| 223, 252,<br>273, 283  | C            | Dihydroxyanthra-<br>quinone      | ---                     | (3)  | 230                    | C            | Benzyl benzoate                   | 843                     | (2)  |
| 223, 253,<br>284, 346  | J            | Chlortetracycline HCl            | ---                     | (3)  | 230                    | H            | Chlocyalizine                     | 550                     | (4)  |
| 224                    | H            | Aconitine                        | 140                     | (4)  | 230                    | M            | Chlocyalizine                     | 600                     | (4)  |
| 224                    | H            | Eucaïne                          | 300                     | (4)  | 230                    | C            | Chlorcyclizine HCl                | 440                     | (2)  |
| 224, 272               | M            | p-Aminobenzoic acid              | 1000, ---               | (4)  | 230                    | C            | Hydroxyzine HCl                   | ---                     | (2)  |
| 224, 280               | H            | Yohimbine                        | 820, ---                | (4)  | 230                    | M            | Hydroxyzine pamoate               | 240                     | (4)  |
| 224, 286               | E            | Pramoxine HCl                    | ---                     | (2)  | 230                    | K            | Iodopanic acid                    | 680                     | (2)  |
| 225                    | C            | Hydroxyamphetamine<br>HBr        | 370                     | (1)  | 230                    | M            | Reserpine                         | 248                     | (4)  |
| 225                    | C            | Pyrrobutamine<br>diphosphate     | ---                     | (1)  | 230                    | Q            | Cocaine HCl                       | 480                     | (1)  |
| 225                    | C            | Sodium levothyroxine             | 616                     | (4)  | 230, 266,<br>272, 260  | C            | Meclizine HCl                     | ---                     | (5)  |
| 225                    | Q            | Caffeine sodium<br>benzoate      | 585                     | (2)  | 230, 267,<br>274       | C            | Estradiol benzoate                | ---                     | (3)  |
| 225                    | Q            | Sodium benzoate                  | 585                     | (2)  | 230, 280               | C            | Hexestrol                         | 775, 140                | (2)  |
| 225, 238,<br>325       | J            | Dibucaïne HCl                    | ---                     | (3)  | 230, 285,<br>330       | H            | Quinidine                         | 980, ---                | (4)  |
| 225, 263               | H            | Aminopyrine                      | 16, ---                 | (4)  | 231                    | Q            | Caffeine and sodium<br>salicylate | 424                     | (2)  |
| 225, 278               | C            | Benzestrol                       | ---                     | (3)  | 231, 296               | Q            | Sodium salicylate                 | 423, 224                | (2)  |
| 225, 278,<br>284       | C            | L-Tyrosine                       | ---                     | (3)  | 231, 309,<br>280       | C            | Vanillin                          | ---                     | (5)  |
| 225, 279               | E            | Chlorocresol                     | 525, 105                | (2)  | 232                    | Q            | Benzamine HCl                     | 610                     | (1)  |
| 226                    | H            | Ascorbic acid                    | 28                      | (4)  | 232                    | F            | Chlorpropamide                    | 600                     | (2)  |
| 226                    | H            | Thyroxine                        | 21                      | (4)  | 232                    | M            | Hydroxyzine HCl                   | 320                     | (4)  |
| 226                    | M            | Thyroxine                        | 18                      | (4)  | 232, 274               | M            | Cocaine                           | 520, ---                | (4)  |
| 226                    | Q            | Tridihexethyl iodide             | 301                     | (2)  | 232, 274               | M            | Eucaïne                           | 370, ---                | (4)  |
| 226, 272               | M            | Ethyl aminobenzoate              | 726, ---                | (4)  | 232, 275               | H            | Alypin                            | ---                     | (4)  |
| 226, 287,<br>315       | H            | Cinchonine                       | 170, ---                | (4)  | 232, 275               | E            | Hexylcaine HCl                    | ---                     | (2)  |
| 226, 330               | H            | Coumarin                         | 890, ---                | (4)  | 232, 282               | C            | Triprolidine HCl                  | ---                     | (7)  |
| 227                    | E            | Cocaine HCl                      | ---                     | (1)  | 233, 267               | C            | Thiamine HCl                      | 380, 240                | (2)  |
| 227                    | J            | Chlorcyclizine HCl               | ---                     | (3)  | 233, 271,<br>294, 332  | C            | Chlorpromazine<br>sulfone HCl     | ---                     | (8)  |
| 227, 264               | M            | Chlormethazone                   | 357, 8                  | (4)  | 233, 275               | E            | Cocaine                           | ---                     | (1)  |
| 227, 278<br>283        | C            | Tubocurarine chloride            | ---                     | (3)  | 234                    | E            | Aconitine                         | ---                     | (1)  |
|                        |              |                                  |                         |      | 234                    | Q            | Amydracaine HCl                   | 450                     | (1)  |
|                        |              |                                  |                         |      | 234, 275               | M            | Aconitine                         | 200                     | (4)  |
|                        |              |                                  |                         |      | 234, 285               | Q            | Anileridine HCl                   | ---                     | (2)  |
|                        |              |                                  |                         |      | 234, 286               | H            | Phenol                            | 1100, ---               | (4)  |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                    | A <sub>1</sub> <sup>1%</sup><br>cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                                  | A <sub>1</sub> <sup>1%</sup><br>cm | Ref. |
|------------------------|--------------|-------------------------|------------------------------------|------|------------------------|--------------|---------------------------------------|------------------------------------|------|
| 234, 334               | C            | Quinidine sulfate       | 792, 236                           | (2)  | 240                    | B            | Cortisone acetate                     | 390                                | (2)  |
| 234, 334               | C            | Quinine dihydrochloride | 780, 134                           | (2)  | 240                    | B            | Desoxycorticosterone acetate          | 440                                | (2)  |
| 234, 334               | C            | Quinine sulfate         | 792, 236                           | (2)  | 240                    | C            | Desoxycorticosterone acetate          | ---                                | (3)  |
| 235, 300               | M            | p-Aminosalicylic acid   | 480, ---                           | (4)  | 240                    | B            | Desoxycorticosterone trimethylacetate | 405                                | (2)  |
| 235, 300               | M            | Salicylic acid          | 680, ---                           | (4)  | 240                    | G            | Desoxycorticosterone trimethylacetate | ---                                | (3)  |
| 235, 316               | M            | Cinchonidine            | 1200, ---                          | (4)  | 240                    | B            | Dexamethasone                         | 390                                | (2)  |
| 235, 344,<br>330, 257  | M            | Chloroquin              | 580, ---                           | (4)  | 240                    | E            | Emetine                               | 350                                | (2)  |
| 236, 225,<br>312, 283  | M            | Pyrimilamine maleate    | ---                                | (3)  | 240                    | B            | Ethisterone                           | 520                                | (2)  |
| 236, 274               | H            | Theobromine             | 230, ---                           | (4)  | 240                    | B            | Fluocinolone acetate                  | 360                                | (2)  |
| 236, 295               | H            | Bemidone                | 150, ---                           | (4)  | 240                    | B            | Fluodrocortisone acetate              | 405                                | (2)  |
| 236, 299               | M            | Salicylamide            | 590, ---                           | (4)  | 240                    | B            | Fluoxymesterone                       | 495                                | (2)  |
| 236, 302               | C            | Salicylamide            | 570, 312                           | (2)  | 240                    | B            | Hydrocortisone                        | 435                                | (2)  |
| 236, 332,<br>278       | C            | Quinidine               | 920, 135, 110                      | (2)  | 240                    | B            | Hydrocortisone acetate                | 390                                | (2)  |
| 236, 332,<br>278       | C            | Quinine                 | 920, 135, 110                      | (2)  | 240                    | B            | Hydrocortisone hydrogen acetate       | 341                                | (2)  |
| 237, 314               | M            | Pheniramine             | 650, ---                           | (4)  | 240                    | B            | Hydrocortisone sodium succinate       | 327                                | (2)  |
| 237, 302               | M            | Methyl salicylate       | 660, ---                           | (4)  | 240                    | B            | Methylprednisolone                    | 400                                | (2)  |
| 237, 313               | M            | Thenylene               | 700, ---                           | (4)  | 240                    | B            | Methyl testosterone                   | 535                                | (2)  |
| 238                    | M            | Acetanilide             | 800                                | (4)  | 240                    | B            | Nandrolone phenylpropionate           | 430                                | (2)  |
| 238                    | G            | Cortisone acetate       | ---                                | (3)  | 240                    | C            | Norandrostenolone                     | 400                                | (2)  |
| 238                    | C            | Diprotizoic acid        | ---                                | (3)  | 240                    | B            | Norethisterone                        | 571                                | (2)  |
| 238                    | J            | Diprotizoic acid        | 575                                | (2)  | 240                    | H            | Picrotoxin                            | 180                                | (4)  |
| 238                    | C            | Iodipamide              | 580                                | (2)  | 240                    | J            | Pentobarbital sodium                  | 360                                | (2)  |
| 238                    | D            | Methapyrilene HCl       | 620                                | (1)  | 240                    | B            | Prednisolone                          | 415                                | (2)  |
| 238                    | Q            | Penthenate bromide      | 189                                | (2)  | 240                    | B            | Prednisolone acetate                  | 370                                | (2)  |
| 238                    | C            | Sodium diatrizoate      | ---                                | (3)  | 240                    | B            | Prednisolone trimethylacetate         | 337                                | (2)  |
| 238                    | G            | Spirocholactone         | 470                                | (2)  | 240                    | B            | Prednisone                            | 430                                | (2)  |
| 238                    | C            | Triamcinolone           | 380                                | (2)  | 240                    | B            | Progesterone                          | 540                                | (2)  |
| 238                    | C            | Triamcinolone acetate   | 343                                | (2)  | 240                    | G            | Progesterone                          | ---                                | (3)  |
| 238, 260               | H            | Phenocaine              | 460, ---                           | (4)  | 240                    | C            | Testosterone enanthate                | ---                                | (3)  |
| 238, 290               | B            | Piperonyl butoxide      | 155, 130                           | (2)  | 240                    | B            | Testosterone phenylpropionate         | 395                                | (2)  |
