

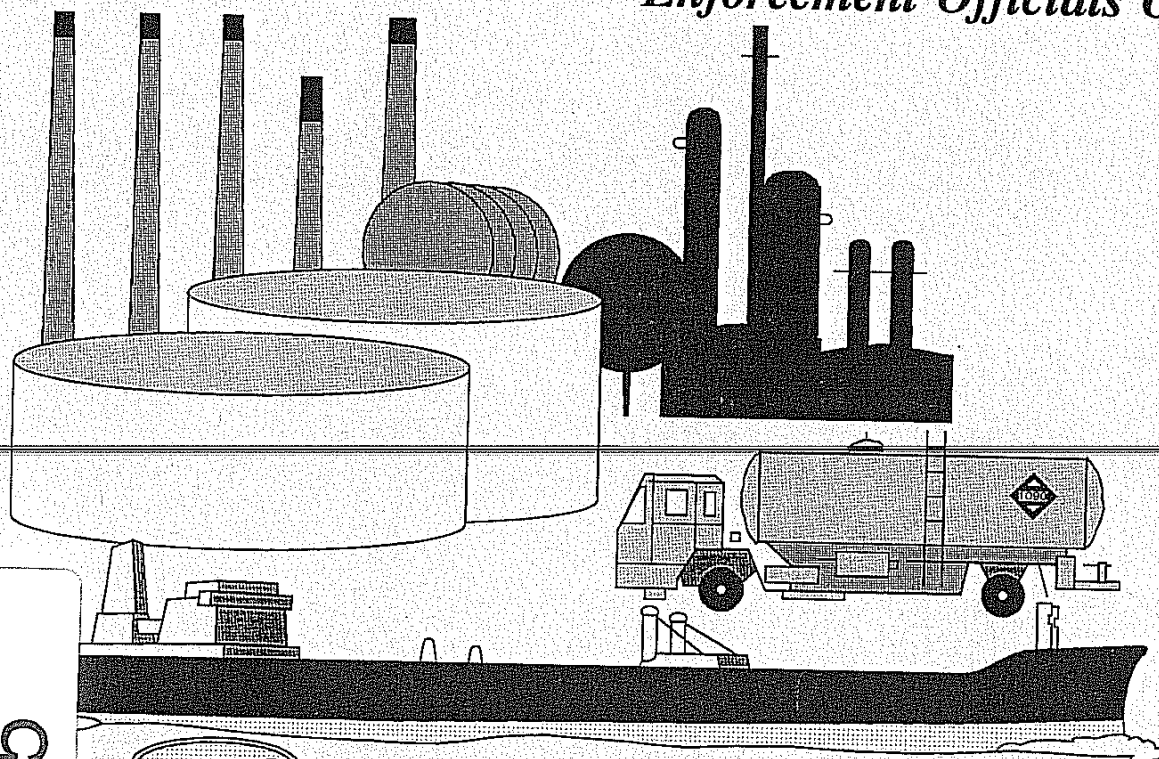


U.S. Department of Justice  
Drug Enforcement Administration  
Office of Diversion Control  
Drug & Chemical Evaluation Section

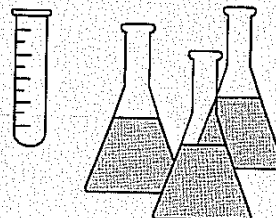
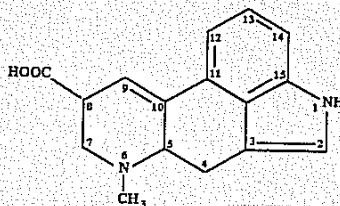
March 1995

# Chemicals Used in the Clandestine Production of Drugs

*For Use by Law  
Enforcement Officials Only*



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# Chemicals Used In the Clandestine Production of Drugs





# ADMINISTRATOR'S MESSAGE

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Large quantities of chemicals are required to synthesize, extract, and purify most illicit drugs. The Drug Enforcement Administration has long recognized the need to monitor these chemicals as part of its overall drug control strategy. Prior to 1988, however, the DEA relied primarily on the voluntary cooperation of the legitimate chemical industry to report suspicious orders of certain chemicals. The only mandatory controls were on two phencyclidine (PCP) precursors and an amphetamine/methamphetamine precursor.

During the 1980's the clandestine laboratory picture changed dramatically. There was a tremendous increase in the clandestine production of controlled substances, particularly methamphetamine. There was a proliferation of clandestine laboratories producing controlled substance analogues, very potent and dangerous variations of controlled narcotics, stimulants and hallucinogens. Additionally, the DEA learned that United States firms were exporting large quantities of chemicals, such as acetone, methyl ethyl ketone and potassium permanganate, to cocaine producing countries. Significant amounts of these chemicals were ultimately diverted to clandestine cocaine laboratories.

It became clear that mandatory controls were needed to control the distribution of these chemicals in order to have an impact on the clandestine laboratory problem. As a result, Congress passed the Chemical Diversion and Trafficking Act (CDTA) in 1988 and subsequent amendments in 1993. These laws provide a system of regulatory controls and criminal sanctions to address both domestic and international diversion of important chemicals without interrupting access to chemicals destined for legitimate commerce. Many states have enacted similar legislation.

Because of the global nature of chemical diversion, the DEA also led efforts to impose regional and international controls on selected precursors and essential chemicals. Chemical control became an important element of the 1988 International Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances. The Organization of American States (OAS) developed model chemical control legislation and the European Community (EC) adopted standard chemical controls which are binding on all EC members.

Although these efforts have generated some successes, much remains to be done in this area. Critical to the successful implementation of chemical control programs is an understanding of what these substances are, their licit and illicit uses, their properties and hazards. Recent efforts by the United States and the international community have made it necessary for law enforcement personnel to become familiar with the many chemicals used in clandestine drug production. This booklet, "Chemicals Used in the clandestine Production of Drugs," provides a source for some of this information.



Thomas A. Constantine  
Administrator

# PREFACE

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The following is a compilation of information on precursor and essential chemicals which are used or have the potential for use in the synthesis or extraction of illicitly produced drugs. As used in this compilation, the term precursor chemical refers to a compound which is required in the synthetic process and is itself incorporated into the molecule of the target drug. Essential chemicals are required in the synthetic or extraction process but, in most cases, do not become part of the drug molecule. Essential chemicals include solvents, catalysts, oxidizing and reducing agents, acids and bases. Essential chemicals are usually nonspecific and therefore may be substituted in extraction and synthetic procedures.

Each chemical was selected for this compilation for one of the following reasons:

1. It is regulated as a list I or II chemical under the CSA.
2. It is listed under the OAS Model Regulations to Control Chemical Precursor and Chemical Substance, Machines and Materials.
3. It is listed in Table I or II of the 1988 UN Convention.
4. It has been found at clandestine laboratory sites as indicated in DEA laboratory and seizure reports.
5. Its properties are such that it could easily be substituted for a regulated chemical.

The data sheets on each chemical are divided into categories of information including:

1. **Other Names** include primarily generic names with trade and foreign names only when these are the usual means of identification.
2. The **Molecular Formula** shows the elemental composition of the chemical, while the **Molecular Weight** represents the sum of the weights of the atoms that make up the compound.
3. The **CSA Code** is the DEA drug/chemical code number for the substance under the CSA.
4. The **Harmonized Code** system is mutually accepted nomenclature developed to classify goods in international trade grouped largely according to the

nature of the materials of which they are made.

5. The **Density, Boiling Point/Freezing Point** and **Description** are included to provide the reader with some of the physical properties of these chemicals.

6. **Hazards** include precautions to be taken during contact or handling of the substance.

7. **Illicit Use** refers to the controlled substance which is a target drug in the clandestine process. In most cases, the specific purpose of the chemical in the production process is given.

8. **Where Controlled or Regulated** identifies whether the chemical is listed under the United States Controlled Substances Act (CSA), the Organization of American States (OAS) Model Regulations or the 1988 United Nations (UN) Convention.

9. The **Thresholds** were established under the CSA for each listed chemical. Regulated transactions which meet or exceed the established threshold amounts require reporting and record keeping.

10. **Legitimate Uses** refer to the most common end products and processes for which the chemical is used. The legitimate use usually has a bearing on the amount of the substance produced.

11. **Annual Production** data were obtained from several sources. The 1993 U.S. production figures were obtained from the U.S. Department of Commerce News, Annual Report on Inorganic Chemicals (August 1994) or as reported in "Chemical and Engineering News" (July 4, 1994). Estimated capacities were obtained from the 1993 Directories of Chemical Producers (U.S., East Asia and Western Europe). These directories do not provide worldwide coverage so total worldwide production capacity cannot be determined from this information. In some instances where only one or two U.S. manufacturers produce a given chemical, the data is proprietary.

12. **Annual U.S. Imports/Exports** were obtained from the Port Import/Export Reporting Service (PIERS) for the specified time periods. For chemicals regulated by CSA, data from the Chemical Handlers Enforcement

Management System (CHEMS) Report was utilized. This system contains data for only those transactions involving quantities above CSA threshold.

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13. The list of *Manufacturer(s)* was obtained primarily from the Directories of Chemical Producers for the U.S., East Asia and Western Europe (SRI). In the U.S., specific companies were listed except when there were large numbers. In those instances, only the larger companies were listed. Not all manufacturer information was verified. For Asia, Western Europe and South America, the countries producing the chemical were listed. Worldwide coverage was not available.

14. The *Remarks* section includes comments which relate to the actual use of the chemical in the clandestine process and the possibility of using alternative chemicals. Some of the properties of the subject chemical which make it likely that this chemical will be used in a clandestine operation are included. It also includes statements on whether the chemical has been identified in clandestine laboratories or in drugs produced in such laboratories.

The information in this publication was compiled by the staff of the Drug and Chemical Evaluation Section of the DEA Office of Diversion Control. Questions or comments may be directed to them at (202) 307-7183.

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# TABLE OF CONTENTS



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i. ADMINISTRATOR'S MESSAGE	Iodine
ii. PREFACE	Isobutyl alcohol
2. LIST I CHEMICALS	Isopropyl acetate
3. LIST II CHEMICALS	Isopropyl alcohol
4. DEFINITIONS	Isosafrole
5. REFERENCES	Kerosene
6. ABBREVIATIONS	Lysergic acid
7. CHEMICALS (in alphabetical order)	Methyl alcohol
Acetic acid	Methylamine
Acetic anhydride	Methylene chloride
Acetone	3,4-Methylenedioxyphenyl-2-propanone
N-Acetylanthranilic acid	N-Methylephedrine
Acetyl chloride	Methyl ethyl ketone
Ammonium chloride	Methyl isobutyl ketone
Ammonium formate	N-Methylpseudoephedrine
Ammonium hydroxide	Nitroethane
Anthranilic acid	Norpseudoephedrine
Benzaldehyde	Petroleum ether
Benzene	Phenylacetic acid
Benzyl chloride	Phenylpropanolamine
Benzyl cyanide	Phenyl-2-propanone
n-Butyl acetate	Piperidine
n-Butyl alcohol	Piperonal
sec-Butyl alcohol	Potassium carbonate
Calcium carbonate	Potassium cyanide
Calcium hydroxide	Potassium dichromate
Calcium oxide	Potassium hydroxide
Chloroform	Potassium permanganate
Cyclohexane	Propionic anhydride
Cyclohexanone	Pseudoephedrine
Diacetone alcohol	Red phosphorus
Diethylamine	Safrole
Ephedrine	Sodium bicarbonate
Ergonovine	Sodium carbonate
Ergotamine	Sodium cyanide
Ethyl acetate	Sodium dichromate
Ethyl alcohol	Sodium hydroxide
Ethylamine	Sodium hypochlorite
N-Ethylephedrine	Sodium sulfate
Ethyl ether	Sodium thiosulfate
Ethylidene diacetate	Sulfuric acid
N-Ethylpseudoephedrine	Tartaric acid
Formamide	Thionyl chloride
Formic acid	Toluene
Hexane	o-Toluidine
Hydriodic acid	Trichloroethylene
Hydrochloric acid	Urea
Hydrogen peroxide	Xylenes

# Chemicals Regulated under the Controlled Substance Act

As of April 16, 1994

See 21 C.F.R. §§ 1310 and 1313 for details.  
 \* exports only, to all South American countries and Panama  
 \*\* and its salts, optical isomers, and salts of optical isomers  
 \*\*\* and its salts  
 \*\*\*\* and its salts and esters

▲ = Precursor ■ = Reagent ● = Solvent

## CONTROLLED SUBSTANCE PRODUCED

Amphetamine  
 Cocaine  
 N,N-Dimethylamphetamine  
 Ethylamphetamine  
 Fenanyl and analogues  
 LSD  
 MDA  
 MDE  
 MDMA  
 Methamphetamine  
 Methaqualone  
 Methacathinone  
 4-Methylamorex  
 Phenylethylamine (PEA)  
 Phenyl-2-propanone (P2P)

THRESHOLDS BY WEIGHT  
 kg = Kilograms, g = Grams

LIST I	CONTROLLED SUBSTANCE PRODUCED										DOMESTIC	IMPORT/EXPORT			
	Amphetamine	Cocaine	N,N-Dimethylamphetamine	Ethylamphetamine	Fenanyl and analogues	LSD	MDA	MDE	MDMA	Methamphetamine	Methaqualone	Methacathinone	4-Methylamorex	Phenylethylamine (PEA)	Phenyl-2-propanone (P2P)
1. N-Acetylanthranilic acid****										▲					40 kg
2. Anthranilic acid****										▲					30 kg
3. Benzaldehyde	▲												▲		4 kg
4. Benzyl cyanide													▲		1 kg
5. Ephedrine**															0 kg
6. Ergonovine***															10 g
7. Ergotamine***															20 g
8. Ethylamine***			▲												1 kg
9. Hydriodic acid (57%)															1.7 kg
10. Isosafrole															4 kg
11. Methylamine***															1 kg
12. 3,4-Methylenedioxyphenyl-2-propanone															4 kg
13. N-Methylephedrine**															1 kg
14. N-Methylpseudoephedrine**			▲												1 kg
15. Nitroethane															1 kg
16. Norpseudoephedrine**															2.5 kg
17. Phenylacetic acid****	▲														2.5 kg
18. Phenylpropanolamine**															1 kg
19. Piperidine***															2.5 kg
20. Piperonal															500 g
21. Propionic anhydride															4 kg
22. Pseudoephedrine**				▲											1 g
23. Saffrole															1 kg
															4 kg

## Chemicals Regulated under the Controlled Substance Act

As of April 16, 1994

See 21 C.F.R. §§ 1310 and 1313 for details.  
 \* exports only, to all South American countries and Panama  
 \*\* and its salts, optical isomers, and salts of optical isomers  
 \*\*\* and its salts  
 \*\*\*\* and its salts and esters

▲ = Precursor ■ = Reagent ● = Solvent

### CONTROLLED SUBSTANCE PRODUCED

Amphetamine  
 Cocaine  
 N,N-Dimethylamphetamine  
 Ethylamphetamine  
 Fenyl and analogues  
 LSD  
 MDA  
 MDE  
 MDMA  
 Methamphetamine  
 Methcathinone  
 4-Methylamitrex  
 Phencyclidine (PCP)  
 Phenyl-2-propanone (P2P)

**THRESHOLDS BY WEIGHT**  
 kg = Kilograms, g = Grams

	CONTROLLED SUBSTANCE PRODUCED											THRESHOLDS BY WEIGHT				
	Amphetamine	Cocaine	N,N-Dimethylamphetamine	Ethylamphetamine	Fenyl and analogues	LSD	MDA	MDE	MDMA	Methamphetamine	Methcathinone	4-Methylamitrex	Phencyclidine (PCP)	Phenyl-2-propanone (P2P)	DOMESTIC	IMPORT/EXPORT
1. Acetic anhydride															1023 kg	1023 kg
2. Acetone	●			▲	●	●	●	●	●	●	●	●	●	●	1500 kg	1500 kg
3. Benzyl chloride															1 kg	4 kg
4. Ethyl ether	●	●	●	●	●	●	●	●	●	●	●	●	●	●	135.8 kg	1364 kg
5. Hydrochloric acid*	■	■	■	■	■	■	■	■	■	■	■	■	■	■	27 kg	27 kg
6. Methyl ethyl ketone (2-Butanone)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	145 kg	1455 kg
7. Potassium permanganate	■	■	■	■	■	■	■	■	■	■	■	■	■	■	55 kg	500 kg
8. Sulfuric acid*	●	●	●	●	●	●	●	●	●	●	●	●	●	●	27 kg	27 kg
9. Toluene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	159 kg	1591 kg

# DEFINITIONS

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1. **Density** is the mass (weight) of an object per unit volume. The formula below is a representation of this:

$$\text{density (d)} = \frac{\text{mass (m)}}{\text{volume (v)}}$$

The units of density are usually expressed as kg/L or g/ml. For purposes of explanation, the densities listed in this book are all expressed in terms of kg/L. Density is used to determine the weight of a substance when the volume is known or the volume when the weight is known. The following are sample calculations using the density to determine the weight and volume of substances:

- A. If 2,500 liters of Methyl Ethyl Ketone (MEK) are seized, what is the weight in terms of kilograms (kg)?  $m = d \times v$ .
1. Look up the density of MEK. It is 0.81 kg/L.
  2. 0.81 kg/L (d) multiplied by 2,500 L (v) equals approximately 2,025 kg (m).
  3. Therefore, 2,500 L of MEK weighs 2,025 kg.
- B. If 23,000 kilograms (kg) of acetic anhydride are seized, what is the volume in terms of liters (L)?  $v = m / d$ .
1. Look up the density of acetic anhydride. It is 1.08 kg/L.
  2. 23,000 kg (m) of acetic anhydride divided by 1.08 kg/L (d) equals approximately 21,296 L (v).
  3. Therefore, 23,000 kg of acetic anhydride equals approximately 21,296 L.
2. The **Boiling Point** is the temperature at which the vapor pressure of a liquid is equal to normal atmospheric pressure (1 atm = 760 mm Hg). The condition of boiling results when a liquid is heated in a container open to the atmosphere and vaporization occurs throughout the liquid.
3. The **Melting Point** is the temperature at which a solid is converted to a liquid. This occurs as heat is applied to a substance.



# REFERENCES

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The Merck Index, Tenth and Eleventh Editions, Merck and Co., Inc., Rahway, N.J.

Directory of Chemical Producers, United States of America, SRI International, Menlo Park, California, 1993.

Directory of Chemical Producers, Western Europe Vol. 2, SRI International, Menlo Park, California, 1993.

Directory of Chemical Producers, East Asia, SRI International, Menlo Park, California, 1993.

Production by the U.S. Chemical Industry, Chemical and Engineering News, July 4, 1994, p. 30-36.

U.S. Department of Commerce News: Current Industrial Reports, Annual Report on Inorganic Chemicals for 1993, Washington, D.C., August 1994.

The Journal of Commerce Trade Information Service, Port Import Export Reporting Service, New York, NY, 1993.

Hazardous Chemicals Desk Reference, Second Edition, Richard J. Lewis, Sr., Van Nostrand Reinhold, New York, 1991.

Hazards in the Chemical Laboratory, Fourth Edition, London, The Royal Society of Chemistry, September 1986.

United Nations International Drug Control Programme, Scientific and Technical Notes, SCITEC/9, Data Sheets on Substances Frequently Used in the Illicit Manufacture of Narcotic Drugs or Psychotropic Substances, November 1991.

U.S. International Trade Commission: Preliminary Report on U.S. Production of Selected Synthetic Organic Chemicals, Washington, D.C., Feb. 1994.

The Petrochemical Industry Handbook: Its Technology, Plants, Markets, Economics and Outlook, Fourth Edition, Princeton Advanced Technology, Inc., Princeton, N.J., 1991.

Ullmann's Encyclopedia of Industrial Chemistry, Vol. A1-A10, Exec. ed.: W. Gerhartz, Senior ed.: Y. Stephen Yamamoto, 5th Edition, 1987.

Medical Toxicology Diagnosis and Treatment of Human Poisoning, M. Ellenhorn and D. Baruloux, eds., Elsevier, N.Y., 1988.

Chemyclopedia: The Manual of Commercially Available Chemicals, Vol. 6, J. Runer, ed., ACS, Washington, D.C., 1988.

# ABBREVIATIONS



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CDTA	Chemical Diversion and Trafficking Act
CSA	Controlled Substances Act
IPA	Isopropyl alcohol
Kg	Kilogram
LSD	Lysergic acid diethylamide
MDA	3,4-Methylenedioxyamphetamine
MDMA	3,4-Methylenedioxymethamphetamine
MDE	3,4-Methylenedioxy-N-ethylamphetamine
MEK	Methyl ethyl ketone
MIBK	Methyl isobutyl ketone
MT	Metric ton
OAS	Organization of American States
PCC	1-Piperidinocyclohexanecarbonitrile
PCP	Phencyclidine; phenyl cyclohexyl piperidine
P2P	Phenyl-2-propanone; benzyl methyl ketone (BMK)
UN	United Nations
US	United States
3,4-MDP2P	3,4-Methylenedioxyphenyl-2-propanone

# Acetic Acid



**Other Names:** Ethanoic acid; methanecarboxylic acid; glacial acetic acid.

**Molecular Formulas:** C<sub>2</sub>H<sub>4</sub>O<sub>2</sub>; CH<sub>3</sub>COOH

**Molecular Weight:** 60.05

**Harmonized Code:** 2915.21.0000

**Density:** 1.05

**Boiling Point:** 118°C

**Description:** Colorless, corrosive liquid with a pungent odor. A 5-6% solution in water is vinegar. Glacial acetic acid refers to a solution which is at least 99.5% concentrated.

**Hazards:** Flammable; vapor irritating to respiratory system, eyes and skin; can cause severe burns to eyes and skin; ingestion causes irritation and damage.

**Illicit Use:** Clandestine manufacture of P2P for amphetamine and methamphetamine synthesis; possibly used to produce acetic anhydride for heroin production.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Manufacture of vinyl acetate (45%), cellulose acetate (20%), acetic anhydride, acetate rayon, plastics and rubber; in tanning; printing calico and dyeing silk; food preservative; solvent for gums, resins, volatile oils and many other substances; used in other organic syntheses.

**Annual Production:**

U.S.: 1,661,818 MT (1993)

WESTERN EUROPE: 1,302,000 MT (1993 est. cap.)

ASIA: 994,000 MT (1993 est. cap.)

MEXICO: 144,000 MT (1990 actual)

SOUTH AMERICA: 543,000 MT (1991 est. cap.)

**Annual U.S. Exports:** 121,668 MT (1993)

**Annual U.S. Imports:** 10,950 MT (1993)

**Manufacturing Process:** Carbonylation of methanol; direct oxidation of saturated hydrocarbons; oxidation of acetaldehyde.

**Shipping and Storage:** Containers lined with stainless steel, glass or polyethylene.

**Manufacturer(s):**

U.S.: Air Products & Chemicals Inc.; Hoechst Celanese Corp.; Quantrum Chemical Corp.; Sterling Chemicals, Inc.; Eastman Chemical Co.; Union Carbide Corp.

WESTERN EUROPE: Austria; Belgium; Denmark; Finland; France; Germany; Italy; Norway; Sweden; Switzerland; United Kingdom.

ASIA: Indonesia; Japan; South Korea; Taiwan.

MEXICO: Pemex.

SOUTH AMERICA: Argentina; Brazil; Colombia; Venezuela.

**Remarks:** The reaction of acetic acid and phenylacetic acid to yield P2P has not been frequently encountered in U.S. clandestine labs. The majority of the companies manufacturing acetic acid in the U.S. convert it to either vinyl acetate or cellulose acetate. Reports from SE Asian countries indicate that acetic acid has been used in the past to produce acetic anhydride through a reaction with ketene. Acetic acid alone will not acetylate morphine to heroin. It can be used as a substitute for ammonium chloride in the extraction of morphine from opium.

# Acetic Anhydride



**Other Names:** Acetic oxide, acetyl oxide.

**Molecular Formulas:**  $C_4H_6O_3$ ;  $(CH_3CO)_2O$

**Molecular Weight:** 102.09

**CSA Code:** 8519

**Harmonized Code:** 2915.24.0000

**Density:** 1.08

**Boiling Point:** 139°C

**Description:** Colorless liquid with a penetrating, strong acetic odor. Fumes in moist air.

**Hazards:** Flammable; vapors are irritating to respiratory system and eyes; liquid may burn eyes and skin severely; ingestion causes irritation, pain and vomiting.

**Illicit Use:** Acetylating agent in the production of heroin, P2P and N-acetylanthranilic acid.

**Where Controlled or Regulated:** CSA; UN; OAS.

**Thresholds:** Domestic 1023 Kg or 250 Gal  
Import/Export 1023 Kg or 250 Gal

**Legitimate Uses:** Acetylating and dehydrating agent; acetylation of cellulose (80%); production of polymethylacrylamide (Hard Foam); acetylated plastic auxiliaries; explosives; production of certain types of brake and drilling fluids; production of cold-bleaching activators; dyeing, chiefly with nitric acid; preparation of organic intermediates; production of pharmaceuticals, e.g., aspirin, acetanilide, phenacetin, theophylline; acetylation of animal and plant fats; production of flavors, fragrances and herbicides.

## **Annual Production:**

U.S.: 1,113,090 MT (1993 est. cap.)  
WESTERN EUROPE: 481,000 MT (1993 est. cap.)  
ASIA: 161,000 MT (1993 est. cap.)  
MEXICO: 288,000 MT (1991 est. cap.)

**Annual U.S. Exports:** 45,975 MT (1990)  
46,547 MT (1991)  
63,206 MT (1992)  
26,902 MT (1993)

**Annual U.S. Imports:** 15,271 MT (1990)  
33,636 MT (1991)  
35,752 MT (1992)  
40,271 MT (1993)

**Manufacturing Process:** Dehydration of acetic acid and carbonylation of methylacetate.

**Shipping and Storage:** Containers lined with stainless steel or polyethylene.

## **Manufacturers:**

U.S.: Eastman Chemical Co.; Hoechst Celanese Corp.  
WESTERN EUROPE: France; Germany; Switzerland; United Kingdom.  
ASIA: Japan.  
MEXICO: Pemex.  
SOUTH AMERICA: Brazil.

**Remarks:** Acetic Anhydride reacts with morphine to yield heroin. It also reacts with anthranilic acid to form N-acetyl-anthranilic acid, the immediate precursor of methaqualone and mecloqualone. It reacts with phenylacetic acid to give P2P, a precursor of amphetamine and methamphetamine.



# Acetone



**Other Names:** Dimethyl ketone;  $\beta$ -ketopropane; pyroacetic ether; 2-propanone.

**Molecular Formulas:**  $C_3H_6O$ ;  $(CH_3)_2CO$

**Molecular Weight:** 58.08

**CSA Code:** 6532

**Harmonized Code:** 2914.11.5000

**Density:** 0.79

**Boiling Point:** 56.5°C

**Description:** Colorless, mobile, flammable liquid with a mildly pungent and somewhat aromatic odor.

**Hazards:** Highly flammable; vapor is irritating to eyes and nose in high concentrations; inhalation of vapor may cause dizziness, narcosis and coma; liquid is irritating to eyes and may cause severe damage; ingestion of liquid may cause gastric irritation, narcosis and coma.

**Illicit Use:** Solvent in purification of morphine base leading to the manufacture of heroin; conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** CSA; UN; OAS.

**Thresholds:** Domestic 150 Kg or 50 Gal  
Import/Export 1500 Kg or 500 Gal

**Legitimate Uses:** Solvent and chemical intermediary for a variety of substances, including plastics, paints, lubricants, pharmaceuticals, cosmetics, agricultural products, fats, oils, waxes, resins, rubber, lacquers, varnishes and rubber cements; used in the extraction of various principals from animal and plant substances; in varnish removers, purifying paraffin; hardening and dehydrating tissue; manufacture of methyl isobutyl ketone, mesityloxide, acetic acid, diacetone alcohol, chloroform, iodoform, bromoform, explosives, rayon, photographic films and isoprene.

**Annual Production:**

U.S.: 1,119,091 MT (1993)  
WESTERN EUROPE: 1,117,000 MT (1993 est. cap.)

ASIA: 557,000 MT (1993 est.cap.)  
MEXICO: 55,000 MT (1990 actual)  
SOUTH AMERICA: 250,000 MT (1991 est. cap.)

**Annual U.S. Exports:** 86,391 MT (1990)  
101,397 MT (1991)  
155,779 MT (1992)  
1,123,878 MT (1993)

**Annual U.S. Imports:** 53,646 MT (1990)  
41,304 MT (1991)  
43,677 MT (1992)  
30,792 MT (1993)

**Manufacturing Process:** Fermentation of cornstarch and molasses; chemical synthesis from isopropanol; from cumene or a by-product in phenol manufacture; oxidation of propene.

**Shipping and Storage:** Shipped in steel drums, tank trucks, and rail cars; stored in closed containers in well ventilated area away from heat, sparks and flames.

**Manufacturers:**

U.S.: Approx. 12 companies including:  
Allied-Signal Inc.; Dow Chemical; General Electric Co.; Shell Oil Co.; Aristech Chemical Corp.  
WESTERN EUROPE: Finland; France; Germany; Italy; The Netherlands; Spain; United Kingdom.  
ASIA: Japan; South Korea; Taiwan, India, Pakistan.  
MEXICO: Pemex  
SOUTH AMERICA: Argentina; Brazil; Ecuador; Venezuela.  
AUSTRALIA

**Remarks:** It is a solvent used in the conversion of cocaine base to cocaine hydrochloride and in the purification of morphine base in the production of heroin. It can be produced by a reaction of diacetone alcohol with an alkaline material such as sodium hydroxide or in the presence of a catalyst such as zinc or aluminum oxide. It may also be produced from isopropyl alcohol at cocaine laboratory sites.

# N-Acetylanthranilic Acid



**Other Names:** Ortho-acetamidobenzoic acid;  
2-acetamidobenzoic acid.

**Molecular Formula:** C<sub>9</sub>H<sub>9</sub>NO<sub>3</sub>

**Molecular Weight:** 179.18

**CSA Code:** 8522

**Harmonized Codes:** 2924.29.4500  
2924.22.0000

**Melting Point:** 184-186°C

**Description:** Fine white or off-white crystalline powder with a sweetish taste.

**Hazards:** Harmful if swallowed.

**Illicit Use:** Production of methaqualone and mecloqualone.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 40 Kg  
Import/Export 40 Kg

**Legitimate Uses:** Chemical intermediate in the manufacture of pharmaceuticals, plastics and fine chemicals.

**Annual Production:**

U.S.: None  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** None (1990-93)

**Annual U.S. Imports:** None (1990-93)

**Manufacturing Process:** From anthranilic acid and acetic anhydride.

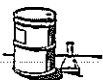
**Shipping and Storage:** Shipped in 100 lb (45.5 kg) fiber drums; stored in tightly closed containers in cool dry area.

**Manufacturers:**

U.S.: None  
WESTERN EUROPE: Belgium; Germany;  
Switzerland; United Kingdom.  
ASIA: Unknown

**Remarks:** N-acetylanthranilic acid is the immediate precursor used in the synthesis of methaqualone and mecloqualone. It is often synthesized from anthranilic acid. Esters of N-Acetylanthranilic Acid such as Ajacine are now included under the CSA.

# Acetyl Chloride



**Other Names:** Ethanoyl chloride

**Molecular Formula:**  $C_2H_3ClO$

**Molecular Weight:** 78.50

**Harmonized Code:** 2903.29.0000

**Density:** 1.104

**Boiling Point:** 52°C

**Description:** Colorless fuming liquid with a pungent odor.

**Hazards:** Highly flammable; vapor is irritating to the respiratory system and eyes; liquid may burn eyes and skin; ingestion of the liquid causes severe internal irritation and damage; its vapor forms explosive mixtures with air and it reacts violently with water.