| 238, 292               | H            | Cresol                  | 1500, ---                          | (4)  | 240                    | B            | Testosterone propionate               | 490                                | (2)  |
| 238, 306               | C            | Methyl salicylate       | 588, 282                           | (2)  | 240, 260,<br>303, 315  | Q            | Hydralazine HCl                       | 580, 540,<br>270, 210              | (2)  |
| 238, 313               | M            | Tripelennamine citrate  | ---                                | (3)  | 240, 263               | B            | Dexamethasone acetate                 | 355, ---                           | (2)  |
| 238, 313               | M            | Tripelennamine HCl      | ---                                | (3)  | 240, 275,<br>298, 342  | C            | Chlorpromazine sulfoxide HCl          | ---                                | (8)  |
| 238, 315               | M            | Methapyrilene           | 640, ---                           | (4)  | 240, 294               | J            | Edrophonium chloride                  | 550, 170                           | (2)  |
| 239                    | H            | Acetanilide             | 710                                | (4)  | 240, 299               | J            | Levorphanol tartrate                  | 198, 70                            | (2)  |
| 239                    | C            | Phenylbutazone          | ---                                | (4)  | 240, 302               | M            | Physostigmine                         | 420, ---                           | (4)  |
| 239                    | G            | Prednisone              | ---                                | (3)  |                        |              |                                       |                                    |      |
| 239                    | Q            | Sodium diatrizoate      | 520                                | (2)  |                        |              |                                       |                                    |      |
| 239, 276               | C            | Diethylstilbestrol      | 600, ---                           | (2)  |                        |              |                                       |                                    |      |
| 239, 304               | Q            | Methapyrilene HCl       | ---                                | (6)  |                        |              |                                       |                                    |      |
| 239, 314               | M            | Tripelennamine          | 561, ---                           | (4)  |                        |              |                                       |                                    |      |
| 239, 316               | F            | Pyrimilamine maleate    | 450, 205                           | (2)  |                        |              |                                       |                                    |      |
| 240                    | K            | Amobarbital             | 415                                | (2)  |                        |              |                                       |                                    |      |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug   | A <sub>1%</sub><br>1 cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                                | A <sub>1%</sub><br>1 cm | Ref. |
|------------------------|--------------|--|-------------------------|------|------------------------|--------------|-------------------------------------|-------------------------|------|
| 240, 305               | C            | Methapyrilene HCl                            | 637, 155                | (9)  | 243, 350               | C            | Colchicine                          | 730, 420                | (2)  |
| 240, 306               | Q            | Methylethyl-<br>ethylenediamine<br>maleate   | ---                     | (6)  | 244                    | J            | Metharbital                         | ---                     | (2)  |
| 240, 307               | M            | Phenyl salicylate                            | 2200, ---               | (4)  | 244                    | E            | Pyrilamine maleate                  | ---                     | (1)  |
| 240, 310               | M            | Ergotamine                                   | 430, ---                | (4)  | 244                    | Q            | Sandostene                          | ---                     | (6)  |
| 240, 310               | H            | Methapyrilene                                | 640, ---                | (4)  | 244, 280               | C            | Piperacetazine HCl                  | ---                     | (8)  |
| 240, 311               | C            | Ergonovine maleate                           | ---                     | (3)  | 244, 306               | C            | Thenyldiamine HCl                   | 635, 152                | (9)  |
| 240, 326               | Q            | Dequalinium chloride                         | 890, 510                | (2)  | 244, 314               | Q            | Pyrilamine maleate                  | 420, 196                | (1)  |
| 240, 327               | Q            | Dequalinium acetate                          | 830, 480                | (2)  | 244, 343,<br>267       | M            | Cinchophen                          | 1100, ---               | (4)  |
| 241                    | Q            | Antazoline methane-<br>sulfonate             | 410                     | (2)  | 245                    | A            | Acetaminophen                       | ---                     | (10) |
| 241                    | G            | Ethisterone                                  | ---                     | (3)  | 245                    | J            | Barbital sodium                     | 320                     | (2)  |
| 241                    | C            | Methyltestosterone                           | ---                     | (3)  | 245                    | K            | Barbital sodium                     | 320                     | (2)  |
| 241                    | G            | Norethandrone                                | 565                     | (2)  | 245                    | E            | Benzodiazepinone                    | ---                     | (6)  |
| 241                    | C            | Testosterone<br>propionate                   | ---                     | (3)  | 245                    | C            | Methaphenilene HCl                  | 537                     | (1)  |
| 241, 291               | E            | Antazoline HCl                               | 500, 67                 | (2)  | 245                    | Q            | Phenacaine HCl                      | 480                     | (1)  |
| 241, 291               | E            | Antazoline phosphate                         | 415, 56                 | (2)  | 245                    | H            | Phenacetin                          | 700                     | (4)  |
| 241, 299               | Q            | Physostigmine<br>salicylate                  | 350, 150                | (2)  | 245, 305               | Q            | Tripelennamine HCl                  | 490, ---                | (2)  |
| 241, 328               | H            | Salicylamide                                 | 540, ---                | (4)  | 246                    | J            | Butabarbital<br>(butethal)          | 330                     | (2)  |
| 242                    | Q            | Antazoline HCl                               | 520                     | (1)  | 246                    | M            | Phenacetin                          | 750                     | (4)  |
| 242                    | C            | Chloromethapyrilene<br>citrate               | 409                     | (1)  | 246, 262               | E            | Mecamylamine HCl                    | ---                     | (10) |
| 242                    | F            | Dimidium bromide                             | 670                     | (2)  | 246, 262               | E            | Mepyrium                            | 420, 400                | (2)  |
| 242                    | F            | Homidium bromide                             | 720                     | (2)  | 246, 282               | C            | Methantheline<br>bromide            | 135, 69                 | (2)  |
| 242                    | G            | Hydrocortisone                               | ---                     | (3)  | 246, 295               | H            | Nordefrin HCl                       | 450, ---                | (4)  |
| 242                    | G            | Hydrocortisone<br>acetate                    | ---                     | (3)  | 246, 307               | C            | Tripelennamine HCl                  | 547, 156                | (9)  |
| 242                    | C            | Hydrocortisone<br>sodium succinate           | ---                     | (5)  | 246, 315               | Q            | Isothipendyl                        | ---                     | (6)  |
| 242                    | Q            | Methaphenilene HCl                           | 489                     | (1)  | 246, 320               | M            | Dibucaine HCl                       | 590, ---                | (4)  |
| 242                    | G            | Prednisolone                                 | ---                     | (3)  | 246, 355               | H            | Colchicine                          | 880, ---                | (4)  |
| 242                    | G            | Prednisolone acetate                         | ---                     | (3)  | 246, 355               | M            | Colchicine                          | 900, ---                | (4)  |
| 242                    | C            | Prednisolone<br>diethylaminoace-<br>tate HCl | 290                     | (2)  | 247                    | M            | Imipramine HCl                      | 240                     | (4)  |
| 242                    | C            | Testosterone cyclo-<br>pentylpropionate      | ---                     | (3)  | 247                    | Q            | Prednisolone sodium<br>phosphate    | 312                     | (2)  |
| 242                    | C            | Thenyldiamine HCl                            | ---                     | (2)  | 247, 296               | M            | Mepazine                            | 2600, 181               | (4)  |
| 242, 290               | M            | Antazoline                                   | 600, ---                | (4)  | 247, 307               | C            | Chlorotrianisene                    | 633, 410                | (2)  |
| 242, 292               | C            | Antazoline HCl                               | 515, 67                 | (9)  | 247, 309               | A            | Chlorotrianisene                    | 633, 410                | (2)  |
| 242, 295               | J            | Hexestrol                                    | 965, 175                | (2)  | 247, 310               | C            | Pyrilamine maleate                  | 464, 115                | (9)  |
| 242, 310               | C            | Phenyl salicylate                            | 664, 248                | (2)  | 248                    | C            | Ascorbic acid                       | ---                     | (3)  |
| 243                    | M            | Ascorbic acid                                | 350                     | (4)  | 248                    | C            | Ethosuximide                        | 8.5                     | (2)  |
| 243                    | G            | Iothalamic acid                              | 530                     | (2)  | 248                    | M            | Methopromazine                      | 458                     | (4)  |
| 243, 277               | E            | Carphenazine maleate                         | 385, ---                | (2)  | 248, 225               | C            | Probenecid                          | 330, ---                | (2)  |
| 243, 278               | C            | Carphenazine maleate                         | ---                     | (8)  | 248, 298               | H            | Antazoline                          | 700, ---                | (4)  |
| 243, 280               | C            | Acetophenazine<br>dimaleate                  | ---                     | (8)  | 248, 306,<br>287       | C            | Novobiocin                          | ---                     | (3)  |
| 243, 302               | E            | Thiabendazole                                | ---                     | (2)  | 248, 310               | J            | Tripelennamine HCl                  | ---                     | (3)  |
| 243, 304               | C            | Chlorothen citrate                           | 408, 89                 | (9)  | 248, 311               | J            | Tripelennamine<br>citrate           | ---                     | (3)  |
| 243, 313               | C            | Thonzylamine HCl                             | 739, 104                | (1)  | 248, 312, 280          | J            | Pyrilamine maleate                  | ---                     | (3)  |
|                        |              |  |                         |      | 248, 313               | H            | Pyrilamine                          | 640, ---                | (4)  |
|                        |              |  |                         |      | 249                    | C            | Ethyl aminobenzoate<br>(benzocaine) | ---                     | (3)  |
|                        |              |  |                         |      | 249                    | Q            | Lobeline HCl                        | 376                     | (1)  |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>m $\mu$  | Sol-<br>vent | Drug                            | 1%<br>A <sub>1</sub> cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                             | 1%<br>A <sub>1</sub> cm | Ref. |