**Illicit Use:** Acetylating agent used for converting morphine to heroin.

**Where Controlled or Regulated:** Hong Kong; Thailand.

**Legitimate Uses:** Synthesis of pharmaceuticals and dyes; determination of water in organic liquids; manufacturing lubricating grease and rubber; in polymerization processes.

**Annual Production:**

US: Proprietary

WESTERN EUROPE: Unknown

EAST ASIA: Unknown

**Manufacturing Process:** Reaction of acetic anhydride and hydrogen chloride; reaction of acetic acid and phosphorus trichloride or 1,1,2-trichloroethylene or 1,1,1-trichloroethane or sulfur mono-chloride or thionyl chloride.

**Shipping and Storage:** Polyethylene lined drums in cool dry area with adequate ventilation.

**Manufacturers:**

U.S.: White Chemical Corporation

WESTERN EUROPE: Germany; Switzerland; United Kingdom.

ASIA: Japan; India.

**Remarks:** This chemical can be substituted for acetic anhydride which is the most widely used acetylating agent in converting morphine to heroin. Acetyl chloride however is more hazardous to use in this procedure than acetic anhydride and has rarely been encountered.

# Ammonium Chloride



**Other Names:** Ammonium muriate; sal ammoniac; salmiac; Amchlor; Darammon.

**Molecular Formula:**  $\text{NH}_4\text{Cl}$

**Molecular Weight:** 53.5

**Harmonized Code:** 2827.10.0000

**Melting Point:** At 340°C it goes from a solid to a gas and then back to a solid again without going through the liquid phase.

**Description:** Colorless, odorless crystals or white granular powder; saline taste; absorbs moisture from the air giving it a tendency to cake.

**Hazards:** Poisonous by subcutaneous, intravenous and intramuscular routes; severely irritating to eyes.

**Illicit Use:** Extraction of morphine from opium for conversion to heroin.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Flux for coating iron with zinc; tinning; in dry cell batteries; dyeing; freezing mixtures; electroplating; to clean soldering irons; lustering cotton; tanning; in washing powders; for snow treatment (slows melting on ski slopes).

**Annual Production:** Estimated worldwide production greater than 1.5 million tons.

**Annual U.S. Exports:** 4,629 MT (1993)

**Annual U.S. Imports:** 1,875 MT (1993)

**Manufacturing Process:** Direct reaction between hydrochloric acid and ammonia; reaction with ammonia and carbon dioxide in aqueous sodium chloride.

**Shipping and Storage:** Shipped in sacks or bags of paper or polyethylene; stored in vessels or tanks which have internal coatings of epoxide or phenoxy resins.

**Manufacturers:**

U.S.: JT Baker Inc.; The Dallas Group of America; GFS Chemicals Inc.; Heico Chemicals, Inc.; Zaclon, Inc.

WESTERN EUROPE: Belgium; France; Germany; Spain; United Kingdom.

ASIA: Indonesia; Japan; Philippines.

**Remarks:** It is used to adjust the pH in the extraction of morphine from opium. It is not a critical chemical in this extraction process and other acid substitutes, such as acetic acid, can be used.

# Ammonium Formate



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**Other Names:** Formic acid ammonium salt.

**Molecular Formulas:**  $\text{CH}_5\text{NO}_2$ ;  $\text{HCOONH}_4$

**Molecular Weight:** 63.06

**Harmonized Code:** 2915.12.0000

**Melting Point:** 119-121°C

**Description:** Crystals have a tendency to become a liquid by absorbing moisture from the air.

**Illicit Use:** Production of amphetamine and MDA.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Chemical analysis, especially to precipitate base metals from salts of the "noble" metals (gold, platinum, etc.)

**Annual Production:**

US: Unknown

WESTERN EUROPE: Unknown

EAST ASIA: Unknown

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**Manufacturing Process:** Prepared from formic acid and ammonia; from methyl formate and ammonia.

**Shipping and Storage:** Tightly closed containers.

**Manufacturer(s):**

U.S.: Farm & Industrial Chemical Co.; Heico Chemicals, Inc.; GFS Chemicals Inc.; R.S.A. Corp.

WESTERN EUROPE: Germany; Italy; United Kingdom.

ASIA: Japan

**Remarks:** It is a precursor in the clandestine production of amphetamine and MDA from P2P and 3,4-MDP2P respectively. Formic acid and ammonia are sometimes substituted for ammonium formate.

# Ammonium Hydroxide



**Other Names:** Ammonia solution; ammonium hydrate; aqua ammonia; "Spirit of Hartshorn".

**Molecular Formula:**  $\text{NH}_4\text{OH}$

**Molecular Weight:** 35.00

**Harmonized Code:** 2814.20.0000

**Density:** 0.91

**Description:** Colorless liquid with a pungent, suffocating odor. Ammonium hydroxide is a 25-30% solution of ammonia gas in water.

**Hazards:** Severely irritating to eyes; poisonous if ingested and possibly if inhaled.

**Illicit Use:** Alkaline material used in the production of coca paste and cocaine base; reagent for producing alkaline solutions in chemical syntheses.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Detergent, removing stains, bleaching, calico printing, extracting plant colors and alkaloids, manufacturing ammonium salts and aniline dyes.

**Annual Production:**

U.S.: 17,252,000 MT (1993) as anhydrous ammonia gas

WESTERN EUROPE: 15,200,000 MT (1993 est. cap.) as anhydrous ammonia gas.

ASIA: 6,742,000 MT (1993 est. cap.) as anhydrous ammonia gas.

MEXICO: 2,632,000 MT (1990 actual) as anhydrous ammonia gas.

**Annual U.S. Exports:** 171 MT (1993) as anhydrous ammonia gas.

**Annual U.S. Imports:** 150 MT (1993) as anhydrous ammonia gas.

**Manufacturing Process:** Reaction of nitrogen and hydrogen under pressure with a catalyst produces ammonia gas; ammonium hydroxide is produced by bubbling ammonia gas into water.

**Shipping and Storage:** Shipped in steel (sometimes stainless) vessels and polyethylene canisters for ammonium hydroxide; stored and distributed as a liquefied gas in spherical or cylindrical pressure vessels and insulated cylindrical tanks.

**Manufacturers:**

U.S.: Mallinckrodt Specialty Chemicals Co.; General Chemical Corp.; J.T. Baker, Inc.; Trade Mark Nitrogen Corp.; Old Bridge Chemicals, Inc.

WESTERN EUROPE: United Kingdom.

EASTERN EUROPE: Estonia

ASIA: Singapore; Thailand.

MEXICO: Pemex.

SOUTH AMERICA: Brazil

AFRICA: Nigeria

MIDDLE EAST: Syria

**Remarks:** This chemical has been frequently found at cocaine production sites. There are many other liquid and solid alkaline substances which can be substituted for ammonium hydroxide in cocaine production. Approximately 80% of the ammonia gas produced in the U.S. is used in the production of fertilizers.

# Anthranilic Acid



**Other Names:** Ortho-aminobenzoic acid; 1-amino-2-carboxybenzene; Vitamin L1; 2-aminobenzoic acid; ortho-carboxyaniline.

**Molecular Formulas:**  $C_7H_7NO_2$ ;  $NH_2C_6H_4COOH$

**Molecular Weight:** 137.13

**CSA Code:** 8530

**Harmonized Code:** 2922.49.3500  
2922.43.0000

**Melting Point:** 144-146°C

**Description:** White to pale yellow crystalline powder with sweetish taste.

**Hazards:** Harmful if swallowed.

**Illicit Use:** Production of methaqualone and mecloqualone by forming N-acetylanthranilic acid.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 30 Kg  
Import/Export 30 Kg

**Legitimate Uses:** Chemical intermediate in the manufacture of dyes (indigo), pharmaceuticals and perfumes; in general organic syntheses.

**Annual Production:**

U.S.: Proprietary  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 232 MT (1990)  
1,159 MT (1991)  
111 MT (1992)  
38.6 MT (1993)

**Annual U.S. Imports:** 18 MT (1990)  
24 MT (1991)  
1.4 MT (1992)  
4.9 MT (1993)

**Manufacturing Process:** Reaction of isatoic anhydride and alkalis; reduction of ortho-nitrobenzoic acid.

**Shipping and Storage:** Shipped in 150 lb. (68.2 kg) fiber drums and as bulk powder; stored in tightly closed containers in cool dry areas.

**Manufacturers:**

U.S.: PMC, Inc.  
WESTERN EUROPE: Denmark; Germany.  
ASIA: Japan.

**Remarks:** Anthranilic acid along with acetic acid is used to synthesize N-acetylanthranilic acid which is used in the clandestine production of methaqualone and mecloqualone. Esters of anthranilic acid such as pindocaine are now controlled under the CSA.

# Benzaldehyde



**Other Names:** Benzoic aldehyde; artificial essential oil of almond; benzenecarbonal.

**Molecular Formulas:**  $C_7H_6O$ ;  $C_6H_5CHO$

**Molecular Weight:** 106.12

**CSA Code:** 8256

**Harmonized Code:** 2912.21.0000

**Density:** 1.05

**Boiling Point:** 179°C

**Description:** Strongly refractive liquid, becoming yellowish on storage; oil of almond odor; burning aromatic taste.

**Illicit Use:** Production of P2P and amphetamine.

**Where Controlled or Regulated:** CSA

**Thresholds:** Domestic 4 Kg  
Import/Export 4 Kg

**Legitimate Uses:** Manufacture of dyes, perfumes, cinnamic and mandelic acids, pharmaceutical, agricultural and other organic chemicals; solvent; ingredient in flavors.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** Hydrolysis of benzal chloride; partial oxidation of toluene.

**Shipping and Storage:** Keep tightly closed and protected from heat.

**Manufacturers:**

U.S.: Kalama Chemical Inc.

WESTERN EUROPE: Germany; Italy; Spain;  
The Netherlands; United Kingdom.

ASIA: Japan

**Remarks:** Oxidizes in air to form benzoic acid. It can be used to clandestinely manufacture a nitropropene intermediate by a reaction with nitroethane and butylamine. This intermediate can then be converted into P2P or amphetamine. This reaction has been encountered in clandestine P2P and amphetamine labs.



# Benzene



**Other Names:** Benzol; cyclohexatriene; phenyl hydride.

**Molecular Formula:** C<sub>6</sub>H<sub>6</sub>

**Molecular Weight:** 78.11

**Harmonized Codes:** 2902.20.0000 (> 90%)  
2707.10.0000 (< 90%)

**Density:** 0.88

**Boiling Point:** 80.1°C

**Description:** Clear, colorless, highly flammable liquid.

**Hazards:** Vapors may cause dizziness, headache, excitement, and unconsciousness in high concentrations; vapor is irritating to the eyes and mucous membranes; liquid may be poisonous if absorbed through the skin or ingested; repeated inhalation of low concentrations may cause severe or fatal blood diseases such as leukemia or aplastic anemia; suspected carcinogen.

**Illicit Use:** Solvent used during the conversion of cocaine base to cocaine hydrochloride and in PCP production.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Solvent for waxes, resins, oils; manufacture of ethylbenzene, cumene and cyclohexane; manufacture of varnishes and lacquers and as a motor fuel component.

**Annual Production:**

U.S.: 5,585,768 MT (1993)  
WESTERN EUROPE: 8,056,000 MT (1993 est. cap.)  
ASIA: 6,482,000 MT (1993 est. cap.)  
MEXICO: 320,000 MT (1990 actual)

**Annual U.S. Exports:** 3,286 MT (1993)

**Annual U.S. Imports:** 503,363 MT (1993)

**Manufacturing Process:** Decomposition of naphtha using heat, pressure and a platinum catalyst; hydrogenation and desulfurization of pyrolysis gasoline (ethylene production by-product); hydrodealkylation and disproportionation of toluene; and to a small extent, the coking of coal.

**Shipping and Storage:** Steel drums or tanks with adequate ventilation.

**Manufacturers:**

U.S.: Approximately 26 companies including Exxon Chemical Co.; Occidental Petroleum Corp; Shell Chemical Co.; Dow Chemical Co.; Texaco Chemical Co.

WESTERN EUROPE: Austria; Belgium; Finland; France; Germany; Italy; The Netherlands; Portugal; Spain; United Kingdom.

ASIA: Indonesia; Japan; Singapore; South Korea; Taiwan.

MEXICO: Pemex

**Remarks:** This chemical can be used to initially extract cocaine alkaloids from the coca leaf but its high flammability and acute toxic properties make it a poor choice for this process. Although it can be used as a solvent in the conversion of cocaine base to hydrochloride, its presence in a sample could possibly result from it being an impurity in another solvent which was used in the cocaine production process.

# Benzyl Chloride



**Other Names:** Chloromethylbenzene;  
 $\alpha$ -chlorotoluene.

**Molecular Formulas:**  $C_7H_7Cl$ ;  $C_6H_5CH_2Cl$

**Molecular Weight:** 126.59

**CSA Code:** 8568

**Harmonized Code:** 2707.10.0000

**Density:** 1.10

**Boiling Point:** 179°C

**Description:** Colorless liquid which fumes in moist air; pungent odor; powerful lachrymatory effect.

**Hazards:** Vapor is irritating to respiratory system, mucous membranes, eyes and skin; liquid can cause burns; ingestion causes severe internal irritation and damage.

**Illicit Use:** Production of phenylacetone (P2P), amphetamine and methamphetamine.

**Where Controlled or Regulated:** CSA; OAS

**Thresholds:** Domestic 1 Kg  
Import/Export 4 Kg

**Legitimate Uses:** Manufacture of plasticizers, benzyl alcohol and phenylacetic acid; production of quaternary ammonium salts for disinfectants and catalysts; benzyl esters for the flavor and perfume industry; dyes of the triphenylmethane series; dibenzyl disulfide (antioxidant) for lubricants; benzylphenol and benzylamines.

**Annual Production:**

US: 120,000 MT (1993 est. cap.)  
WESTERN EUROPE: 79,000 MT (1993 est. cap.)  
ASIA: 13,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 253 MT (1990)  
353 MT (1991)  
300 MT (1992)  
187 MT (1993)

**Annual U.S. Imports:** 346 MT (1990)  
844 MT (1991)  
931 MT (1992)  
948 MT (1993)

**Manufacturing Process:** Chlorination of toluene.

**Manufacturers:**

U.S.: Akzo America; Inc.; Monsanto Co.  
WESTERN EUROPE: Belgium; Germany;  
Spain; United Kingdom.  
ASIA: Japan

**Remarks:** It is used in one of the methods to manufacture P2P, a precursor of amphetamine and methamphetamine. This method is not the primary method used to produce P2P.

# Benzyl Cyanide



**Other Names:** Benzeneacetonitrile; phenylacetonitrile;  $\alpha$ -tolunitrile; cyanotoluene; 2-phenylacetonitrile.

**Molecular Formulas:**  $C_8H_7N$ ;  $C_6H_5CH_2CN$

**Molecular Weight:** 117.14

**CSA Code:** 8570

**Harmonized Code:** 2926.90.4000

**Density:** 1.02

**Boiling Point:** 233.5°C

**Description:** Colorless oily liquid with an aromatic odor; rapidly absorbed through the skin; toxicity due to presence of cyanide; insoluble in water.

**Hazards:** Vapor may cause faintness, headache and vomiting; liquid is irritating to eyes and skin; ingestion may cause irritation and poisoning.

**Illicit Use:** Production of P2P.

**Manufacturing Process:** Reaction of benzyl chloride and sodium or potassium cyanide.

**Manufacturers:**

U.S.: Unknown

WESTERN EUROPE: Denmark; France; United Kingdom.

ASIA: Japan (Mikuni Pharmaceutical Industrial Co., Ltd.).

**Remarks:** Benzyl cyanide is used in a several step synthesis to produce P2P. This method is not frequently used.

**Where Controlled or Regulated:** CSA; OAS.

**Thresholds:** Domestic 1 Kg  
Import/Export 1 Kg

**Legitimate Uses:** Synthesis of phenylacetic acid used in the production of penicillin; in general organic syntheses.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 47 Kg (1990)  
10,122 Kg (1991)  
30 Kg (1992)  
19,793 Kg (1993)

**Annual U.S. Imports:** 766 MT (1990)  
304 MT (1991)  
105 MT (1992)  
152 MT (1993)

# n-Butyl Acetate



**Other Names:** Acetic acid butyl ester.

**Molecular Formulas:**  $C_6H_{12}O_2$ ;  $CH_3COO(CH_2)_3CH_3$

**Molecular Weight:** 116.16

**Harmonized Code:** 2915.33.0000

**Density:** 0.88

**Boiling Point:** 125-126°C

**Description:** Colorless liquid with a pleasant odor.

**Hazards:** Vapors may irritate respiratory system and cause headache and nausea; liquid irritates the eyes and may cause conjunctivitis; liquid irritates the skin and causes dermatitis; if ingested may act as a central nervous system depressant.

**Illicit Use:** Solvent used during the conversion of cocaine to cocaine hydrochloride.

**Where Controlled or Regulated:** Colombia

**Legitimate Uses:** Manufacture of lacquer, artificial leather, photographic film, plastics and safety glass.

**Annual Production:**

U.S.: 250,000 MT (1993 est. cap.)

WESTERN EUROPE: 279,000 MT (1993 est. cap.)

ASIA: 104,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 57,931 MT (1993)

**Annual U.S. Imports:** 1,168 MT (1993)

**Manufacturing Process:** Reaction of acetic acid and n-butyl alcohol.

**Manufacturers:**

U.S.: Eastman Chemical Co.; Hoechst Celanese Corp.; Union Carbide Corp.

WESTERN EUROPE: Belgium; France; Germany; Italy; Spain; Switzerland; United Kingdom.

ASIA: Japan; Taiwan.

**Remarks:** This chemical has been identified in cocaine hydrochloride samples seized in the U.S. Its solvent properties are similar to ethyl ether except that it is less volatile.

# n-Butyl Alcohol



**Other Names:** Butyl alcohol; 1-butanol; n-butanol; butyl hydroxide; 1-hydroxybutane; n-propylcarbinol.

**Molecular Formulas:** C<sub>4</sub>H<sub>10</sub>O

**Molecular Weight:** 74.12

**Harmonized Code:** 2905.13.0000

**Density:** 0.81

**Boiling Point:** 117-118°C

**Description:** Colorless liquid with irritating vapors.

**Hazards:** Toxic by skin contact, ingestion and subcutaneous routes; severely irritating to eyes and skin.

**Illicit Use:** Solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Colombia

**Legitimate Uses:** Solvent for fats, waxes, resins, shellac, varnish, gums; manufacture of lacquers, rayon and detergents.

**Annual Production:**

U.S.: 603,636 MT (1993)

WESTERN EUROPE: 555,000 MT (1993 est. cap.)

ASIA: 158,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 66,871 MT (1993)

**Annual U.S. Imports:** 7,013 MT (1993)

**Manufacturing Process:** Hydrogenation of n-butyraldehyde; reduction of butyraldehyde with sodium borohydride.

**Shipping and Storage:** Untreated mild steel or enamelled steel drums; also stainless steel.

**Manufacturers:**

U.S.: BASF Corp.; Hoechst Celanese Corp.; Shell Chemical Co.; Texas Eastman Co.; Union Carbide Corp.; Vista Chemical Co.

WESTERN EUROPE: France; Germany; Spain; Sweden; United Kingdom.

ASIA: Japan; South Korea.

**Remarks:** This chemical has not been identified in cocaine hydrochloride samples seized in the U.S. but a closely related chemical, isobutyl alcohol, has been frequently identified in these samples.

# sec-Butyl Alcohol



**Other Names:** 2-Butanol; butylene hydrate; 2-hydroxybutane; methyl ethyl carbinol.

**Molecular Formulas:** C<sub>4</sub>H<sub>10</sub>O; C<sub>4</sub>H<sub>9</sub>OH

**Molecular Weight:** 74.12

**Harmonized Code:** 2905.13.0000

**Density:** 0.80

**Boiling Point:** 98-99.5°C

**Description:** Colorless liquid with irritating vapors.

**Hazards:** Flammable; vapor may irritate the respiratory system and eyes; liquid irritates eyes and may irritate the skin; if ingested may cause headache, dizziness, drowsiness and narcosis.

**Illicit Use:** Solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Synthesis of MEK, flotation agents, flavors, perfumes, dyestuffs, wetting agents; production of industrial cleaners, paint removers, solvent for natural resins, linseed and castor oils.

**Annual Production:**

U.S.: 520,000 MT (1993 est. cap.)

WESTERN EUROPE: 350,000 MT (1993 est. cap.)

ASIA: 256,000 MT (1993 est. cap.)

**Export:** 1,986 MT (1993)

**Import:** 175 MT (1993)

**Manufacturing Process:** Hydration of 2-butene.

**Shipping and Storage:** Untreated mild steel or enamelled steel drums; stainless steel may also be used.

**Manufacturers:**

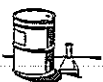
U.S.: Exxon Chemical Americas; Shell Chemical Co.

WESTERN EUROPE: France; Germany; The Netherlands; United Kingdom.

ASIA: Japan; Taiwan.

**Remarks:** Approximately 95% of U.S. produced sec-butyl alcohol is used to manufacture methyl ethyl ketone by dehydrogenation and 5% is used for solvents and chemical intermediates. This chemical has been identified in cocaine hydrochloride samples seized in the U.S.

# Calcium Carbonate



**Other Names:** Carbonic acid calcium salt; Calcichew; Calcidia; Light Carbonate.

**Molecular Formula:**  $\text{CaCO}_3$

**Molecular Weight:** 100.09

**Harmonized Code:** 2836.50.0000

**Melting Point:** 825°C (decomposes)

**Description:** Odorless, tasteless powder or crystals. Practically insoluble in water but soluble in dilute acids.

**Hazards:** Severely irritating to eyes and moderately irritating to skin.

**Illicit Use:** Alkaline material in the processing of cocaine base.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Antacid; calcium supplement; manufacture of paint, rubber, plastics, paper; insecticides; inks; filler in the production of adhesives, matches, pencils, crayons, linoleum, insulating compounds and welding rods; cosmetics, pharmaceuticals, antibiotics and for removing acidity of wines.

**Annual Production:**

U.S.: 1,648,582 MT (1993)

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** Commercial calcium carbonate is produced from limestone. Native mineral is purified by elutriation.

**Manufacturer(s):**

U.S.: ECC International, Inc.; Engelhard Corp.; General Electric Co.; GFS Chemicals Inc.; GTE Corp.; J.M. Huber Corp.; Johnson Matthey, Inc.; OMYA Inc.; Whittaker, Clark & Daniels Inc.

WESTERN EUROPE: Austria; Belgium; Denmark; Finland; France; Germany; Ireland; Italy; The Netherlands; Norway; Portugal; Spain; Sweden; United Kingdom.

ASIA: Japan; Malaysia; South Korea; Taiwan; Thailand.

**Remarks:** Calcium carbonate is one of a number of alkaline substances such as potassium or sodium carbonate which may be used in the production of cocaine and other substances.

# Calcium Hydroxide



**Other Names:** Calcium hydrate; slaked lime; caustic lime; hydrated lime.

**Molecular Formula:**  $\text{Ca}(\text{OH})_2$

**Molecular Weight:** 74.10

**Harmonized Code:** 2825.90.0000

**Melting Point:** decomposes

**Description:** Crystals or soft, odorless granules or powder with bitter alkaline taste; slightly soluble in water; readily absorbs carbon dioxide forming calcium carbonate.

**Hazards:** Mildly toxic by ingestion; severely irritating to eyes, skin, mucous membranes and respiratory system; causes dermatitis.

**Illicit Use:** Alkaline material in the production of coca paste, cocaine base, morphine and other substances.

**Where Controlled or Regulated:** Bolivia

**Legitimate Uses:** In mortar, plaster, cement and other building and paving materials; lubricants, drilling fluids, pesticides, fireproof coatings, water based paints; water treatment; manufacture of paper pulp.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 73 MT (1993)

**Import/Export:** 0 (1993)

**Manufacturing Process:** Hydration of lime (calcium oxide).

**Shipping and Storage:** Tightly closed and dry containers.

**Manufacturers:**

U.S.: Continental Lime Inc.; APG Lime; Chemline; Chemstar Lime Co.; Hondo Chemical; Mississippi Lime Co.; Whittaker; Clark & Daniels, Inc.

WESTERN EUROPE: Belgium; Denmark; Finland; France; Germany; Ireland; The Netherlands; Spain; Sweden; United Kingdom.

ASIA: Indonesia; Japan; Malaysia.

**Remarks:** This chemical has been found at cocaine laboratory sites in South America. Although it is used in the production of cocaine, many other alkaline materials can be substituted in its place.



# Calcium Oxide



**Other Names:** Lime; burnt lime; calx; quicklime.

**Molecular Formula:** CaO

**Molecular Weight:** 56.08

**Harmonized Code:** 2825.90.0000

**Melting Point:** 2614°C

**Description:** White or grayish-white granular powder or crystals; commercial grade sometimes has a yellowish or brownish tint.

**Hazards:** Dust irritates the skin, eyes and respiratory system; it is a strong caustic which may cause severe irritation to skin and mucous membranes.

**Illicit Use:** Alkaline material in the production of coca paste, cocaine base, morphine and other substances.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Building and construction materials; industrial chemicals; steel, aluminum and magnesium production; glass manufacture; fungicides, insecticides, drilling fluids and lubricants; water and sewage treatment.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 12,381 MT (1993)

**Import/Export:** 10 MT (1993)

**Manufacturing Process:** Produced by heating limestone (natural calcium carbonate).

**Shipping and Storage:** Tightly closed and dry containers.

**Manufacturers:**

U.S.: Continental Lime, Inc.; General Electric Company; APG Lime; Allied Lime Co.; Chemline; Chemstar Lime Co.; Mississippi Lime Co.

WESTERN EUROPE: Belgium; Denmark; Finland; France; Germany; Ireland; Italy; The Netherlands; Spain; Sweden; United Kingdom.

ASIA: Japan; Taiwan.

**Remarks:** This material has been found at cocaine laboratory sites in South America. It is an alkaline material which has been used in the production of cocaine. Many other alkaline materials can be substituted in its place.

# Chloroform



**Other Names:** Trichloromethane

**Molecular Formula:** CHCl<sub>3</sub>

**Molecular Weight:** 119.39

**Harmonized Code:** 2903.13.0000

**Density:** 1.48

**Boiling Point:** 61-62°C

**Description:** Colorless, nonflammable, very volatile liquid with a characteristic sweet odor.

**Hazards:** Vapor has anesthetic properties causing drowsiness, giddiness, headache, nausea, vomiting and unconsciousness; vapor and liquid irritate the eyes causing conjunctivitis; liquid is poisonous if ingested; suspected carcinogen.

**Illicit Use:** Solvent used in the production of cocaine, heroin and other clandestine drug syntheses.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Production of Fluorocarbon-22; solvent for fats, oils, rubber, alkaloids, waxes, resins; cleansing agent.

**Annual Production:**

U.S.: 216,364 MT (1993)

WESTERN EUROPE: 316,000 MT (1993 est. cap.)

ASIA: 78,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 23,398 MT (1993)

**Annual U.S. Imports:** 10,012 MT (1993)

**Manufacturing Process:** Reaction of methanol and hydrochloric acid to make methyl chloride which is then reacted with chlorine to yield methylene chloride, chloroform and carbon tetrachloride.

**Shipping and Storage:** Vessels constructed of iron or steel; stainless steel for very high purity products.

**Manufacturers:**

U.S.: Dow Chemical Co.; Occidental Chemical Corp.; Vulcan Materials Co.

WESTERNEUROPE: France; Germany; Italy; The Netherlands; Spain; United Kingdom.

ASIA: Japan; South Korea.

**Remarks:** This chemical has been identified in cocaine hydrochloride samples seized in the U.S. It is not well suited for use by itself in cocaine manufacture because both cocaine base and cocaine hydrochloride are soluble in it. Chloroform is very widely used for purification and clean-up procedures in chemical processes. Approximately 93% of the chloroform produced in the U.S. is used to make the refrigerant Fluorocarbon-22.

# Cyclohexane



**Other Names:** Hexahydrobenzene; hexamethylene; hexanaphthene

**Molecular Formula:** C<sub>6</sub>H<sub>12</sub>

**Molecular Weight:** 84.16

**Harmonized Code:** 2902.11.0000

**Density:** 0.77

**Boiling Point:** 80.7°C

**Description:** Flammable liquid with a solvent odor.

**Hazards:** May irritate the eyes, skin and respiratory system; inhalation of high concentrations may cause narcosis; assumed to be an irritant and narcotic if ingested.

**Illicit Use:** Solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Solvent for lacquers and resins; paint and varnish remover; manufacture of organic compounds; fuel for camp stoves; extraction of essential oils; fungicidal formulations.

**Annual Production:**

U.S.: 909,091 MT (1993)

WESTERN EUROPE: 1,099,000 MT (1993 est. cap.)

ASIA: 947,000 MT (1993 est. cap.)

MEXICO: 75,000 MT (1990 actual)

SOUTH AMERICA: 56,000 MT (1991 est. cap.)

**Annual U.S. Exports:** 8,439 MT (1993)

**Annual U.S. Imports:** 45,704 MT (1993)

**Manufacturing Process:** Hydrogenation of benzene.

**Shipping and Storage:** Glass carboys, metal barrels or drums, tank cars, cargo tanks with pressure relief valves.

**Manufacturers:**

U.S.: Chevron Chemical Co.; Citgo Petroleum Corp.; Phillips Petroleum Co.; Phillips Puerto Rico Core, Inc.; Texaco Chemical Co.

WESTERN EUROPE: Belgium; France; Germany; Italy; The Netherlands; Spain; United Kingdom.

ASIA: Japan; South Korea; Taiwan.

MEXICO: Pemex

SOUTH AMERICA: Brazil

**Remarks:** This chemical has been identified in cocaine hydrochloride samples seized in the U.S. It has solvent properties similar to toluene for use in the cocaine production process.

# Cyclohexanone



**Other Names:** Ketohexamethylene; pimelic ketone; Hytrol O; Anone; Nadone.

**Molecular Formula:** C<sub>6</sub>H<sub>10</sub>O

**Molecular Weight:** 98.14

**Harmonized Code:** 2914.22.1000

**Density:** 0.95

**Boiling Point:** 155.6°C

**Description:** Oily liquid with odor reminiscent of peppermint and acetone.

**Hazards:** Vapor is harmful.

**Illicit Use:** Clandestine manufacture of PCP.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Solvent for cellulose acetate, nitrocellulose, natural resins, vinyl resins, crude rubber, waxes, fats, shellac, and DDT; production of adipic acid for nylon.

**Annual Production:**

U.S.: 478,308 MT (1992)

**Annual U.S. Exports:** 5,198 MT (1993)

**Annual U.S. Imports:** 280 MT (1993)

**Manufacturing Process:** Catalytic dehydrogenation or oxidation of cyclohexanol; oxidation of cyclohexane.

**Shipping and Storage:** Keep in tightly closed containers.

**Manufacturers:**

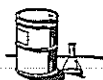
U.S.: Allied Signal Inc.; BASF Corp.; DSM Chemicals North America, Inc.; DuPont; Monsanto Co.

WESTERN EUROPE: Belgium; Germany; Italy; The Netherlands; Spain.

ASIA: Japan

**Remarks:** Cyclohexanone is used along with sodium cyanide, piperidine, and sodium metabisulfate to produce the PCP intermediate (PCC) which is then reacted with a Grignard reagent (phenylmagnesium bromide) to synthesize PCP.

# Diacetone Alcohol



**Other Names:** Pyranton; 4-hydroxy-4-methyl-2-pentanone; 4-hydroxy-2-keto-4-methylpentane.

**Molecular Formulas:**  $C_6H_{12}O_2$

**Molecular Weight:** 116.16

**Harmonized Code:** 2914.41.0000

**Density:** 0.94

**Boiling Point:** 160-164°C

**Description:** Colorless liquid with a mild odor.

**Hazards:** Highly flammable; vapor irritates eyes and respiratory system; liquid irritates eyes and mucous membranes and is absorbed by the skin; liquid if ingested has a narcotic effect.