|-------------------------|--------------|---------------------------------|-------------------------|------|------------------------|--------------|----------------------------------|-------------------------|------|
| 249                     | F            | Promethazine HCl                | 910                     | (2)  | 254                    | M            | Strychnine                       | 390                     | (4)  |
| 249, 294                | M            | Antergan                        | 340, ---                | (4)  | 254                    | Q            | Strychnine HCl                   | 330                     | (2)  |
| 249, 298                | Q            | Diethazine HCl                  | ---                     | (6)  | 254                    | L            | Strychnine phosphate             | 270                     | (2)  |
| 249, 298                | M            | Promethazine HCl                | ---                     | (3)  | 254                    | Q            | Strychnine sulfate               | 280                     | (2)  |
| 249, 300                | C            | 8-Methoxypsoralen (methoxsalen) | 1060, 563               | (2)  | 254                    | M            | Triflupromazine                  | 730                     | (4)  |
| 250                     | C            | Acetaminophen                   | ---                     | (7)  | 254, 260               | C            | Cyclizine diHCl                  | ---                     | (6)  |
| 250                     | M            | Picrotoxin                      | 22                      | (4)  | 254, 304               | C            | Mepazine HCl                     | ---                     | (8)  |
| 250, 247, 256, 262      | C            | Trihexyphenidyl HCl             | ---                     | (3)  | 254, 304               | C            | Methdilazine HCl                 | ---                     | (8)  |
| 250, 298                | M            | Promazine                       | 850, ---                | (4)  | 254, 306               | C            | Promazine                        | ---                     | (8)  |
| 250, 299                | Q            | Soventol lactate                | ---                     | (6)  | 255                    | H            | Gelsemine                        | 210                     | (4)  |
| 250, 300                | H            | Morphine                        | 246, ---                | (4)  | 255                    | M            | Methylparaben                    | 1050                    | (4)  |
| 250, 300                | M            | Phenergan                       | 878, ---                | (4)  | 255                    | F            | Pipamazine                       | 800                     | (2)  |
| 250, 314                | H            | Tripeleminamine                 | 635, ---                | (4)  | 255                    | Q            | Sodium iron edetate              | 0.23                    | (2)  |
| 250, 345, 318           | M            | Quinidine                       | 853, ---                | (4)  | 255, 280, 290          | C            | Strychnine                       | 377, 130, 101           | (1)  |
| 250, 345, 318           | M            | Quinine                         | 853, ---                | (4)  | 255, 305               | M            | Chlorpromazine                   | 699, ---                | (4)  |
| 250, 348                | E            | Quinidine                       | ---                     | (1)  | 255, 305               | M            | Perphenazine                     | 700, ---                | (4)  |
| 250, 348, 316           | E            | Quinine phosphate               | 770, 142, 115           | (2)  | 255, 305               | F            | Thiopropazate HCl                | 610, 80                 | (2)  |
| 251                     | J            | Cyclobarbitol                   | 296                     | (2)  | 255, 308               | C            | Promethazine HCl                 | ---                     | (8)  |
| 251                     | F            | Imipramine HCl                  | 265                     | (2)  | 255, 308               | C            | Trimeprazine HCl                 | ---                     | (8)  |
| 251                     | Q            | Promazine HCl                   | 910                     | (2)  | 256                    | Q            | Atropine sulfate                 | 5.4                     | (1)  |
| 251, 242, 261           | C            | Dihydrotachysterol              | 1010, 870               | (2)  | 256                    | M            | Benactyzine HCl                  | 110                     | (4)  |
| 251, 257, 263, 366, 320 | G            | Benzathine penicillin G         | ---                     | (3)  | 256                    | I            | Meperidine                       | ---                     | (11) |
| 251, 287                | Q            | Bacitracin                      | ---                     | (3)  | 256                    | M            | Sycotrol                         | 33                      | (4)  |
| 251, 302                | F            | Trimeprazine tartrate           | 700, ---                | (2)  | 256                    | F            | Trifluoperazine HCl              | 630                     | (2)  |
| 251, 309, 285           | L            | Papaverine                      | 1790, 242, 189          | (2)  | 256, 250, 262          | Q            | Phenylmercuric nitrate           | 8.3, 7.5, 6.5           | (2)  |
| 251, 316                | C            | Chlorquinaldol                  | 2140, 170               | (2)  | 256, 283, 365          | J            | Folic acid                       | 547, 533 187            | (2)  |
| 252                     | C            | Benzyl alcohol                  | 18.6                    | (2)  | 256, 288, 355          | A            | Anthralin                        | ---                     | (3)  |
| 252                     | M            | Gelsemine                       | 220                     | (4)  | 256, 309               | C            | Prochlorperazine dihydrochloride | ---                     | (8)  |
| 252                     | C            | Hyoscyamine HBr                 | 5.2                     | (1)  | 256, 310               | C            | Chlorpromazine HCl               | ---                     | (8)  |
| 252                     | E            | Scopolamine                     | ---                     | (1)  | 256, 320               | C            | 2-Chlorophenothiazine            | ---                     | (1)  |
| 252                     | J            | Vinbarbital                     | 3375                    | (2)  | 257                    | E            | dl-Alphaprodine                  | ---                     | (11) |
| 252, 302                | H            | Antergan                        | 710, ---                | (4)  | 257                    | I            | dl-Alphaprodine                  | ---                     | (11) |
| 252, 302                | C            | Promethazine HCl                | ---                     | (8)  | 257                    | M            | Aminopyrine                      | 14                      | (4)  |
| 253                     | J            | Phenobarbital                   | 320                     | (2)  | 257                    | Q            | Amphetamine sulfate              | 9.7                     | (1)  |
| 253                     | J            | Phenobarbital sodium            | 304                     | (2)  | 257                    | M            | Azacyclonol                      | 18                      | (4)  |
| 253, 233, 329           | K            | Hydroxychloroquine sulfate      | ---                     | (3)  | 257                    | F            | Chloroquine sulfate              | 390                     | (2)  |
| 253, 302                | Q            | Mepazine HCl                    | ---                     | (6)  | 257                    | E            | Mephentermine                    | 11.5                    | (1)  |
| 253, 304                | H            | Promethazine                    | 1100, ---               | (4)  | 257                    | C            | Methyl hydroxybenzoate           | 1088                    | (2)  |
| 253, 305                | M            | Prochlorperazine maleate        | 1170, ---               | (4)  | 257                    | E            | Norpethidine                     | ---                     | (11) |
| 253, 320                | C            | Phenothiazine                   | ---                     | (8)  | 257                    | I            | Norpethidine                     | ---                     | (11) |
| 254                     | E            | Perphenazine                    | 812                     | (2)  | 257                    | E            | Pimindine                        | ---                     | (11) |
| 254                     | C            | Pyrazithiazine HCl              | 960                     | (1)  | 257                    | Q            | Pipradol HCl                     | 15                      | (2)  |
| 254                     | E            | Strychnine                      | ---                     | (1)  | 257                    | C            | Propyl hydroxybenzoate           | 919                     | (2)  |
| 254                     | H            | Strychnine                      | 380                     | (4)  | 257, 245, 251, 295     | J            | Sodium penicillin G              | ---                     | (3)  |
| 254                     | L            | Strychnine                      | 378                     | (2)  | 257, 250, 263, 333     | C            | Menadione                        | ---                     | (3)  |
|                         |              |                                 |                         |      | 257, 251               | M            | Alphaprodine HCl                 | 7, ---                  | (4)  |
|                         |              |                                 |                         |      | 257, 251               | Q            | Meperidine HCl                   | 7.7, 6.6                | (2)  |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                              | A <sub>1</sub> <sup>1%</sup><br>cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                            | A <sub>1</sub> <sup>1%</sup><br>cm | Ref. |
|------------------------|--------------|-----------------------------------|------------------------------------|------|------------------------|--------------|---------------------------------|------------------------------------|------|
| 257, 251<br>262        | Q            | Ephedrine sulfate                 | 7.6, 6.1,<br>6.1                   | (2)  | 258                    | M            | Diphenhydramine HCl             | 15                                 | (4)  |
| 257, 251, 262          | J            | L-Phenylalanine                   | ---                                | (3)  | 258                    | M            | Hyoscyamine                     | 9                                  | (4)  |
| 257, 251,<br>263       | L            | Atropine methonitrate             | 5.2, 4.3,<br>3.9                   | (2)  | 258                    | E            | d-Propoxyphene                  | ---                                | (11) |
| 257, 251,<br>263       | H            | Demerol                           | 9, ---                             | (4)  | 258                    | Q            | Scopolamine HBr                 | 4.0                                | (1)  |
| 257, 251,<br>263       | M            | Demerol                           | 9, ---                             | (4)  | 258, 251,<br>264       | C            | Primidone                       | ---                                | (3)  |
| 257, 251,<br>263       | H            | Ephedrine                         | 10, ---                            | (4)  | 258, 252               | J            | Diphenhydramine HCl             | ---                                | (3)  |
| 257, 251,<br>263       | M            | Ephedrine                         | 10, ---                            | (4)  | 258, 252,<br>264       | C            | Homatropine<br>methylbromide    | ---                                | (3)  |
| 257, 251,<br>263       | Q            | Ephedrine HCl                     | 9.6, 7.4<br>7.3                    | (2)  | 258, 252,<br>264       | Q            | Trimetaphan<br>camphorsulfonate | 78, 76,<br>58                      | (2)  |
| 257, 251,<br>263       | G            | Glutethimide                      | ---                                | (3)  | 258, 252,<br>265       | C            | Benactyzine HCl                 | 12, 11, 10                         | (2)  |
| 257, 251,<br>263       | H            | Mepiridine                        | 9, ---                             | (4)  | 258, 252,<br>265       | G            | Carbetapentane<br>citrate       | ---                                | (3)  |
| 257, 251,<br>263       | E            | L-Phenylalanine                   | ---                                | (3)  | 258, 253               | Q            | Systral                         | ---                                | (6)  |
| 257, 251,<br>263, 246  | C            | Atropine sulfate                  | 5.1, 4.3,<br>3.8, 3.6              | (2)  | 258, 253,<br>263       | C            | Pipradrol HCl                   | ---                                | (3)  |
| 257, 251,<br>263, 247  | C            | Propoxyphene HCl                  | ---                                | (3)  | 258, 253,<br>264       | C            | Amphetamine                     | ---                                | (1)  |
| 257, 252               | Q            | Azacyclonol HCl                   | ---                                | (3)  | 258, 253,<br>264, 266  | H            | Atropine                        | 11, ---                            | (4)  |
| 257, 252               | M            | Diphenhydramine HCl               | 15, ---                            | (4)  | 258, 253,<br>267       | H            | Amphetamine                     | 30, ---                            | (4)  |