**Illicit Use:** Solvent used to produce acetone for cocaine production.

**Where Controlled or Regulated:** Colombia

**Legitimate Uses:** Solvent for cellulose acetate, nitrocellulose, fats, oils, waxes, resins; preservative in pharmaceutical preparations; antifreeze solutions and hydraulic fluids; intermediate for making mesityl oxide, methyl isobutyl ketone and hexylene glycol.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 45 MT (1993)

**Annual U.S. Imports:** 246 MT (1993)

**Manufacturing Process:** Condensation of acetone in the presence of a basic catalysts such as barium hydroxide of calcium hydroxide.

**Shipping and Storage:** Tank car or truck.

**Manufacturers:**

U.S.: Hoechst Celanese Corp.; Shell Chemical Co.; Union Carbide Corp.

WESTERN EUROPE: France; Germany; Italy; The Netherlands; United Kingdom.

ASIA: Japan; Taiwan.

SOUTH AMERICA: Brazil.

**Remarks:** There is substantial evidence that diacetone alcohol has been used to produce acetone. This can be accomplished by the reaction of diacetone alcohol with an alkaline material (e.g. sodium hydroxide) or with a catalyst such as aluminum or zinc oxide.

# Diethylamine



**Other Names:** N-Ethylethanamine

**Molecular Formulas:**  $C_4H_{11}N$ ;  $(CH_3CH_2)_2NH$

**Molecular Weight:** 73.14

**Harmonized Code:** 2921.12.0000

**Density:** 0.71

**Boiling Point:** 55.5°C

**Description:** Strong alkaline liquid.

**Hazards:** Flammable; vapor irritates eyes and respiratory system; liquid irritates skin and eyes; may be poisonous if ingested.

**Illicit Use:** Manufacture of diethyltryptamine (DET) and LSD.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Production of vulcanization accelerators; in flotation agents, resins, dyes and pharmaceuticals.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** Produced from ethanol and ammonia or ethyl iodide and ammonia.

**Shipping and Storage:** Stored in carbon steel or stainless steel containers; small amounts stored in glass or ceramic vessels.

**Manufacturers:**

U.S.: Air Products and Chemicals, Inc.; Elf Atochem North America Inc.; Hoechst Celanese Corp.

WESTERN EUROPE: France; United Kingdom.

ASIA: Japan

**Remarks:** This precursor is infrequently encountered because there have been very few seizures of clandestine diethyltryptamine laboratories in the U.S. and virtually no seizures of clandestine laboratories producing LSD. The LSD operations in the U.S. have made dosage forms (tablets, blotter paper, etc).

# Ephedrine



**Other Names:**  $\alpha$ -[1-(Methylamino)ethyl]-benzene-methanol;  $\alpha$ -[1-(methylamino)ethyl]benzyl alcohol; 2-methylamino-1-phenyl-1-propanol; 1-phenyl-1-hydroxy-2-methylaminopropane; 1-phenyl-2-methylaminopropanol;  $\alpha$ -hydroxy- $\beta$ -methylaminopropylbenzene.

**Molecular Formula:** C<sub>10</sub>H<sub>15</sub>NO

**Molecular Weight:** 165.23

**CSA Code:** 8113

**Harmonized Codes:** 2939.40.5000  
2939.41.0000

**Melting Point:** 40-42°C

**Description:** Racemic ephedrine and its hydrochloride and sulfate salts are white crystals; l-ephedrine is a waxy hygroscopic solid, crystals or granules with a soapy feel; l-ephedrine hydrochloride and sulfate are orthorhombic needles which are affected by light.

**Hazards:** Harmful if swallowed in large quantities; do not breathe dust; avoid contact with skin and eyes.

**Illicit Use:** Production of methamphetamine/  
N-methylcathinone.

**Where Controlled or Regulated:** CSA; UN; OAS.

**Thresholds:** Domestic 0 Kg  
Import/Export 0 Kg

**Legitimate Uses:** l-Ephedrine is used in medicinal preparations as a bronchodilator.

**Annual Production:**

U.S.: none

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 596 Kg (1990)  
755 Kg (1991)  
1,934 Kg (1992)  
2,385 Kg (1993)

**Annual U.S. Imports:** 238 MT (1990)  
353 MT (1991)  
202 MT (1992)  
315 MT (1993)

**Manufacturing Process:** l-Ephedrine can be extracted from several species of the plant genus Ephedra; l-ephedrine is produced synthetically by the fermentation of a mixture of benzaldehyde and molasses, followed by dehydrogenation in a methylamine solution (Meubery Process). It can also be synthesized by the catalytic hydrogenation of (-)-1-phenyl-2-methylaminopropane.

**Shipping and Storage:** Keep tightly closed in cool, dry place and out of light.

**Manufacturers:**

U.S.: None

WESTERN EUROPE: Germany; Czech Republic.

ASIA: India, Japan, Peoples Republic of China; CIS States.

**Remarks:** Ephedrine is the primary precursor used in the clandestine synthesis of methamphetamine in the U.S. The process involves the reduction of ephedrine with hydriodic acid in the presence of red phosphorus. The reaction is relatively simple and the yield is high. Ephedrine is an ingredient in over-the-counter medications and look-alike preparations. There are no manufacturers of ephedrine in the U.S.

# Ergonovine



**Other Names:** Ergometrine; dextrolysergic acid  
levo-2-propranolamide.

**Molecular Formula:**  $C_{19}H_{23}N_3O_2$

**Molecular Weight:** 325.39

**CSA Code:** 8675

**Harmonized Codes:** 2939.60.0000  
2939.61.0000

**Melting Point:** 162°C

**Description:** White crystalline material which darkens and decomposes on exposure to light; hydrochloride, maleate and tartrate salts are also crystalline.

**Hazards:** In large quantities it is highly toxic and may cause vomiting, diarrhea, unquenchable thirst, confusion, and unconsciousness; chronic poisoning from ingestion of grain contaminated with the fungus, ergot.

**Illicit Use:** Production of LSD.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 10 g  
Import/Export 10 g

**Legitimate Uses:** An oxytocic for obstetrical use and as a vasoconstrictor particularly in the treatment of migraine headaches.

**Annual Production:**

U.S.: None  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 0.4 Kg (1990)  
0.8 Kg (1991)  
0.9 Kg (1992)  
1.9 Kg (1993)

**Annual U.S. Imports:** 292 Kg (1990)  
423 Kg (1991)  
817 Kg (1992)  
397 Kg (1993)

**Manufacturing Process:** Extraction from ergot (fungus that grows on grain); synthesis from dextrolysergic acid and levo (+)-2-amino-1-propanol.

**Shipping and Storage:** In tightly closed amber colored containers in cool dry area.

**Manufacturers:**

US: None  
WESTERN EUROPE: Switzerland  
ASIA: India

**Remarks:** Ergonovine can be used to produce lysergic acid which in turn is used to synthesize LSD or it can be used in a direct synthesis of LSD. Small amounts (less than 100 micrograms) of LSD produce significant hallucinogenic activity therefore very little ergonovine is needed to yield a substantial number of dosage units of LSD.



# Ergotamine



**Other Names:** 12-Hydroxy-2-methyl-5- $\alpha$ -(phenylmethyl)-ergotaman-3,6,18-trione.

**Molecular Formula:**  $C_{33}H_{35}N_5O_5$

**Molecular Weight:** 581.65

**CSA Code:** 8676

**Harmonized Codes:** 2939.60.0000  
2939.62.0000

**Description:** White hygroscopic crystalline material which darkens and decomposes on exposure to air, heat and light. Hydrochloride, succinate and tartrate salts are also crystalline.

**Hazards:** In high concentration it is highly toxic and may cause vomiting, diarrhea, unquenchable thirst, confusion and unconsciousness; chronic poisoning from ingestion of grain contaminated with the fungus, ergot.

**Illicit Use:** Production of LSD.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 20 g  
Import/Export 20 g

**Legitimate Uses:** An oxytocic in obstetrics and as a vasoconstrictor, particularly in the treatment of migraine headaches.

**Annual Production:**

U.S.: None

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 0.3 Kg (1990)  
0 Kg (1991)  
0 Kg (1992)  
4.6 Kg (1993)

**Annual U.S. Imports:** 53.3 Kg (1990)  
103 Kg (1991)  
105 Kg (1992)  
76.3 Kg (1993)

**Manufacturing Process:** Extraction from ergot.

**Shipping and Storage:** Shipped as a bulk powder; stored in tightly closed amber-colored containers in cool dry areas.

**Manufacturers:**

US: Unknown

WESTERN EUROPE: Switzerland

ASIA: India

**Remarks:** Ergotamine can be used to produce lysergic acid, which in turn is used to synthesize LSD or it can be used in a direct synthesis of LSD. Small amounts (less than 100 micrograms) of LSD produce significant hallucinogenic activity therefore very little ergotamine is needed to yield a substantial number of dosage units of LSD.

# Ethyl Acetate



**Other Names:** Acetic ether; acetic acid ethyl ester; vinegar naphtha; ethyl acetic ester; ethyl ethanoate; acetidin.

**Molecular Formulas:**  $C_4H_8O_2$ ;  $CH_3COOC_2H_5$

**Molecular Weight:** 88.10

**Harmonized Code:** 2915.31.0000

**Density:** 0.90

**Boiling Point:** 77°C

**Description:** Clear, volatile, liquid with a fruity pleasant odor.

**Hazards:** Highly flammable; vapor may irritate the eyes and respiratory system; liquid irritates the eyes and mucous surfaces; prolonged inhalation may cause kidney and liver damage.

**Illicit Use:** Solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Colombia

**Legitimate Uses:** Solvent for nitrocellulose, varnishes and lacquers; artificial fruit essences; manufacture of smokeless powder, artificial leather, artificial silk, perfumes.

**Annual Production:**

US: 280,000 MT (1993 est. cap.)  
WESTERN EUROPE: 292,000 MT (1993 est. cap.)  
ASIA: 293,000 MT (1993 est. cap.)  
MEXICO: 85,000 MT (1991 est. cap.)  
SOUTH AMERICA: 77,000 MT (1991 est. cap.)

**Annual U.S. Exports:** 48,818 MT (1993)

**Annual U.S. Imports:** 13,345 MT (1993)

**Manufacturing Process:** Oxidation/reduction reaction of acetaldehyde in the presence of aluminum or sodium alkoxide; by-product in oxidation of butane or formation of polyvinylbutral (PVB); direct esterification of acetic acid.

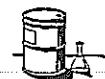
**Shipping and Storage:** Glass carboys, metal barrels or drums, tank cars, cargo tanks with pressure relief devices.

**Manufacturers:**

U.S.: Eastman Chemical Co.; Hoechst Celanese Corp.; Monsanto Co.  
WESTERN EUROPE: Belgium; Germany; Italy; Spain; Sweden; Switzerland; United Kingdom.  
ASIA: Indonesia; Japan; South Korea; Taiwan.  
SOUTH AMERICA: Argentina; Brazil; Colombia; Peru.

**Remarks:** From 1989 to 1993, this chemical has been found in a significant number of cocaine hydrochloride samples seized in the U.S. It is usually found in combination with other solvents. It has properties similar to ethyl ether for use in the cocaine production process. Ethyl acetate can easily be produced by a combination of acetic acid, ethyl alcohol and sulfuric acid.

# Ethyl Alcohol



**Other Names:** Ethanol; anhydrous alcohol; ethyl hydroxide; methyl carbinol.

**Molecular Formulas:**  $C_2H_6O$ ;  $C_2H_5OH$

**Molecular Weight:** 46.07

**Harmonized Codes:** 2207.10.3000

**Density:** 0.79

**Boiling Point:** 78.5°C

**Description:** Clear, colorless liquid with a pleasant odor.

**Hazards:** Highly flammable; in high concentrations causes impaired perception and uncoordination.

**Illicit Use:** Solvent used in conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Alcoholic beverages; industrial solvent; gasoline octane booster; perfumery; organic syntheses and pharmaceuticals.

**Annual Production:**

U.S.: 1,458,000 MT (1993 est. cap.)

WESTERN EUROPE: 625,000 MT (1993 est. cap.)

ASIA: 121,000 MT (1993 est. cap.)

SOUTH AMERICA: 292,000 MT (1991 est. cap.)

**Annual U.S. Exports:** 80,379 MT (1993)

**Annual U.S. Imports:** 353,868 MT (1993)

**Manufacturing Process:** Fermentation of starch, sugar and other carbohydrates; hydration of ethylene.

**Shipping and Storage:** Railroad tank cars, tank trucks, drums and smaller glass or metal containers; some drums may be lined with phenolic resin.

**Manufacturers:**

U.S.: Approximately 21; of which the largest are Archer Daniels Midland Co.; Quantum Chemical Corp.; Union Carbide Corp.

WESTERN EUROPE: France; Germany; United Kingdom.

ASIA: Japan; South Korea.

SOUTH AMERICA: Argentina; Brazil; Chile.

**Remarks:** This chemical has been identified in cocaine hydrochloride samples seized in the U.S. This solvent is not essential to the cocaine hydrochloride production since other alcohols such as methyl isopropyl, etc. can be used. This solvent is used in combination with water insoluble solvents. Ethanol can be used in a process with sulfuric acid to produce ethyl ether.

# Ethylamine



**Other Names:** Ethanamine; monoethylamine; aminoethane.

**Molecular Formula:** C<sub>2</sub>H<sub>7</sub>N

**Molecular Weight:** 45.08

**CSA Code:** 8678

**Harmonized Code:** 2921.19.1000

**Description:** At room temperature ethylamine is a gas with an ammonia-like odor; below 16° C it is a highly flammable and corrosive liquid; the hydrochloride and hydriodide salts are hygroscopic crystals.

**Hazards:** Vapor irritates the mucous membranes, respiratory system and eyes; in high concentrations it may effect the central nervous system; liquid may irritate eyes and skin; if ingested may be irritating and poisonous.

**Illicit Use:** Used with P2P to synthesize N-ethylamphetamine and with 3,4-methylenedioxyphenyl-2-propanone to synthesize MDE; also used to make diethyltryptamine (DET).

**Where Controlled or Regulated:** CSA

**Thresholds:** Domestic 1 Kg  
Import/Export 1 Kg

**Legitimate Uses:** Production of herbicides, dyes and pharmaceuticals; also used as a stabilizer for rubber latex; in resin chemistry.

**Annual Production:**

U.S.: Unknown  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 63 MT (10/91 - 12/91)  
236 MT (1992)  
740 MT (1993)

**Annual U.S. Imports:** 144 Kg (10/91 - 12/91)  
192 Kg (1992)  
75 Kg (1993)

**Manufacturing Process:** Produced from ethanol and ammonia or ethyl iodide and ammonia.

**Shipping and Storage:** Stored and shipped in carbon steel or stainless steel containers; small amounts can be kept in glass or ceramic; since ethylamine is a vapor at room temperature it is stored under pressure; often produced in 50% or 70% solutions to facilitate storage and shipping; shelf life very long but should be stored under nitrogen to prevent contact with carbon dioxide and atmospheric moisture; keep out of light.

**Manufacturers:**

U.S.: Air Products and Chemicals, Inc.; Elf Atochem North America, Inc.; Hoechst Celanese Corp.  
WESTERN EUROPE: Belgium; France; Germany; United Kingdom.  
ASIA: Japan

**Remarks:** Ethylamine is not to be confused with diethylamine, used in the synthesis of LSD, or triethylamine.

# N-Ethylephedrine



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**Other Names:** Etafedrine, 1-ethylephedrine.

**Molecular Formula:**  $C_{12}H_{19}NO$

**Molecular Weight:** 193.28

**Harmonized Code:** 2939.40.5000

**Melting Point:** 183-184°C

**Illicit Use:** Production of N-ethyl-N-methylamphetamine.

**Where Controlled or Regulated:** Removed from CSA 4/16/94.

**Thresholds:** Domestic 1 Kg  
Import/Export 1 Kg

**Annual Production:**

U.S.: None

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
0 Kg (1993)

**Annual U.S. Imports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
0 Kg (1993)

**Manufacturers:**

US: None

WESTERN EUROPE: Germany (Knoll AG)

EAST ASIA: Unknown

**Remarks:** There have been no documented purchases or seizures of this precursor or its potential illicit product, N-ethyl-N-methylamphetamine, in the U.S. There were also no manufacturers or suppliers of this precursor located in the U.S.