| 257, 252               | E            | Trihexyphenidyl HCl               | ---                                | (4)  | 258, 263               | Q            | Keithon                         | ---                                | (6)  |
| 257, 252,<br>263       | M            | Amphetamine                       | 26, ---                            | (4)  | 258, 263,<br>251       | M            | Anileridine                     | 980, ---                           | (4)  |
| 257, 252,<br>263       | M            | Atropine                          | 8, ---                             | (4)  | 258, 298               | G            | Syrosingopine                   | ---                                | (2)  |
| 257, 252,<br>263       | Q            | Methscopolamine<br>nitrate        | 4.8, ---                           | (2)  | 258, 308               | C            | Trifluoperazine HCl             | ---                                | (8)  |
| 257, 252,<br>263       | H            | Scopolamine                       | 10, ---                            | (4)  | 258, 308               | C            | Trifluoromepazine<br>HCl        | ---                                | (8)  |
| 257, 252,<br>263       | M            | Scopolamine                       | 9, ---                             | (4)  | 258, 308               | C            | Trifluopromazine HCl            | ---                                | (8)  |
| 257, 252,<br>263       | Q            | Tricyclamol chloride              | 5.6, 4.5,<br>4.2                   | (2)  | 258, 320               | H            | Cinchophen                      | 1900, ---                          | (4)  |
| 257, 263               | C            | Tolazoline HCl                    | 12.5, 8.5                          | (2)  | 259                    | H            | Chlormethazone                  | 347                                | (4)  |
| 257, 263               | Q            | Tricyclamol HCl                   | 5.6, 4.2                           | (2)  | 259                    | J            | Diethylstilbestrol              | 764                                | (2)  |
| 257, 301               | J            | Methotrexate                      | ---                                | (3)  | 259                    | J            | Doxylamine succinate            | ---                                | (3)  |
| 257, 310               | C            | Perphenazine HCl                  | ---                                | (8)  | 259                    | E            | Nicotine                        | 34.3                               | (1)  |
| 257, 310               | C            | Thiopropazate HCl                 | ---                                | (8)  | 259                    | M            | Nicotine                        | 343                                | (4)  |
| 257, 312               | C            | Pipamazine HCl                    | ---                                | (8)  | 259                    | M            | Phenindamine<br>tartrate        | ---                                | (3)  |
| 257, 321               | J            | Cinchophen                        | 1492, 340                          | (2)  | 259                    | Q            | Phenindamine<br>tartrate        | 220                                | (2)  |
| 257, 321               | K            | Cinchophen                        | 1492, 340                          | (2)  | 259                    | Q            | Sulfaguanidine                  | 790                                | (2)  |
| 257, 330               | H            | Chloroquin                        | 520, ---                           | (4)  | 259                    | J            | Thiouracil                      | 864                                | (2)  |
| 257, 365               | C            | Rutin                             | ---                                | (3)  | 259, 253,<br>265       | Q            | Cetylpyridinium<br>chloride     | ---                                | (3)  |
| 258                    | E            | L-Acetylmethadol                  | ---                                | (11) | 259, 264               | Q            | Orphenadrine HCl                | ---                                | (6)  |
| 258                    | E            | Atropine                          | ---                                | (1)  | 259, 265               | B            | Ethotoin                        | 11, 8                              | (2)  |
| 258                    | Q            | Benztropine methane-<br>sulfonate | 11                                 | (2)  | 259, 268,<br>276       | C            | Hydroxyzine HCl                 | ---                                | (1)  |
| 258                    | B            | Diiodohydroxy-<br>quinoline       | 1060                               | (2)  | 259, 292,<br>265, 251  | M            | Methadone                       | 19, ---                            | (4)  |
| 258                    | C            | Diloxanide furoate                | 700                                | (2)  | 260                    | Q            | Doxylamine<br>succinate         | 110                                | (1)  |
| 258                    | H            | Diphenhydramine HCl               | 15                                 | (4)  | 260                    | M            | Neostigmine                     | 32                                 | (4)  |
|                        |              |                                   |                                    |      | 260                    | J            | Propylthiouracil                | 600                                | (2)  |
|                        |              |                                   |                                    |      | 260, 256,<br>266       | G            | Carbinoxamine<br>maleate        | ---                                | (3)  |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>$\mu$ | Sol-<br>vent | Drug                        | 1%<br>$A_{1\text{ cm}}$ | Ref. | Wavelength,<br>$\mu$ | Sol-<br>vent | Drug                           | 1%<br>$A_{1\text{ cm}}$ | Ref. |
|----------------------|--------------|-----------------------------|-------------------------|------|----------------------|--------------|--------------------------------|-------------------------|------|
| 260, 266             | L            | Neostigmine bromide         | 16.2, 13.9              | (2)  | 263, 239             | Q            | Sulfamerazine sodium           | 628, 503                | (2)  |
| 260, 266             | L            | Neostigmine methylsulfate   | 14.7, 12.6              | (2)  | 263, 269             | H            | Nicotinic acid                 | 268, 207                | (4)  |
| 260, 280, 292        | H            | Neostigmine                 | 41, ---                 | (4)  | 263, 271             | Q            | Mepivacaine HCl                | 16.5, 13.4              | (2)  |
| 260, 375             | C            | Nitrofurazone               | ---                     | (3)  | 263, 314             | C            | Thioridazine HCl               | ---                     | (8)  |
| 261                  | G            | Brompheniramine maleate     | ---                     | (2)  | 264                  | E            | Acetazolamide                  | ---                     | (3)  |
| 261                  | Q            | Carbinoxamine maleate       | 138                     | (1)  | 264                  | M            | Acetazolamide                  | 187                     | (4)  |
| 261                  | F            | Cyclomethycaine sulfate     | 400                     | (2)  | 264                  | C            | Brucine                        | 307                     | (3)  |
| 261                  | Q            | Dexchlorpheniramine maleate | ---                     | (2)  | 264                  | M            | Dextrochlorpheniramine         | 860                     | (4)  |
| 261                  | M            | Doxylamine                  | 312                     | (4)  | 264                  | M            | Nikethamide                    | 645                     | (4)  |
| 261                  | J            | Methylthiouracil            | 690                     | (2)  | 264                  | F            | Orphenadrine citrate           | 14                      | (2)  |
| 261                  | H            | Nicotine                    | 260                     | (4)  | 264                  | F            | Orphenadrine HCl               | 20.7                    | (2)  |
| 261                  | M            | Nicotinic acid              | 424                     | (4)  | 264, 272             | E            | Sulfisoxazole                  | ---                     | (3)  |
| 261                  | M            | Nicotinic acid hydrazide    | 396                     | (4)  | 264, 300             | L            | Brucine                        | 318, 215                | (2)  |
| 261                  | C            | Phenindamine tartrate       | 223                     | (1)  | 264, 316             | C            | Thiethylperazine maleate       | ---                     | (8)  |
| 261                  | C            | Sulfanilamide               | 1100                    | (2)  | 265                  | C            | Activated 7-dehydrocholesterol | ---                     | (3)  |
| 261, 244             | Q            | Sulfapyridine               | 680, 620                | (2)  | 265                  | E            | Brucine                        | ---                     | (1)  |
| 261, 244             | Q            | Sulfapyridine sodium        | 625, 570                | (2)  | 265                  | C            | Calciferol                     | ---                     | (3)  |
| 261, 291             | C            | Vanillic acid               | ---                     | (5)  | 265                  | M            | Chlorpheniramine maleate       | 300                     | (4)  |
| 262                  | M            | Carbinoxamine               | 220                     | (4)  | 265                  | F            | Isoniazid                      | 420                     | (2)  |
| 262                  | Q            | Chlorpheniramine maleate    | 145                     | (2)  | 265                  | C            | Orthocaine                     | 550                     | (1)  |
| 262                  | H            | Disulfiram                  | 19                      | (4)  | 265                  | E            | Pilocarpine                    | ---                     | (1)  |
| 262                  | M            | Disulfiram                  | 11                      | (4)  | 265, 228, 337, 319   | E            | Chlortetracycline HCl          | 340, 320, 170, 150      | (2)  |
| 262                  | H            | Lidocaine                   | 33                      | (4)  | 265, 262             | Q            | Prophepyridamine maleate       | 212, 138                | (1)  |
| 262                  | M            | Lidocaine                   | 262                     | (4)  | 265, 272, 292        | L            | Phanquone                      | 500, 500, 480           | (2)  |
| 262, 240             | Q            | Sulfamethazine sodium       | 607, 556                | (2)  | 265, 299             | H            | p-Aminosalicylic acid          | 856, ---                | (4)  |
| 262, 256, 268        | C            | Nicotinamide (niacinamide)  | ---                     | (3)  | 265, 299             | J            | Sodium amino-salicylate        | ---                     | (2)  |
| 262, 257, 253, 269   | M            | Cyclizine HCl               | ---                     | (3)  | 265, 300             | E            | Aminosalicylic acid            | ---                     | (2)  |
| 262, 257, 268        | M            | Chlorcyclizine HCl          | ---                     | (3)  | 265, 300             | M            | Brucine                        | 328, ---                | (4)  |
| 262, 257, 268        | C            | Nicotinic acid              | ---                     | (3)  | 265, 305             | H            | Brucine                        | 320, ---                | (4)  |
| 262, 258, 268        | J            | Chlorpheniramine maleate    | ---                     | (3)  | 266                  | F            | Biallylamical HCl              | 410                     | (2)  |
| 262, 267, 257, 274   | C            | Tolbutamide                 | ---                     | (3)  | 266                  | D            | Isoniazid                      | 378                     | (1)  |
| 262, 312             | Q            | Mellaril                    | ---                     | (10) | 266                  | M            | Picolinic acid hydrazide       | 438                     | (4)  |
| 262, 450, 238        | E            | Acriflavin                  | 1522, 1192, 720         | (2)  | 266-270              | E            | Coniine                        | ---                     | (1)  |
| 263                  | M            | Adenine                     | 970                     | (4)  | 266, 214             | M            | Canescine                      | 150, ---                | (4)  |
| 263                  | H            | p-Aminobenzoic acid         | 1300                    | (4)  | 267                  | B            | Amisometradine                 | 1120                    | (2)  |
| 263                  | H            | Apomorphine                 | 460                     | (4)  | 267                  | G            | Amisometradine                 | ---                     | (2)  |
| 263                  | M            | Covatin                     | 412                     | (4)  | 267                  | M            | Deanor                         | 760                     | (4)  |
| 263                  | H            | Nikethamide                 | 220                     | (4)  | 267                  | M            | Isoniazid                      | 374                     | (4)  |
| 263                  | C            | Prophepyridamine            | 184                     | (1)  | 267                  | M            | Marsilid                       | 374                     | (4)  |