# Ethyl Ether



**Other Names:** 1,1'-Oxybisethane; ethyl oxide; diethyl oxide; ethoxyethane; sulfuric ether; diethyl ether; ether.

**Molecular Formulas:**  $C_4H_{10}O$ ;  $(C_2H_5)_2O$

**Molecular Weight:** 74.12

**CSA Code:** 6584

**Harmonized Code:** 2909.11.0000

**Density:** 0.71

**Boiling Point:** 34.6°C

**Description:** Colorless, very volatile liquid with a sweet pungent odor and burning taste. Ether vapors are heavier than air.

**Hazards:** Highly flammable; vapor may cause drowsiness, dizziness, mental confusion, faintness, and in high concentrations, unconsciousness; ingestion may also produce these effects; continued inhalation of low concentrations may cause loss of appetite, dizziness, fatigue and nausea; repeated inhalation or swallowing may lead to "ether habit" with symptoms resembling chronic alcoholism.

**Illicit Use:** Processing of heroin base to heroin hydrochloride and cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** CSA; UN; OAS.

**Thresholds:** Domestic 135.8 Kg 50 Gal  
Import/Export 1,364 Kg 500 Gal

**Legitimate Uses:** Solvent or extractant for fats, waxes, oils, perfumes, resins, dyes, gums and alkaloids; manufacture of munitions and plastics; denaturant in several denatured alcohol formulas; starting fuel for diesel engines and as a general anesthetic in surgery; commercial source of ethylene in plants that do not have access to petroleum refinery gases; analytical laboratories.

**Annual U.S. Production:** 6,679 MT (1993)

**Annual U.S. Exports:** 448 MT (1990)  
1,191 MT (1991)  
1,761 MT (1992)  
1,698 MT (1993)

**Annual U.S. Imports:** 6 MT (1990)  
5 MT (1991)  
29 MT (1992)  
0 MT (1993)

**Manufacturing Process:** Dehydration of ethanol; hydration of ethylene; both processes are carried out in the presence of sulfuric acid.

**Shipping and Storage:** Shipped in metal containers, drums, tank cars and boxcars; stored in cool, dark, well ventilated areas in tightly closed inert containers for limited time periods.

**Manufacturers:**

U.S.: Eastman Chemical Co.; Quantum Chemical Corp.  
WESTERN EUROPE: France; Germany; Norway; Spain.  
ASIA: Japan; Taiwan.

**Remarks:** Commonly referred to as ether. Ethyl ether is a solvent used in the conversion of cocaine base to cocaine hydrochloride and in other clandestine processes where hydrochloride salts are produced. It may be used in conjunction with a water miscible solvent such as acetone. Its presence has markedly decreased in cocaine hydrochloride samples seized in the U.S. It can be synthesized from sulfuric acid and ethanol.

# Ethylidene Diacetate



**Other Names:** 1,1-Ethanediol diacetate;  
1,1-diacetoxyethane.

**Molecular Formula:**  $C_6H_{10}O_4$

**Molecular Weight:** 146.14

**Harmonized Code:** 2915.39.6000

**Density:** 1.061

**Boiling Point:** 167-169°C

**Description:** Liquid with a sharp, fruity odor.

**Illicit Use:** Acetylation of morphine to produce heroin.

**Where Controlled or Regulated:** Some Southeast Asian countries.

**Legitimate Uses:** Agricultural fungicide; intermediate in the production of vinyl acetate.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** Addition of acetic acid to acetylene in the presence of mercury salts; heating acetaldehyde and acetic anhydride.

**Manufacturers:**

U.S.: None

WESTERN EUROPE: United Kingdom

ASIA: India

**Remarks:** Ethylidene diacetate is used in the acetylation of morphine to produce diacetylmorphine (heroin). It is not the acetylating agent but is decomposed to acetic anhydride when heated with sulfuric acid. Acetic anhydride is the acetylating agent. Ethylidene diacetate has been found at clandestine heroin production sites.

# N-Ethylpseudoephedrine



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**Molecular Formula:** C<sub>12</sub>H<sub>19</sub>NO

**Molecular Weight:** 193.26

**Harmonized Code:** 2939.40.5000

**Illicit Use:** Production of N-Ethyl,N-Methylamphet-amine.

**Where Controlled or Regulated:** Removed from CSA effective 4/16/94.

**Annual Production:**

U.S.: None

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** None (1991 - 1993)

**Annual U.S. Imports:** None (1991 - 1993)

**Manufacturers:**

U.S.: None

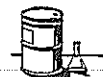
WESTERN EUROPE: Unknown

ASIA: Unknown

**Remarks:** There have been no documented purchases or seizures of this precursor or its potential illicit product, N-ethyl,N-methylamphetamine, in the U.S. There are no known manufacturers or suppliers of this precursor located in the U.S.



# Formamide



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**Other Names:** Methanamide; Carbamaldehyde.

**Molecular Formulas:**  $\text{CH}_3\text{NO}$ ;  $\text{HCONH}_2$

**Molecular Weight:** 45.04

**Harmonized Code:** 2924.10.0000

**Density:** 1.13

**Boiling Point:** 210.5° C

**Description:** Slightly viscous, odorless, colorless liquid. Industrial grades may have a slight ammonia odor.

**Hazards:** Poisonous by skin contact and or if injected; moderately toxic by ingestion; irritating to skin, eyes and mucous membranes.

**Illicit Use:** Precursor in the production of amphetamine and MDA.

**Where Controlled or Regulated:** Unknown

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**Legitimate Uses:** Ionizing solvent; manufacture of formic esters; as softener for paper; used in animal glues and water soluble gums.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** Produced from carbon monoxide and ammonia at high temperature and pressure.

**Manufacturer(s):**

U.S.: GFS Chemicals Inc.; Johnson Matthey, Inc.

WESTERN EUROPE: Germany

ASIA: Japan

**Remarks:** It is used with ammonia in place of formic acid in a reaction with P2P or 3,4-MD P2P to form amphetamine or MDA.

# Formic Acid



**Other Names:** Aminic acid; Methanoic acid.

**Molecular Formulas:**  $\text{CH}_2\text{O}_2$ ;  $\text{HCOOH}$

**Molecular Weight:** 46.02

**Harmonized Codes:** 2915.11.0000  
2915.12.0000  
2915.13.0000

**Density:** 1.22

**Boiling Point:** 100.5° C

**Description:** Colorless liquid with a pungent odor. It is a strong reducing agent.

**Hazards:** Vapor is irritating to respiratory system and eyes; liquid causes burns to eyes; ingestion produces severe internal irritation and damage; dangerously caustic to skin; chronic absorption causes albuminuria/hematuria.

**Illicit Use:** Production of amphetamine and MDA.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Decalcifier; reducer in dyeing wool fast colors; dehairing and plumping hides; tanning; electroplating; coagulating rubber latex; aid in regenerating old rubber; in chemical analysis.

**Annual Production:**

U.S.: Unknown  
WESTERN EUROPE: 228,000 MT (1993 est. cap.)  
ASIA: Unknown

**Annual U.S. Exports:** 1,877 MT (1993)

**Annual U.S. Imports:** 13,560 MT (1993)

**Manufacturing Process:** Produced by heating carbon monoxide and sodium hydroxide under pressure and decomposing the sodium formate with sulfuric acid.

**Manufacturer(s):**

U.S.: Hoechst Celanese Corp.  
WESTERN EUROPE: Finland; Germany; Italy; Norway; Sweden; United Kingdom.  
ASIA: Indonesia; Japan; Korea; Taiwan.

**Remarks:** It is used with ammonia in place of formamide in a reaction with P2P or 3,4-methylenedioxyphenyl-2-propanone to form amphetamine or MDA.

# Hexane



**Other Names:** n-Hexane; caproyl hydride; hexyl hydride.

ASIA: Japan; South Korea; Taiwan.

**Molecular Formula:** C<sub>6</sub>H<sub>14</sub>

**Molecular Weight:** 86.17

**Harmonized Code:** 2901.10.0000

**Density:** 0.66

**Boiling Point:** 69°C

**Description:** Colorless, very volatile liquid with faint peculiar odor.

**Remarks:** This chemical has been identified in cocaine hydrochloride samples seized in the U.S., and has been reported by authorities in Latin American countries. It has solvent properties similar to toluene in the cocaine production process except that it is more volatile. Hexane must be used in conjunction with a water miscible solvent such as acetone.

**Hazards:** Flammable; vapors may irritate respiratory system and in high concentrations have a narcotic effect; may cause chronic effects, such as loss of sensation in hands and feet.

**Illicit Use:** Solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Colombia

**Legitimate Uses:** Determining refractive indices of minerals; filling for thermometers; quick drying adhesives and rubber cement; vegetable oil extraction.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 24,575 MT (1993)

**Annual U.S. Imports:** 447 MT (1993)

**Manufacturing Process:** Refined from petroleum.

**Manufacturers:**

U.S.: The Humphrey Chemical Co.; Exxon Chemical Co.; Pennzoil Co.; Phillips Petroleum Co.; Texaco Chemical Co.; Phibro Energy USA, Inc.; South Hampton Refining Co.; The UNO-VEN Company.

WESTERN EUROPE: Belgium; France; Germany; Portugal; Spain.

# Hydriodic Acid



**Other Names:** Hydrogen iodide (aqueous solution).

**Molecular Formula:** HI

**Molecular Weight:** 127.91

**CSA Code:** 6695

**Harmonized Code:** 2811.19.5050

**Density:** 1.5 (47%); 1.7 (57%)

**Boiling Point:** 127°C (57%)

**Description:** Corrosive acid which is colorless when freshly prepared. However, upon exposure to light and air it turns yellow to brown. It is a solution of hydrogen iodide gas in water.

**Hazards:** Vapor is irritating to respiratory system, skin and eyes; liquid causes severe burns to eyes and skin; if ingested, may cause severe internal irritation and damage.

**Illicit Use:** Reducing agent in the clandestine manufacture of methamphetamine from ephedrine or psuedoephedrine.

**Where Controlled or Regulated:** CSA

**Thresholds:** Domestic (57% HI) 1.7 Kg 1 L  
Import/Export (57% HI) 1.7 Kg 1 L

**Legitimate Uses:** Manufacture of organic and inorganic iodo compounds; removal of iodine from iodo compounds; disinfectant; chemical reagent; pharmaceutical application in adding iodine to iodine-deficient human diets. (Hydriodic Acid Syrup).

**Annual U.S. Exports:** 24 MT (1991)  
7.5 MT (1992)  
78 MT (1993)

**Annual U.S. Imports:** 0 Kg (1991)  
8.5 Kg (1992)  
0 Kg (1993)

**Manufacturing Process:** Hydrogen iodide gas in water; iodine in the presence of hydrogen sulfide; iodine with red phosphorus and water.

**Shipping and Storage:** Keep protected from air and light and at temperatures below 30° C.

**Manufacturers:**

U.S.: Ajay Chemical; Deepwater Iodides Inc.;  
H & S Chemical.

WESTERN EUROPE: Germany.

ASIA: Japan

**Remarks:** Main reducing agent in methamphetamine synthesis, however, other reducing agents can be used. There has been increasing production of hydriodic acid in clandestine laboratories from iodine, red phosphorus and water. Produced in various concentrations (e.g. 47% HI, 57% HI).

# Hydrochloric Acid



**Other Names:** Muriatic acid; hydrogen chloride.

**Molecular Formula:** HCl

**Molecular Weight:** 36.46

**CSA Code:** 6545

**Harmonized Code:** 2806.10.0000

**Density:** 1.2 (39.1% solution)

**Boiling Point:** 108.58°C (20.22% solution)

**Description:** A solution of hydrogen chloride gas in water. Corrosive, colored to light yellow liquid from traces of iron, chlorine and organic matter. Fumes in air. Reagent grade contains 36.5% - 38% hydrochloric acid.

Hydrogen chloride gas is also available.

**Hazards:** Inhalation may cause coughing or choking, inflammation and ulceration of the respiratory tract; concentrated solutions cause severe burns; strongly corrosive, irritant to the mucous membranes, eyes and respiratory tract; exposure to vapors may result in pulmonary edema and possibly death.

**Illicit Use:** Manufacture of hydrochloride salts of clandestinely produced controlled substances, including cocaine.

**Where Controlled or Regulated:** OAS; CSA; UN.

**Threshold:** Export 50 Gal (exports to selected South American countries)

**Legitimate Uses:** Production of chlorides and hydrochlorides; neutralization of basic systems; catalyst and solvent in organic syntheses.

**Annual Production:**

U.S.: 3,491,885 MT (1993)

WESTERN EUROPE: 4,432,000 MT (1993 est. cap.)

ASIA: 2,243,000 MT (1993 est. cap.)

MEXICO: 282,000 MT (1989 actual)

**Annual U.S. Exports:** 97 MT (10/92 - 12/92)  
291 MT (1993)

**Annual U.S. Imports:** 0 Kg (10/92 - 12/92)  
0 Kg (1993)

**Manufacturing Process:** Produced industrially by the interaction of sodium chloride and sulfuric acid; from sodium chloride, sulfur dioxide, air and water vapor; as a by-product of the synthesis of chlorinated hydrocarbons.

**Shipping and Storage:** Carboys in boxes, steel portable tanks, lined with a polyethylene, for hydrochloric acid not over 20 %; tank cars for acid not over 30 %; cargo tanks lined with rubber or equally acid-resistant material, glass bottles, polyethylene containers, metal drums (lined); store below 30 degrees in airtight containers of glass or other inert material.

**Manufacturers:**

U.S.: Approximately 45 companies including: Allied-Signal, Inc.; BASF Corp.; Dow Chemical U.S.A.; DuPont Chemicals.

WESTERN EUROPE: Austria; Belgium; Finland; France; Germany; Greece; Ireland; Italy; The Netherlands; Norway; Portugal; Spain; Sweden; Switzerland; United Kingdom.

ASIA: Japan; Malaysia; Singapore; South Korea; Taiwan; Thailand; Indonesia; Philippines.

SOUTH AMERICA: Bolivia and Colombia.

**Remarks:** An acid is essential in the production of water soluble salts of controlled substances. However, other acids such as sulfuric acid, phosphoric acid, etc. can be used for this purpose. Cocaine hydrochloride is the most commonly encountered salt of cocaine. A small percentage of the hydrochloric acid produced in the U.S. is exported. It is easily obtainable in retail outlets as muriatic acid. Hydrochloric acid can be produced in clandestine laboratories by the reaction of sodium chloride and sulfuric acid. Hydrochloride gas can be bubbled into an organic solvent containing the base form of the drug to form the hydrochloride salt.

# Hydrogen Peroxide



**Other Names:** Hydrogen dioxide; hydroperoxide; Albone; Hioxyl.

**Molecular Formula:** H<sub>2</sub>O<sub>2</sub>

**Molecular Weight:** 34.02

**Harmonized Code:** 2847.00.0000

**Density:** 1.11 (30 % solution)

**Boiling Point:** 152°C

**Description:** Colorless, bitter tasting and rather unstable liquid. Marketed as a solution in water in concentrations of 3-90 percent by weight. Strong oxidizing agent.

**Hazards:** Irritating and caustic in high concentrations to mucous membranes, eyes and skin; ingestion may cause acute distension of the stomach, nausea, vomiting and internal bleeding; may cause burns to skin and mucous membranes.

**Illicit Use:** Oxidizing agent in the production of cocaine.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** 90% solution is used in rocket propulsion; bleaching agent in food; strong oxidizer; topical antiseptic and cleansing agent (dilute solution); in pharmaceutical preparations, mouth-washes, sanitary lotions (dilute solutions).

**Annual Production:**

U.S.: 301,581 MT (1993)

WESTERN EUROPE: 700,000 MT (1993 est. cap.)

ASIA: 333,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 21,598 MT (1993)

**Annual U.S. Imports:** 2,437 MT (1993)

**Manufacturing Process:** Catalytic reduction of 2-ethylanthraquinone.

**Shipping and Storage:** Preserve in partially-filled containers having a vent in the closure and store in a cool place; glass bottles, aluminum drums with vented closure in the top head, not over 30 gallons; polyethylene containers with vent closures; tank cars and cargo tanks fabricated of aluminum.

**Manufacturers:**

U.S.: Degussa Corp.; FMC Corp.; Eka Nobel, Inc.; Fort Howard Corp.; Solvay Interlox.

WESTERN EUROPE: Austria; Belgium; Finland; France; Germany; Italy; The Netherlands; Norway; Portugal; Spain; Sweden; United Kingdom.

ASIA: Indonesia; Japan; South Korea; Taiwan; Thailand.

**Remarks:** Hydrogen Peroxide is commonly referred to as peroxide. It can be used as a substitute for potassium permanganate to oxidize cinnamoylcocaine in the illicit cocaine process. It is harder to use due to lack of color change as with potassium permanganate. It has been found at cocaine laboratory sites.

# Iodine



**Molecular Formula:** I<sub>2</sub>

**Molecular Weight:** 253.82

**CSA Code:** 6699

**Harmonized Code:** 2801.20.0000

**Melting Point:** 113.6°C

**Description:** Bluish-black scales or plates. It has a characteristic odor, a sharp acrid taste and produces a violet corrosive vapor.

**Hazards:** Vapor is irritating to respiratory system and eyes; solid irritates the eyes and may burn the skin; if ingested there may be severe internal irritation and damage.

**Illicit Use:** Production of methamphetamine and PCP.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Manufacture of iodine solutions, germicides, fungicides and antiseptics; reduces friction of hard surfaces including stainless steel and glass; reagent in analytical chemistry; manufacture of iodide salts.

**Annual Production:**

U.S.: 1,995 MT (1992)

World: 16,930 MT (1992)

**Annual U.S. Exports:** 707 MT (1993)

**Annual U.S. Imports:** 3,781 MT (1993)

**Manufacturing Process:** Extracted from Cholean nitrate-bearing earth (Caliche) and from seaweed.

**Manufacturers:**

U.S.: Iochem Corp.; North American Brine Resources; Woodward Iodine Corp.

WESTERN EUROPE: The Netherlands; United Kingdom.

ASIA: Indonesia; Japan.

**Remarks:** Iodine and water can be mixed with hydrogen sulfide to produce hydriodic acid which, in turn, is the primary reducing agent for methamphetamine synthesis. This is a hazardous procedure. Iodine is also mixed with red phosphorus and water to make hydriodic acid. In a clandestine laboratory setting, a little acid may be added to this reaction mixture.

# Isobutyl Alcohol



**Other Names:** 2-Methyl-1-propanol; isopropylcarbinol; 1-hydroxymethylpropane; isobutanol.

**Molecular Formulas:** C<sub>4</sub>H<sub>10</sub>O; C<sub>4</sub>H<sub>9</sub>OH

**Molecular Weight:** 74.12

**Harmonized Code:** 2905.14.0010

**Density:** 0.81

**Boiling Point:** 108°C

**Description:** Colorless liquid.

**Hazards:** Flammable; vapor irritates respiratory system, and in high concentrations produces narcotic-like effects; liquid irritates eyes and is harmful if ingested.

**Illicit Use:** Solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Manufacture of esters for fruit flavoring essences; solvent in paint and varnish removers.

**Annual Production:**

U.S.: 177,000 MT (1993 est. cap.)

WESTERN EUROPE: 138,000 MT (1993 est. cap.)

ASIA: 103,000 MT (1993 est. cap.)

**Manufacturing Process:** Extracted from fusel oil; fermentation of carbohydrates; hydrogenation of isobutyraldehyde; single stage reaction from propylene.

**Shipping and Storage:** Polyethylene bottles and drums, metal tanks.

**Manufacturers:**

U.S.: BASF Corp.; Eastman Chemical Co.; Hoechst Celanese Corp.; Shell Chemical Co.; Union Carbide Corp.

WESTERN EUROPE: France; Germany; Spain; United Kingdom.

ASIA: Japan; South Korea.

**Remarks:** Isobutyl alcohol can be used to dissolve hydrochloric acid for use in the production of cocaine hydrochloride. This solvent is not essential in the cocaine hydrochloric production, since other alcohols such as ethyl, isopropyl and methyl can be used. It has been found in cocaine hydrochloride samples seized in the U.S.



# Isopropyl Acetate



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**Other Names:** 2-Propylacetate, acetic acid isopropyl ester.

**Molecular Formula:**  $C_5H_{10}O_2$

**Molecular Weight:** 102.13

**Harmonized Code:** 2915.39.4550

**Density:** 0.87

**Boiling Point:** 89°C

**Description:** Colorless liquid with mild fruity smell.

**Hazards:**

**Illicit Use:** Solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Colombia

**Legitimate Uses:** Solvent for cellulose derivatives, plastics, oils and fats; used in perfumery.

**Annual Production:**

U.S.: 35,619 MT (1993 est. cap.)

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 148 MT (1993)

**Annual U.S. Imports:** 59 MT (1993)

**Manufacturing Process:** Esterification of acetic acid with isopropyl alcohol and sulfuric acid as a catalyst.

**Shipping and Storage:** Store and transport in steel or aluminum containers, or tank cars under nitrogen.

**Manufacturers:**

U.S.: Eastman Chemical Company; Hoechst Celanese Corp.; Union Carbide Corp.

WESTERN EUROPE: France; United Kingdom.

ASIA: Japan

**Remarks:** Isopropyl acetate has been found in a few cocaine hydrochloride samples seized in the U.S.

# Isopropyl Alcohol



**Other Names:** 2-Propanol; isopropanol; dimethyl carbinol; petrohol; secondary propyl alcohol; IPA.

**Molecular Formula:** C<sub>3</sub>H<sub>8</sub>O; C<sub>3</sub>H<sub>7</sub>OH

**Molecular Weight:** 60.09

**Harmonized Code:** 2932.90.4100

**Density:** 0.78

**Boiling Point:** 82.5°C

**Description:** Colorless, liquid with a slightly bitter taste.

**Hazards:** Flammable; inhalation of the vapor in high concentrations and ingestion of the liquid may result in headache, dizziness, mental depression, nausea, vomiting, narcosis, anesthesia, and coma; liquid may damage eyes severely.

**Illicit Use:** Recrystallization of hydrochloride salts of some clandestinely produced controlled substances; solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Colombia

**Legitimate Uses:** Solvent; extractant; dehydration and defrosting agent; disinfectant; feedstock for manufacture of acetone and other compounds; premium grade IPA is formulated into skin lotions, hair care products, nail polish and other personal care products.

**Annual Production:**

U.S.: 561,818 MT (1993)  
WESTERN EUROPE: 811,000 MT (1993 est. cap.)  
MEXICO: 90,000 MT (1991 est. cap.)  
19,000 MT (1990 actual)  
SOUTH AMERICA: 200,000 (1991 est. cap.)  
ASIA: 311,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 142,160 MT (1993)

**Annual U.S. Imports:** 15,227 MT (1993)

**Manufacturing Process:** Sulfuric acid oxidation of propylene; hydrogenation of acetone.

**Shipping and Storage:** Polyethylene bottles and drums, metal tanks.

**Manufacturers:**

U.S.: Exxon Chemical Co.; Lyondell Petrochemical Co.; Shell Chemical Co.; Union Carbide Corp.

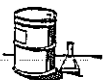
WESTERN EUROPE: France; Germany; The Netherlands; Spain; United Kingdom.

ASIA: Japan; Singapore; South Korea; Taiwan.

SOUTH AMERICA: Argentina; Brazil; Peru; Venezuela.

**Remarks:** Isopropyl alcohol can be used to incorporate hydrochloric acid into the solvents used in the production of cocaine hydrochloride. IPA is not essential in cocaine hydrochloride production, since other alcohols (ethyl, isobutyl, and methyl) can be used. Isopropyl alcohol has been found in combination with other solvents in liquid samples obtained from South America and in cocaine hydrochloride samples seized in the U.S. It can be used as a starting material in the production of acetone.

# Isosafrole



**Other Names:** 1,2-(methylenedioxy)-4-propenyl-benzene; 5-(1-propenyl)-1,3-benzodioxole.

**Molecular Formula:** C<sub>10</sub>H<sub>10</sub>O<sub>2</sub>

**Molecular Weight:** 162.18

**CSA Code:** 8704

**Harmonized Codes:** 2932.90.4100  
2932.91.0000

**Density:** 1.12

**Boiling Point:** 253 C° (trans)

**Description:** Liquid with the odor of anise. Isosafrole may exist in cis or trans isomeric forms. The trans form is more stable. Generally, a mixture of both forms is found.

**Hazards:** Poison by intravenous routes; moderately toxic by ingestion and subcutaneous routes; suspected carcinogen; irritates skin; when heated to decomposition, it emits acrid smoke and fumes.

**Illicit Use:** Clandestine production of MDA, MDMA, MDE or N-hydroxy-MDA.

**Where Controlled or Regulated:** CSA; UN.

**Thresholds:** Domestic 4 Kg  
Import/Export 4 Kg

**Legitimate Uses:** Production of perfumes and fragrances, root beer and sarsaparilla flavors and general organic syntheses.

**Annual Production:**

U.S.: None  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
0 Kg (1993)

**Annual U.S. Imports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
0 Kg (1993)

**Manufacturing Process:** Reaction of safrole with alcoholic potassium hydroxide.

**Manufacturers:**

U.S.: Unknown  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Remarks:** Isosafrole is used either to synthesize 3,4-methylenedioxyphenyl-2-propanone or piperonal, both of which are intermediates in syntheses of MDA, MDMA, MDE or N-hydroxy-MDA. Isosafrole has been identified in U.S. clandestine laboratories producing MDA or MDMA. It is available from U.S. chemical suppliers such as Aldrich.

# Kerosene



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**Other Names:** Kerosine; Deobase.

**Harmonized Code:** 2710.00.2000

**Density:** about 0.8

**Description:** Clear, colorless to pale yellow, mobile, oily liquid. A mixture of hydrocarbons, chiefly of methane series.

**Hazards:** Flammable; inhalation of high concentrations causes headache, drowsiness and coma; ingestion causes irritation with vomiting and diarrhea; induction of vomiting following ingestion is contraindicated.

**Illicit Use:** Extraction of cocaine from coca leaves.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Fuel (stoves and lamps), degreaser and cleaner. Solvent in cosmetics and insecticides.

**Annual Production:** Unknown

**Annual U.S. Exports:** 238,344 MT (1993)

**Annual U.S. Imports:** 17,647 MT (1993)

**Manufacturing Process:** Fractionation of petroleum.

**Manufacturers:**

U.S.: Petroleum processors.

WESTERN EUROPE: Petroleum processors.

ASIA: Petroleum processors.

**Remarks:** Kerosene is used to extract cocaine from coca leaves. It is the most widely used organic liquid in cocaine extraction. Other organic liquids, such as gasoline, can be used, however, the physical properties (flammability and high volatility) make some of these alternative organic compounds less desirable to use.

# Lysergic Acid



**Other Names:** 9,10-Didehydro-6-methyl-ergoline-8-carboxylic acid.

**Molecular Formula:**  $C_{16}H_{16}N_2O_2$

**Harmonized Codes:** 2939.60.0000  
2939.63.0000

**Melting point:** 240°C (decomposition)

**Molecular Weight:** 268.32

**Description:** Crystalline material which is only sparingly soluble in water and neutral organic solvents.

**Illicit Use:** Production of LSD.

**Where Controlled or Regulated:** Schedule III controlled substance under the US CSA; OAS; UN. Removed as a listed chemical from CSA effective 4/16/94.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** None (1992 - 1993)

**Annual U.S. Imports:** None (1992 - 1993)

**Manufacturing Process:** Alkaline hydrolysis of ergot alkaloids such as ergotamine or ergonovine; fermentation of cultures of *Claviceps purpurea* or *Aspergillus clavatus*.

**Shipping and Storage:** Keep in tightly closed containers in a cool place, protected from light.

**Manufacturers:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Remarks:** Lysergic acid is the main precursor in at least two methods of synthesizing LSD; often it is synthesized or obtained from ergot or ergot alkaloids. Lysergic acid can be found in U.S. and Japanese chemical supply catalogues. There was no identified U.S. production, importation or exportation of lysergic acid during 1992 or 1993.

# Methyl Alcohol



**Other Names:** Methanol; carbinol; wood spirit; wood alcohol; methyl hydroxide, mono-hydroxy methane.

**Molecular Formula:** CH<sub>4</sub>O; CH<sub>3</sub>OH

**Molecular Weight:** 32.04

**Harmonized Code:** 2905.11.0000

**Density:** 0.79

**Boiling Point:** 64.7°C

**Description:** Clear, colorless, mobile liquid; burns with a bluish flame.

**Hazards:** Flammable; inhalation of high concentrations of vapor may cause dizziness, stupor, cramps and digestive disturbances; lower concentrations may cause headache, nausea, vomiting, and irritation of the mucous membranes; vapor and liquid are very dangerous to the eyes; ingestion damages the central nervous system especially the optic nerve causing temporary or permanent blindness; ingestion also injures kidneys, liver, heart and other organs; unconsciousness may develop after some hours and may be followed by death.

**Illicit Use:** Recrystallization of hydrochloride salts of some clandestinely produced controlled substances; solvent in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Colombia

**Legitimate Uses:** Industrial solvent; antifreeze; octane booster; to denature ethanol; raw material for making formaldehyde and methyl esters of inorganic and organic acids; solvent used in the manufacture of pharmaceuticals.

**Annual Production:**

US: 4,791,818 MT (1993)  
WESTERN EUROPE: 2,834,000 MT (1993 est. cap.)  
ASIA: 1,267,000 MT (1993 est. cap.)  
MEXICO: 210,000 MT (1990 actual)  
SOUTH AMERICA: 2,445,000 MT (1991 est. cap.)

**Annual U.S. Exports:** 11,418 MT (1993)

**Annual U.S. Imports:** 1,006,074 MT (1993)

**Manufacturing Process:** Destructive distillation of wood; from hydrogen and carbon monoxide or carbon dioxide; oxidation of hydrocarbons. By-product in the manufacture of polyethylene terephthalate when dimethyl terephthalate is used.

**Shipping and Storage:** Preserve in tight containers, remote from heat, sparks and open flames.

**Manufacturers:**

U.S.: Air Products and Chemicals, Inc.; Ashland Chemical, Inc.; Beaumont Methanol Corp.; Borden Chemicals and Plastics; Coastal Chem, Inc.; Eastman Chemical Co.; Enron Methanol Co.; Georgia Gulf Corp.; Hoechst Celanese Corp.; Lyondell Petrochemical Co.; Quantum Chemical Corp.; Sand Creek Chemical, Ltd.; Star Enterprise.  
WESTERNEUROPE: Germany; Italy; Greece; The Netherlands; Switzerland; United Kingdom.  
ASIA: Indonesia; Japan; Malaysia; Taiwan; Thailand.  
SOUTH AMERICA: Argentina; Brazil; Chile; Colombia; Venezuela.  
MEXICO: Pemex.  
ESTERN EUROPE: Russia.

**Remarks:** Methanol can be used to dissolve hydrochloric acid in the manufacture of cocaine hydrochloride. This solvent is not essential to cocaine hydrochloride production, since other alcohols such as ethyl, isopropyl, etc. can be used. This solvent is used in combination with water insoluble solvents. It has been identified in cocaine hydrochloride samples.

# Methylamine



**Other Names:** Methanamine; monomethylamine; aminomethane.

**Molecular Formula:** CH<sub>5</sub>N; CH<sub>3</sub>NH<sub>2</sub>

**Molecular Weight:** 31.06

**CSA Code:** 8520

**Harmonized Code:** 2921.11.0000

**Description:** Gas at ordinary temperature and pressure; corrosive liquid when liquified by cooling in ice and salt mixture; commonly sold as 33-40% aqueous solutions. The hydrochloride exists as deliquescent tetragonal crystals.