| 263                  | H            | Thenylene                   | 420                     | (4)  | 267                  | C            | Sulfamethoxyypyridazine        | ---                     | (3)  |
|                      |              |                             |                         |      | 267, 245, 370        | J            | Oxytetracycline                | ---                     | (3)  |
|                      |              |                             |                         |      | 267, 290             | G            | Reserpine                      | 278, 187                | (2)  |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                                     | A <sub>1</sub> %<br>1 cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                                | A <sub>1</sub> %<br>1 cm | Ref. |
|------------------------|--------------|--|--------------------------|------|------------------------|--------------|-------------------------------------|--------------------------|------|
| 267, 353               | E            | Oxytetracycline                          | ---                      | (3)  | 272                    | M            | Theobromine                         | 230                      | (4)  |
| 267, 355               | E            | Tetracycline HCl                         | ---                      | (3)  | 272, 240               | Q            | Sulfamethazine                      | 660, 600                 | (2)  |
| 268                    | M            | Mescaline                                | 39                       | (4)  | 272, 279               | A            | Phenoxybenzamine HCl                | 0.68, 0.54               | (2)  |
| 268                    | H            | Saccharin                                | 98                       | (4)  | 273                    | Q            | Apomorphine HCl                     | 670                      | (1)  |
| 268                    | C            | Sulfadiazine                             | 860                      | (2)  | 273                    | C            | Caffeine                            | 467                      | (2)  |
| 268                    | F            | Sulfisoxazole                            | 480                      | (2)  | 273                    | H            | Caffeine                            | 400                      | (4)  |
| 268, 274               | Q            | Phenoxyethyl-<br>penicillin<br>potassium | ---                      | (2)  | 273                    | M            | Caffeine                            | 400                      | (4)  |
|                        |              |  |                          |      | 273                    | P            | Caffeine                            | 500                      | (1)  |
| 268, 274,<br>262       | C            | Estradiol<br>dipropionate                | ---                      | (3)  | 273                    | Q            | Dyphylline                          | 361                      | (7)  |
| 268, 275,<br>263       | G            | Phenoxyethyl<br>penicillin               | 39, 32.5,<br>30.5        | (2)  | 273                    | E            | Edrophonium chloride                | ---                      | (3)  |
| 268, 288-<br>295       | C            | Reserpine                                | 270, 170                 | (2)  | 273                    | Q            | Edrophonium chloride                | 107                      | (4)  |
| 269                    | Q            | Benzpyrinium<br>bromide                  | 136                      | (1)  | 273                    | L            | Phenylephrine HCl                   | 96                       | (2)  |
| 269                    | E            | Phenindione                              | 923                      | (2)  | 273                    | Q            | Phenylephrine HCl                   | ---                      | (1)  |
| 269                    | C            | Sulfamerazine                            | ---                      | (3)  | 273                    | E            | Resorcinol                          | ---                      | (6)  |
| 269                    | C            | Sulfamethazine                           | ---                      | (3)  | 273, 220               | H            | 4,6-Dinitroresol                    | 727, ---                 | (4)  |
| 269                    | Q            | Viomycin sulfate                         | 310                      | (2)  | 273, 328               | A            | Betanaphthoxyethanol                | 250, 99                  | (2)  |
| 269, 223,<br>440, 355  | C            | Riboflavin                               | ---                      | (3)  | 273, 329               | K            | Bendroflumethiazide                 | 413, 80                  | (2)  |
| 270                    | M            | Aminophylline                            | 490                      | (4)  | 274                    | F            | Piperocaine HCl                     | 320                      | (2)  |
| 270                    | M            | Benzonate                                | 97                       | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | M            | Butacaine                                | 33                       | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | E            | Caffeine                                 | ---                      | (1)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | M            | Isonicotinic acid                        | 355                      | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | H            | Mephensin                                | 108                      | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | M            | Mephensin                                | 92                       | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | Q            | Mephensin                                | 79                       | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | E            | Phenol                                   | 160                      | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | M            | Phenol                                   | 180                      | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | Q            | Pyridostigmine<br>bromide                | 184                      | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | E            | Theobromine                              | ---                      | (1)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | E            | Theophylline                             | 530                      | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | M            | Theophylline                             | 550                      | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | E            | Theophylline<br>ethylenediamine          | ---                      | (1)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | C            | Thiambutosine                            | 700                      | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270                    | Q            | Thiamine HCl                             | 280                      | (1)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 270, 230               | H            | Quinacrine HCl                           | ---                      | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 271                    | E            | Apocodeine                               | ---                      | (1)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 271                    | B            | Chloramphenicol<br>palmitate             | 178                      | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 271                    | B            | Cyclocumarol                             | 394                      | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 271, 318               | C            | Hydrochlorothiazide                      | 660, 120                 | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 272                    | E            | Apomorphine                              | ---                      | (1)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 272                    | M            | Apomorphine                              | 780                      | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 272                    | E            | Apomorphine HCl                          | 570                      | (2)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 272, 277               | C            | Mephensin                                | ---                      | (3)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 272                    | M            | Methocarbamol                            | 97                       | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
| 272                    | M            | Phenylephrine HCl                        | 85                       | (4)  | 274                    | Q            | Piperocaine HCl                     | 80                       | (1)  |
|                        |              |  |                          |      | 275                    | H            | Aminophylline                       | 580                      | (4)  |
|                        |              |  |                          |      | 275                    | M            | Bemidone                            | 38                       | (4)  |
|                        |              |  |                          |      | 275                    | C            | Dimethyl phthalate                  | 75.4                     | (2)  |
|                        |              |  |                          |      | 275                    | C            | Ethyl phthalate                     | 55.5                     | (2)  |
|                        |              |  |                          |      | 275                    | Q            | Meprylcaine HCl                     | ---                      | (1)  |
|                        |              |  |                          |      | 275                    | K            | Procainamide HCl                    | 600                      | (2)  |
|                        |              |  |                          |      | 275                    | E            | Procaine                            | ---                      | (1)  |
|                        |              |  |                          |      | 275                    | H            | Theophylline                        | 640                      | (4)  |
|                        |              |  |                          |      | 275                    | H            | Thymol                              | 140                      | (4)  |
|                        |              |  |                          |      | 275                    | M            | Tyrosine                            | 450                      | (4)  |
|                        |              |  |                          |      | 275, 283               | C            | Saccharin                           | 54, 42                   | (2)  |
|                        |              |  |                          |      | 276                    | B            | Chloramphenicol<br>cinnamate        | 710                      | (2)  |
|                        |              |  |                          |      | 276                    | Q            | Chloramphenicol<br>sodium succinate | ---                      | (2)  |
|                        |              |  |                          |      | 276                    | C            | 5-Chlorosalicylani-<br>lide         | ---                      | (4)  |
|                        |              |  |                          |      | 276                    | Q            | Triprolidone HCl                    | 230                      | (2)  |
|                        |              |  |                          |      | 276, 309               | M            | Coumarin                            | 700, ---                 | (4)  |
|                        |              |  |                          |      | 277                    | M            | Cresol                              | 660                      | (4)  |
|                        |              |  |                          |      | 277                    | E            | Metronidazole                       | 380                      | (2)  |
|                        |              |  |                          |      | 277, 226               | C            | Nylidrin HCl                        | 47, ---                  | (1)  |
|                        |              |  |                          |      | 277, 257,<br>263       | E            | Sodium penicillin G                 | ---                      | (3)  |
|                        |              |  |                          |      | 277, 271, 287          | E            | L-Tryptophan                        | ---                      | (3)  |
|                        |              |  |                          |      | 278                    | M            | Arterenol                           | 140                      | (4)  |
|                        |              |  |                          |      | 278                    | B            | Butylated hydroxy-<br>toluene       | 85                       | (2)  |
|                        |              |  |                          |      | 278                    | C            | Butylated hydroxy-<br>toluene       | 85                       | (2)  |
|                        |              |  |                          |      | 278                    | Q            | Chloramphenicol                     | 298                      | (2)  |
|                        |              |  |                          |      | 278                    | M            | Chlorothiazide                      | 301                      | (4)  |
|                        |              |  |                          |      | 278                    | Q            | Dextromethorphan HBr                | 54                       | (2)  |



Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>m $\mu$    | Sol-<br>vent | Drug                              | A <sub>1</sub> <sup>1%</sup><br>1 cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                                      | A <sub>1</sub> <sup>1%</sup><br>1 cm | Ref. |
|---------------------------|--------------|-----------------------------------|--------------------------------------|------|------------------------|--------------|---|--------------------------------------|------|
| 278                       | E            | Diacetylmorphine                  | 39                                   | (2)  | 280                    | E            | Methyldopa                                | 115                                  | (2)  |
| 278                       | C            | Diloxanide                        | 94                                   | (2)  | 280                    | M            | Nordefrin HCl                             | 170                                  | (4)  |
| 278                       | H            | Dimenhydrinate                    | 310                                  | (4)  | 280                    | Q            | Procainamide sulfate                      | 600                                  | (2)  |
| 278                       | M            | Emetine                           | 350                                  | (4)  | 280                    | E            | Procaine HCl                              | ---                                  | (1)  |
| 278                       | H            | Ethyl aminobenzoate               | 1200                                 | (4)  | 280                    | E            | d-Tubocurarine<br>chloride                | ---                                  | (1)  |
| 278                       | H            | Heroin                            | 47                                   | (4)  | 280                    | I            | d-Tubocurarine<br>chloride                | ---                                  | (1)  |
| 278                       | Q            | Isoproterenol HCl                 | 112                                  | (2)  | 280                    | Q            | Tubocurarine HCl                          | 118.5                                | (2)  |
| 278                       | E            | Levomethorphan                    | ---                                  | (11) | 280, 220               | M            | Quinacrine HCl                            | 337, ---                             | (4)  |
| 278                       | E            | L-3-Methoxymorphinan              | ---                                  | (11) | 280, 286               | C            | Estradiol cyclo-<br>pentylpropionate      | ---                                  | (3)  |
| 278                       | E            | Phenazocine HBr                   | 50                                   | (2)  | 280, 287               | C            | Estrone                                   | ---                                  | (3)  |
| 278                       | Q            | Phentolamine<br>methanesulfonate  | ---                                  | (3)  | 280, 287               | C            | Estradiol                                 | 74, 66                               | (2)  |
| 278, 284                  | E            | Zoxazolamine                      | ---                                  | (2)  | 280, 288               | J            | L-Tryptophan                              | ---                                  | (3)  |
| 278, 288, 305<br>322, 360 | Q            | Cyanocobalamin                    | ---                                  | (3)  | 280, 327               | J            | Phenindione                               | 1328, ---                            | (4)  |
| 279                       | J            | Dextromethorphan HBr              | 0.57                                 | (2)  | 281                    | E            | N-Allylnormorphine                        | ---                                  | (11) |
| 279                       | Q            | Emetine HCl                       | 85                                   | (1)  | 281                    | B            | Diacetylmorphine                          | ---                                  | (11) |
| 279                       | E            | L-3-Hydroxymorphinan              | ---                                  | (11) | 281                    | E            | Dihydrohydroxy-<br>codeinone              | ---                                  | (11) |
| 279                       | M            | Isoproterenol                     | 110                                  | (4)  | 281                    | I            | Dihydrohydroxy-<br>codeinone              | ---                                  | (11) |
| 279                       | Q            | Isoproterenol                     | 113                                  | (1)  | 281                    | E            | Dihydromorphinone                         | ---                                  | (11) |
| 279                       | E            | Levallorphan                      | ---                                  | (11) | 281                    | B            | Ethinyl estradiol                         | 71                                   | (2)  |
| 279                       | Q            | Levallorphan<br>tartrate          | 47                                   | (2)  | 281                    | E            | Methyldihydro-<br>morphinone              | ---                                  | (11) |
| 279                       | D            | Levarterenol<br>bitartrate        | 80                                   | (1)  | 281, 271,<br>288, 291  | F            | Naphazoline HCl                           | 255, 215,<br>175, 170                | (2)  |
| 279                       | I            | Levomethorphan                    | ---                                  | (11) | 281, 271,<br>288, 291  | F            | Naphazoline nitrate                       | 265, 230,<br>185, 185                | (2)  |
| 279                       | E            | Levorphanol                       | ---                                  | (11) | 281, 287               | C            | Ethinyl estradiol                         | ---                                  | (3)  |
| 279                       | Q            | Levorphanol<br>tartrate dihydrate | 46                                   | (2)  | 282                    | B            | Dihydrocodeinone                          | ---                                  | (11) |
| 279                       | I            | L-3-Methoxymorphinan              | ---                                  | (11) | 282                    | B            | Dihydromorphinone                         | ---                                  | (11) |
| 279                       | F            | Norepinephrine                    | 80                                   | (2)  | 282, 263               | J            | Picadex                                   | 960, 860                             | (2)  |
| 279                       | Q            | Quinacrine HCl                    | 1020                                 | (2)  | 282, 290,<br>276       | C            | Dimethyltryptamine                        | ---                                  | (5)  |
| 279, 323                  | M            | Digitalis                         | 35, ---                              | (4)  | 283                    | F            | Benzthiazide<br>(ethanolic)               | 284                                  | (2)  |
| 280                       | H            | Butacaine                         | 410                                  | (4)  | 283                    | Q            | Dihydrocodeinone<br>bitartrate            | 36                                   | (2)  |
| 280                       | M            | Chloramphenicol                   | 500                                  | (4)  | 283                    | E            | Pholcodine                                | 40                                   | (2)  |
| 280                       | Q            | Chlorphenesin                     | 67                                   | (2)  | 283                    | Q            | Pholcodine tartrate                       | 22                                   | (2)  |
| 280                       | H            | Cocaine                           | 33                                   | (4)  | 283, 258               | Q            | Sulfathiazole<br>sodium                   | 549, 452                             | (2)  |
| 280                       | E            | Dihydrocodeinone                  | ---                                  | (11) | 284                    | H            | Codeine                                   | 52                                   | (4)  |
| 280                       | I            | Dihydrocodeinone                  | ---                                  | (11) | 284                    | Q            | Codeine phosphate                         | 39                                   | (2)  |
| 280                       | H            | Dihydrohydroxy-<br>codeinone HCl  | 38                                   | (4)  | 284                    | E            | Dihydromorphine                           | ---                                  | (11) |
| 280                       | M            | Dihydrohydroxy-<br>codeinone HCl  | 39                                   | (4)  | 284                    | B            | Dihydrohydroxy-<br>codeinone              | ---                                  | (11) |
| 280                       | M            | Dihydromorphinone<br>HCl          | 41                                   | (4)  | 284                    | B            | Dihydrohydroxy-<br>morphinone             | ---                                  | (11) |
| 280                       | D            | Dimethyltubocurarine<br>iodide    | 74                                   | (1)  | 284                    | L            | Thebaine                                  | 252                                  | (2)  |
| 280                       | F            | Epinephrine                       | 150                                  | (2)  | 284                    | C            | d- $\alpha$ -tocopheryl<br>succinate acid | 38                                   | (3)  |
| 280                       | F            | Epinephrine acid<br>tartrate      | 80                                   | (2)  | 284, 258               | K            | Sulfathiazole                             | 790, 260                             | (2)  |
| 280                       | M            | Heroin                            | 86                                   | (4)  | 285                    | Q            | N-Allylnormorphine<br>HCl                 | 44                                   | (1)  |
| 280                       | Q            | Isoproterenol<br>sulfate          | 100                                  | (2)  | 285                    | C            | p-Aminobenzoic acid                       | ---                                  | (3)  |
| 280                       | E            | Ketobemidone                      | ---                                  | (11) |                        |              |   |                                      |      |
| 280                       | Q            | Methicillin sodium                | 57                                   | (2)  |                        |              |   |                                      |      |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                         | 1%<br>A <sub>1</sub> cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                                | 1%<br>A <sub>1</sub> cm | Ref. |
|------------------------|--------------|------------------------------|-------------------------|------|------------------------|--------------|-------------------------------------|-------------------------|------|
| 285                    | H            | Anileridine                  | 253                     | (4)  | 291                    | F            | Pyridoxine HCl                      | 430                     | (2)  |
| 285                    | E            | Codeine                      | ---                     | (11) | 291, 239               | J            | Acetazolamide                       | ---                     | (3)  |
| 285                    | I            | Codeine                      | ---                     | (11) | 291, 261               | E            | Veratrine                           | ---                     | (1)  |
| 285                    | L            | Codeine                      | 50                      | (2)  | 292                    | J            | Chlorothiazide                      | 430                     | (2)  |
| 285                    | M            | Codeine                      | 58                      | (4)  | 292                    | I            | Dihydrohydroxy-<br>morphinone       | ---                     | (11) |
| 285                    | L            | Codeine sulfate              | 40                      | (2)  | 292                    | I            | Dihydromorphinone                   | ---                     | (11) |
| 285                    | E            | Diacetylmorphine<br>(heroin) | ---                     | (1)  | 292                    | E            | di-Methadone                        | ---                     | (11) |
| 285                    | H            | Ergonovine                   | 660                     | (4)  | 292                    | Q            | Methadone HCl                       | ---                     | (1)  |
| 285                    | B            | Ethylmorphine                | ---                     | (11) | 292                    | E            | Pyridoxine HCl                      | 422                     | (1)  |
| 285                    | E            | Ethylmorphine                | ---                     | (11) | 292                    | H            | d-Tubocurarine                      | 200                     | (4)  |
| 285                    | H            | Ethylmorphine HCl            | 49                      | (4)  | 292, 220               | C            | Acetyl sulfisoxazole                | ---                     | (4)  |
| 285                    | M            | Ethylmorphine HCl            | 59                      | (4)  | 292, 241               | H            | Acetazolamide                       | 523, ---                | (4)  |
| 285                    | I            | Ethylmorphine                | ---                     | (11) | 293                    | H            | Methylparaben                       | 1370                    | (4)  |
| 285                    | H            | Isoproterenol                | 450                     | (4)  | 294                    | H            | Chlorothiazide                      | 444                     | (4)  |
| 285                    | B            | Menadiol diacetate           | 240                     | (2)  | 294                    | B            | Ethyl aminobenzoate<br>(benzocaine) | 1264                    | (2)  |
| 285                    | B            | Methyldihydro-<br>morphinone | ---                     | (11) | 294                    | C            | Methadone HCl                       | ---                     | (1)  |
| 285                    | E            | 6-Monoacetylmorphine         | ---                     | (11) | 294                    | H            | Tyrosine                            | 800                     | (4)  |
| 285                    | E            | Morphine                     | ---                     | (1)  | 294, 340               | H            | Phenyl salicylate                   | 740, ---                | (4)  |
| 285                    | F            | Morphine                     | 50                      | (2)  | 295                    | C            | Methypylon                          | ---                     | (7)  |
| 285                    | M            | Morphine                     | 55                      | (4)  | 295, 252               | M            | Thiopropazate                       | 486, ---                | (4)  |
| 285                    | Q            | Morphine HCl                 | 41                      | (2)  | 295, 260               | C            | Diaminodiphenyl-<br>sulfone         | ---                     | (3)  |
| 285                    | Q            | Morphine sulfate             | 40                      | (2)  | 295, 268               | A            | Reserpine                           | ---                     | (1)  |
| 285                    | Q            | Nalorphine HCl               | 39                      | (2)  | 296                    | J            | Chlorocresol                        | 183                     | (2)  |
| 285                    | E            | Norcodeine                   | ---                     | (11) | 296                    | H            | Isoniazid                           | 292                     | (4)  |
| 285                    | I            | Norcodeine                   | ---                     | (11) | 297                    | I            | Dihydromorphine                     | ---                     | (11) |
| 285                    | E            | Normorphine                  | ---                     | (11) | 297                    | I            | 6-Monoacetylmorphine                | ---                     | (11) |
| 286                    | B            | Codeine                      | ---                     | (11) | 297                    | I            | Morphine                            | ---                     | (11) |
| 286                    | H            | Digitalis                    | 40                      | (4)  | 297                    | I            | Normorphine                         | ---                     | (11) |
| 286, 295               | E            | Dichlorphenamide             | 60, 56                  | (2)  | 297                    | I            | Normorphine                         | ---                     | (11) |
| 287                    | B            | N-Allylnormorphine           | ---                     | (11) | 297, 243               | E            | Folic acid                          | ---                     | (3)  |
| 287                    | B            | 6-Monoacetylmorphine         | ---                     | (11) | 298                    | I            | N-Allylnormorphine                  | ---                     | (11) |
| 287                    | B            | Morphine                     | ---                     | (11) | 298, 291               | C            | Hexachlorophene                     | ---                     | (3)  |
| 287                    | C            | Morphine                     | 55                      | (1)  | 298                    | H            | L-3-Hydroxymorphinan                | ---                     | (11) |
| 287                    | B            | Normorphine                  | ---                     | (11) | 298                    | Q            | Promethazine HCl                    | 926                     | (1)  |
| 287                    | C            | Pyrimethamine                | ---                     | (3)  | 299                    | H            | Ketobemidone                        | ---                     | (11) |
| 288                    | C            | Pyridoxine HCl               | ---                     | (3)  | 299                    | H            | Levallorphan                        | ---                     | (11) |
| 288                    | M            | Thiopental                   | 76                      | (4)  | 299                    | H            | Levorphanol                         | ---                     | (11) |
| 290                    | H            | Benzonatate                  | 284                     | (4)  | 300                    | M            | Dimenhydrinate                      | 245                     | (4)  |
| 290                    | H            | Dihydromorphinone<br>HCl     | 82                      | (4)  | 300                    | H            | Physostigmine                       | 460                     | (4)  |
| 290                    | Q            | Methoxamine HCl              | 133                     | (2)  | 300                    | H            | Salicylic acid                      | 275                     | (4)  |
| 290                    | Q            | Procaine                     | 740                     | (1)  | 300, 245               | E            | Physostigmine                       | ---                     | (1)  |
| 290                    | Q            | Procaine HCl                 | 1010                    | (1)  | 303, 255               | J            | Thiopental                          | ---                     | (3)  |
| 290                    | Q            | Procaine peni-<br>cillin G   | ---                     | (1)  | 304, 245               | H            | Arterenol                           | 360, ---                | (4)  |
| 290                    | C            | Nystatin                     | ---                     | (2)  | 305                    | H            | Thiopental                          | 1100                    | (4)  |
| 290, 260               | E            | Methadone                    | ---                     | (1)  | 306                    | C            | Bithionol                           | 255                     | (2)  |
| 290, 279               | E            | Meperidine                   | ---                     | (1)  | 306                    | H            | Ergotamine tar-<br>trate            | 86                      | (4)  |
| 290, 294               | H            | Methadone                    | 65, ---                 | (4)  | 306                    | Q            | Sulphetrone<br>(solapsone)          | 350                     | (2)  |
| 291                    | E            | Carbimazole                  | 557                     | (2)  | 306, 226               | H            | Tetracaine                          | 1100, ---               | (4)  |
| 291                    | H            | Phenylephrine HCl            | 140                     | (4)  | 306, 241               | E            | Methotrexate                        | ---                     | (3)  |

Table 1. Ultraviolet and absorptivity data for pharmaceuticals (cont'd.)

| Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                               | 1%<br>A<br>1 cm | Ref. | Wavelength,<br>m $\mu$ | Sol-<br>vent | Drug                               | 1%<br>A<br>1 cm  | Ref. |
|------------------------|--------------|------------------------------------|-----------------|------|------------------------|--------------|------------------------------------|------------------|------|
| 306, 250               | E            | Hydrastine                         | ---             | (1)  | 317                    | C            | Ergotinine                         | 157.5            | (1)  |
| 306, 291               | F            | Warfarin sodium                    | ---             | (3)  | 317                    | N            | Lysergic acid                      | ---              | (5)  |
| 307, 230,<br>281       | Q            | Benoxinate HCl                     | ---             | (3)  | 317, 315               | N            | Ergotinine                         | 162.5, 138       | (1)  |
| 308                    | J            | Warfarin sodium                    | 430             | (2)  | 317, 332               | G            | Methallenestril                    | ---              | (2)  |
| 308                    | K            | Warfarin sodium                    | 430             | (2)  | 319                    | N            | Ergotamine bitar-<br>trate         | 138              | (1)  |
| 308                    | K            | Warfarin potassium                 | 410             | (2)  | 319                    | J            | Liothyronine sodium                | 65               | (2)  |
| 308, 385,<br>253       | J            | Hydroxystilbamidine<br>isethionate | ---             | (3)  | 319                    | A            | Metabutethamine HCl                | 877              | (1)  |
| 309, 231               | J            | Mercaptopurine                     | ---             | (3)  | 320, 344               | F            | Hydroxystilbamidine<br>isethionate | ---              | (3)  |
| 309, 247               | E            | Vanillin                           | 58.6, 10.6      | (6)  | 322                    | O            | Ergotamine                         | 138              | (1)  |
| 309, 288,<br>322       | A            | Bishydroxycoumarin                 | ---             | (3)  | 323                    | C            | Ergotoxine<br>ethanesulfonate      | 146              | (1)  |
| 310                    | A            | Lysergic acid<br>diethylamide      | ---             | (5)  | 323, 223               | E            | Mercaptopurine                     | ---              | (3)  |
| 310                    | E            | Lysergic acid<br>diethylamide      | ---             | (5)  | 324, 254               | Q            | Pyridoxine HCl                     | 350, 180         | (2)  |
| 310                    | M            | Methylergonovine<br>tartrate       | 191             | (1)  | 325                    | J            | Thyroxine sodium                   | 76               | (2)  |
| 310                    | E            | Tetracaine HCl                     | ---             | (1)  | 327, 273               | H            | Dibucaine HCl                      | 120, ---         | (4)  |
| 310, 238               | C            | Cinchotoxin                        | ---             | (1)  | 327, 281               | C            | Quinine                            | ---              | (1)  |
| 310, 279,<br>228       | M            | Tetracaine                         | 960, ---        | (4)  | 328                    | C            | Thiacetazone                       | 1815             | (2)  |
| 310, 291               | C            | Noscapine                          | 120, 100        | (2)  | 329, 277               | Q            | Methylquinine<br>sulfate           | ---              | (1)  |
| 310, 285,<br>251       | E            | Papaverine                         | 220, ---        | (1)  | 330                    | H            | Methyl salicylate                  | 300              | (4)  |
| 311                    | C            | Tetracaine HCl                     | 962             | (1)  | 330, 235               | Q            | Eucupin dihydro-<br>chloride       | ---              | (1)  |
| 312                    | E            | Noscapine HCl<br>(narcotine)       | ---             | (1)  | 330, 280               | C            | Quinine ethyl-<br>carbonate        | ---              | (1)  |
| 313, 290               | Q            | Narcotine                          | ---             | (2)  | 330, 280               | Q            | Quinine HCl                        | ---              | (1)  |
| 314                    | E            | Methapyrilene HCl                  | 274             | (1)  | 334, 282               | C            | Cupreine                           | ---              | (1)  |
| 314                    | D            | Tripeleminamine HCl                | 274             | (1)  | 334, 284               | C            | Hydrocupreine                      | ---              | (1)  |
| 315                    | H            | Bishydroxycoumarin                 | 790             | (4)  | 335, 316               | M            | Cinchonine                         | 180, ---         | (4)  |
| 315                    | P            | Ergotamine tartrate                | 116             | (1)  | 336, 287               | Q            | Ethylhydrocupreine<br>HCl          | ---              | (1)  |
| 315                    | N            | Ergotoxine                         | 138             | (1)  | 341, 235               | C            | Aminitrozole<br>(acinitrazole)     | 590, ---         | (2)  |
| 315                    | Q            | Metabutethamine HCl                | 770             | (1)  | 343, 224               | E            | Amodiaquin HCl                     | 370              | (2)  |
| 315, 282,<br>224       | C            | Cinchonidine HCl                   | ---             | (1)  | 342, 329,<br>256       | F            | Hydroxychloroquine<br>sulfate      | 470, 430,<br>390 | (2)  |
| 315, 285,<br>228       | Q            | Cinchonidine HCl                   | ---             | (1)  | 343, 329,<br>257       | F            | Chloroquine<br>phosphate           | 370, 320,<br>290 | (2)  |
| 315, 285,<br>228       | Q            | Cinchonine HCl                     | ---             | (1)  | 345                    | Q            | Nicarbazin                         | ---              | (2)  |
| 316                    | N            | Ergonovine                         | 185             | (1)  | 346                    | D            | Quinine                            | ---              | (1)  |
| 316                    | N            | Ergotaminine                       | 120             | (1)  | 348, 270               | J            | Vanillin                           | ---              | (5)  |
| 316                    | C            | Ergotamine                         | 183             | (1)  | 350                    | C            | Colchicine                         | ---              | (1)  |
| 316                    | C            | Ergotoxine                         | 162.5           | (1)  | 360, 225,<br>257       | H            | 2,4-Dinitrophenol                  | 792, ---         | (4)  |
| 316                    | Q            | Ergotoxine<br>ethanesulfonate      | 127.5           | (1)  | 368, 266               | Q            | Nitrofurantoin                     | 753, ---         | (4)  |
| 317                    | C            | Ergotamine bitar-<br>trate         | 17.5            | (1)  | 375, 260               | Q            | Nitrofurazone                      | 800, ---         | (2)  |
|                        |              |                                    |                 |      | 385                    | J            | Demethylchlor-<br>tetracycline HCl | ---              | (2)  |
|                        |              |                                    |                 |      | 386                    | Q            | Aminonitrothiazole                 | 1080             | (2)  |

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PROPOSED RULE MAKING

9833

DEPARTMENT OF JUSTICE

Bureau of Narcotics and Dangerous  
Drugs

[ 21 CFR Part 166 ]

DEPRESSANT AND STIMULANT  
DRUGS

Proposed Listing of Synthesized Tetra-  
hydrocannabinols as Subject to  
Control

The Bureau of Narcotics and Dangerous  
Drugs has recommended, on the  
basis of its investigations and the recom-  
mendations of an advisory committee  
appointed pursuant to section 511(g) (1)  
of the Federal Food, Drug, and Cosmetic  
Act, that the drugs set forth below be  
listed as "depressant or stimulant" drugs  
within the meaning of section 201(v) of  
the Act because of their hallucinogenic  
effect. Having considered such recom-  
mendations, pursuant to the provisions  
of the Act (secs. 201(v), 511, 701, 52 Stat.  
1055, as amended, 79 Stat. 227 et seq.;  
21 U.S.C. 321(v), 360a, 371) and under  
the authority vested in the Attorney  
General by Reorganization Plan No. 1 of  
1968 (33 F.R. 5611), it is proposed that  
§ 166.3(c) (3) be amended by alphabet-  
ically inserting in the list of drugs a new  
item, as follows:

§ 166.3 Listing of drugs defined in sec-  
tion 201(v) of the Act.

\* \* \* \* \*  
(c) \* \* \* \* \*  
(3) \* \* \* \* \*

Synthetic equivalents of the substances  
contained in the plant, or in the resinous  
extractives of *Cannabis* sp. and/or synthetic  
substances, derivatives, and their isomers  
with similar chemical structure and pharma-  
cological activity such as the following:

- Δ<sup>1</sup> cis or trans tetrahydrocannabinol, and  
their optical isomers,
- Δ<sup>9</sup> cis or trans tetrahydrocannabinol, and  
their optical isomers,
- Δ<sup>8</sup> tetrahydrocannabinol, and its optical  
isomers.

(Since nomenclature of these substances is  
not internationally standardized, compounds  
of these structures, regardless of numerical  
designation of atomic positions are covered)

All interested persons are invited to  
submit their views in writing regarding  
this proposal. Comments concerning any  
additional trade or other names that may  
be properly listed for the subject drugs  
are also invited. Views and comments  
should be submitted, preferably in quin-  
tuplicate, addressed to the Office of Chief  
Counsel, Bureau of Narcotics and Dan-  
gerous Drugs, Department of Justice,  
Room 613, 633 Indiana Avenue, Wash-  
ington, D.C. 20226, within 30 days fol-  
lowing the date of publication of this  
notice in the FEDERAL REGISTER, and may  
be accompanied by a memorandum or  
brief in support thereof.

Dated: July 6, 1968.

RAMSEY CLARK,  
Attorney General.

[F.R. Doc. 68-8189; Filed, July 6, 1968;  
11:51 a.m.]