**Hazards:** Gas and liquid are flammable; gas irritates the skin, eyes and respiratory system; sustained contact may cause burns; highly corrosive to the skin, mucous membranes and respiratory tract.

**Illicit Use:** Used with P2P to produce methamphetamine and with 3,4-methylenedioxyphenyl-2-propanone to produce MDMA.

**Where Controlled or Regulated:** CSA covers monomethylamine. Dimethylamine and trimethylamine are not included.

**Thresholds:** Domestic 1 Kg  
Import/Export 1 Kg

**Legitimate Uses:** Production of bactericides, insecticides (36%), explosives (31%) and N-methylpyrrolidine (lube oil additive) (15%).

**Annual Production:**

U.S.: 380,000 MT (1993 est. cap., includes mono-, di- and trimethylamines)

WESTERN EUROPE: 235,000 MT (1993 est. cap., includes mono-, di-, trimethylamines)

ASIA: 81,000 MT (1993 est. cap., includes mono-, di- and trimethylamines)

**Annual U.S. Exports:** 60.5 Mt (10/91 - 12/91)  
2,141 MT (1992)  
2,625 MT (1993)

**Annual U.S. Imports:** 0 Kg (10/91 - 12/91)  
1.8 MT (1992)  
4,115 MT (1993)

**Manufacturing Process:** Produced from methanol and ammonia; by heating methanol, ammonium chloride and zinc chloride; by heating ammonium chloride and formaldehyde.

**Shipping and Storage:** Stored in carbon steel or stainless steel containers; small amounts are stored in glass or ceramic vessels. Methylamine must be stored under pressure at room temperature. It should be kept under nitrogen to avoid contact with carbon dioxide (forms carbonates) and moisture.

**Manufacturers:**

U.S.: Air Products and Chemicals; DuPont Chemicals.

WESTERN EUROPE: Belgium; Germany; Italy; The Netherlands; Spain; United Kingdom.

ASIA: Japan; Korea.

**Remarks:** The P2P/methylamine process to manufacture methamphetamine is used in less than one third of the clandestine laboratories seized in the U.S. Methylamine is a necessary chemical in these processes. It is also a necessary chemical for the clandestine production of MDMA. Methylamine is readily available from U.S. chemical supply houses.

# Methylene Chloride



**Other Names:** Dichloromethane; methylene dichloride; methylene bichloride.

**Molecular Formula:** CH<sub>2</sub>Cl<sub>2</sub>

**Molecular Weight:** 84.94

**Harmonized Code:** 2903.12.0000

**Density:** 1.36

**Boiling Point:** 39.75°C

**Description:** Clear, colorless liquid.

**Hazards:** Vapor irritates the eyes and respiratory system and may cause headache and nausea; high concentrations may result in cyanosis and unconsciousness; liquid irritates the eyes; vapor is not flammable and not explosive.

**Illicit Use:** Solvent used in the production of cocaine hydrochloride and other substances.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Solvent for cellulose acetate; degreasing and cleaning fluid; solvent in food processing (coffee); solvent in paint and varnish removers.

**Annual Production:**

U.S.: 160,909 MT (1993)

WESTERN EUROPE: 341,000 MT (1993 est. cap.)

ASIA: 70,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 35,324 MT (1993)

**Annual U.S. Imports:** 6,115 MT (1993)

**Manufacturing Process:** Chlorination of methane or methyl chloride.

**Shipping and Storage:** Preserve in tightly sealed glass, metal or plastic containers, or metal drums.

**Manufacturers:**

U.S.: Dow Chemical U.S.A.; Occidental Chemical Corporation; Vulcan Materials Company.

WESTERN EUROPE: France; Germany; Italy; The Netherlands; Spain; United Kingdom.

ASIA: Japan; South Korea.

**Remarks:** Methylene chloride is found in combination with other solvents in cocaine samples. Due to its properties, this solvent does not appear to be usable by itself in the manufacture of cocaine because cocaine hydrochloride is soluble in methylene chloride. It could probably be used in a mixture of solvents. Methylene chloride can also be used in the separation and purification of other controlled substances.



# 3,4-Methylenedioxyphenyl-2-propanone



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**Other Names:**

3,4-Methylenedioxyphenylacetone; 3,4-methylene-dioxybenzyl methyl ketone; piperonylmethylketone.

**Molecular Formula:** C<sub>10</sub>H<sub>10</sub>O<sub>3</sub>

**Molecular Weight:** 178.19

**CSA Code:** 8502

**Harmonized Codes:** 2932.90.4100  
2932.92.0000

**Density:** 1.20

**Boiling Point:** 120-122°C

**Description:** Colorless to pale yellow liquid.

**Hazards:** Irritating to the skin and eyes.

**Illicit Use:** Production of MDA, MDMA, MDE and N-hydroxy-MDA.

**Where Controlled or Regulated:** CSA; OAS; UN.

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**Thresholds:** Domestic 4 Kg  
Import/Export 4 Kg

**Legitimate Uses:** Organic syntheses.

**Annual Production:**

U.S.: None  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 153 Kg (1990)  
None (1991 - 1993)

**Annual U.S. Imports:** 218 Kg (1990)  
None (1991 - 1993)

**Manufacturing Process:** From isosafrole and formic acid; hydrogen peroxide and sulfuric acid.

**Shipping and Storage:** Carbon steel containers for short-term storage and transportation; stainless steel or containers with a thin lining for long-term storage.

**Manufacturers:**

U.S.: None  
WESTERN EUROPE: Germany  
ASIA: Unknown

**Remarks:** 3,4-methylenedioxyphenyl- 2-propanone is the primary precursor in a one-step synthesis of MDA and its analogues. It has also been synthesized from safrole and isosafrole and then used to produce MDA and its analogues.

# N-Methylephedrine



**Other Names:**  $\alpha$ -[1-(dimethylamino)ethyl] benzene methanol;  $\alpha$ -[1-(dimethylamino)ethyl] benzyl alcohol; methylephedrine; N-methyl-l-ephedrine; 2-dimethyl-amino-1-phenylpropanol; N,N-dimethylnorephedrine.

**Remarks:** This chemical is available from many specialty chemical suppliers in the U.S. such as Aldrich Chemical Co., Sigma Chemical Co., Lancaster Synthesis, Ltd., Fluka Chemical Corp., and Alfa Products.

**Molecular Formula:** C<sub>11</sub>H<sub>17</sub>NO

**Molecular Weight:** 179.25

**CSA Code:** 8115

**Harmonized Code:** 2939.40.5000

**Melting Point:** 86-87°C

**Illicit Use:** Used with hydriodic acid to produce N,N-dimethylamphetamine.

**Hazards:** Moderately toxic if ingested.

**Where Controlled or Regulated:** CSA

**Thresholds:** Domestic 1 Kg  
Import/Export 1 Kg

**Legitimate Uses:** Organic syntheses.

**Annual Production:**

U.S.: None

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
0 Kg (1993)

**Annual U.S. Imports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
0 Kg (1993)

**Manufacturing Process:** Levo isomer of this chemical occurs naturally in several species of the plant genus "Ephedra".

**Manufacturers:**

U.S.: None

WESTERN EUROPE: Germany (Knoll AG)

ASIA: None

# Methyl Ethyl Ketone



**Other Names:** 2-Butanone; ethylmethyl ketone; MEK; 2-oxobutane; methyl acetone.

**Molecular Formula:** C<sub>4</sub>H<sub>8</sub>O

**Molecular Weight:** 72.1

**CSA Code:** 6714

**Harmonized Code:** 2914.12.0000

**Density:** 0.81

**Boiling Point:** 79.6°C

**Description:** Clear liquid with an acetone-like odor.

**Hazards:** Flammable; inhalation of vapor may cause dizziness, headache and nausea; liquid irritates the eyes and may cause severe damage; if ingested may cause gastric irritation and narcosis; weak teratogen.

**Illicit Use:** Solvent used in cocaine hydrochloride production.

**Where Controlled or Regulated:** CSA; OAS; UN

**Thresholds:** Domestic 145 Kg 50 Gal  
Import/Export 1445 Kg 500 Gal

**Legitimate Uses:** Production of coatings solvent (60%); adhesives (15%); magnetic tapes (10%); lube oil dewaxing (5%); printing inks (5%); synthetic leather; transparent paper; printing inks; aluminum foil; lacquers; degreasing agents; extraction of fats, oils, waxes; natural and synthetic resins; and manufacture of smokeless powder.

**Annual Production:**

U.S.: 252,727 MT (1993)

WESTERN EUROPE: 335,000 MT (1993 est. cap.)

ASIA: 260,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 38,481 MT (1990)

41,020 MT (1991)

59,971 MT (1992)

81,771 MT (1993)

**Annual U.S. Imports:** 28,074 MT (1990)

18,114 MT (1991)

23,946 MT (1992)

15,959 MT (1993)

**Manufacturing Process:** Dehydrogenation of sec-butyl alcohol; catalytic oxidation of N-butenes.

**Shipping and Storage:** Carbon steel containers for short-term storage and transportation; stainless steel or containers with tin linings are for long-term storage.

**Manufacturers:**

U.S.: Exxon Chemical Co.; Hoechst Celanese Corp.; Shell Chemical Co.; Union Carbide Corp.

WESTERN EUROPE: France; Germany; The Netherlands; United Kingdom.

ASIA: Japan; Taiwan.

**Remarks:** MEK is a List II chemical under the CSA. It is a solvent used in the conversion of cocaine base to cocaine hydrochloride. In recent years it has been the most frequently identified solvent in cocaine hydrochloride samples (approximately 90% in 1993). MEK can be used alone.

# Methyl Isobutyl Ketone



**Other Names:** Isopropylacetone; hexone; 4-methyl-2-pentanone; MIBK.

**Molecular Formula:** C<sub>6</sub>H<sub>12</sub>O

**Molecular Weight:** 100.16

**Harmonized Code:** 2914.13.0000

**Density:** 0.80

**Boiling Point:** 117-118°C

**Description:** Colorless liquid, faint ketonic and camphor odor.

**Hazards:** Flammable; inhalation of vapors may cause dizziness, headache and nausea; liquid irritates the eyes and may cause severe damage; if ingested may cause gastric irritation and narcosis.

**Illicit Use:** Solvent used in the production of cocaine hydrochloride.

**Where Controlled or Regulated:** CSA; Colombia.

**Thresholds:** Export 1523 Kg 500 Gal  
(Exports to Western Hemisphere countries except Canada; international transactions and transshipments)

**Legitimate Uses:** Solvent for gums, resins, nitrocellulose, etc.

**Annual Production:**

U.S.: 75,690 MT (1993 est. cap.)  
WESTERN EUROPE: 82,000 MT (1993 est. cap.)  
ASIA: 78,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 8,996 MT (1993)

**Annual U.S. Imports:** 7,809 MT (1993)

**Manufacturing Process:** Controlled catalytic reduction of mesityl oxide.

**Shipping and Storage:** Carbon steel containers for short term storage and transportation; stainless steel or tin lined containers for long term storage.

**Manufacturers:**

U.S.: Eastman Chemical Co.; Shell Chemical Co.; Union Carbide Corp.  
WESTERN EUROPE: France; Germany; The Netherlands; United Kingdom.  
ASIA: Japan; Taiwan; South Korea.

**Remarks:** Found in combination with other solvents in cocaine samples. It has solvent properties suitable for use in the conversion of cocaine base to cocaine hydrochloride.

# N-Methylpseudoephedrine



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**Molecular Formula:** C<sub>11</sub>H<sub>17</sub>NO

**Molecular Weight:** 179.25

**CSA Code:** 8119

**Harmonized Code:** 2939.40.5000

**Illicit Use:** Used with hydriodic acid to produce N,N-dimethylamphetamine.

**Where Controlled or Regulated:** CSA

**Thresholds:** Domestic 1 Kg  
Import/Export 1 Kg

**Annual Production:**

U.S.: None

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
0 Kg (1993)

**Annual U.S. Imports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
0 Kg (1993)

**Manufacturers:**

U.S.: None

WESTERN EUROPE: Unknown

ASIA: Unknown

**Remarks:** Although this chemical could be used in place of N-methylephedrine to synthesize N,N-dimethylamphetamine, N-methylpseudoephedrine has not been identified at clandestine laboratories.

# Nitroethane



**Other Names:** none found

**Molecular Formula:** C<sub>2</sub>H<sub>5</sub>NO<sub>2</sub>

**Molecular Weight:** 75.07

**CSA Code:** 6724

**Harmonized Code:** 2904.20.5000

**Density:** 1.05

**Melting Point:** 114-115°C

**Description:** Oily liquid with a pleasant odor. Miscible with methanol, ethanol and ether.

**Hazards:** Vapor irritates eyes and respiratory system; liquid irritates eyes and mucous membranes; absorption by skin contact or ingestion may cause liver and kidney damage.

**Illicit Use:** Synthesis of P2P, amphetamine, MDA and its analogues.

**Where Controlled or Regulated:** CSA

**Thresholds:** Domestic 2.5 Kg  
Import/Export 2.5 Kg

**Legitimate Uses:** Solvent in organic syntheses and experimentally as a liquid propellant.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** Nitration of ethane with nitric acid.

**Manufacturers:**

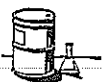
U.S.: Angus Chemical Company

WESTERN EUROPE: Unknown

ASIA: Unknown

**Remarks:** Nitroethane, in combination with benzaldehyde and butylamine, has been used to clandestinely manufacture a nitropropene intermediate which can be converted to P2P and/or amphetamine. This reaction is being encountered more frequently in clandestine P2P/amphetamine labs. Nitroethane can also be reacted with piperonal to produce MDA/MDMA or reacted with benzaldehyde derivatives to produce other amphetamine analogues.

# Norpseudoephedrine



**Other Names:** Cathine (d-norpseudoephedrine); pseudonorephedrine; threo-1-phenyl-1-hydroxy-2-aminopropane; threo-2-amino-1-hydroxy-1-phenylpropane.

**Remarks:** Norpseudoephedrine and its isomer phenylpropanolamine can be used in the synthesis of amphetamine. This synthetic route is not commonly used.

**Molecular Formula:** C<sub>9</sub>H<sub>13</sub>NO

**Molecular Weight:** 151.20

**CSA Code:** 8317

**Harmonized Code:** 2939.40.5000

**Melting Point:** 78°C (base)

**Description:** Crystalline material; base is in the form of plates; hydrochloride salt is in the form of prisms.

**Illicit Use:** Production of amphetamine and 4-methylaminorex.

**Where Controlled or Regulated:**

d-Norpseudoephedrine (cathine) is a Schedule IV controlled substance under the US CSA and the UN Convention on Psychotropic Substances; other isomers are list I chemicals under the CSA.

**Thresholds:** Domestic 2.5 Kg  
Import/Export 2.5 Kg

**Legitimate Uses:** Laboratory analytical purposes and therapeutically as an anorectic agent.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** None (1991 - 1993)

**Annual U.S. Imports:** None (1991 - 1993)

**Manufacturing Process:** The d-isomer is isolated from *Catha edulis* (Khat) leaves.

**Manufacturers:**

U.S.: Unknown

WESTERN EUROPE: Germany; Switzerland.

ASIA: Unknown

# Petroleum Ether



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**Other Names:** Petroleum benzin; naphtha; benzin; petroleum naphtha.

**Molecular Formula:** Mixture of low boiling fractions of petroleum; chiefly pentanes and hexanes.

**Harmonized Code:** 2710.00.0000

**Density:** 0.62-0.66

**Boiling Point:** 35-80°C

**Description:** Clear, colorless, nonfluorescent, highly flammable, volatile liquid.

**Hazards:** Highly flammable; toxicity similar to hexane.

**Illicit Use:** Solvent to produce hash oil from marijuana; also used in cocaine production.

**Where Controlled or Regulated:** Peru

**Legitimate Uses:** Pharmaceutical aid (solvent)

**Manufacturing Process:** Distillation of petroleum.

**Shipping and Storage:** Keep tightly closed in a cool place and away from fire.

**Manufacturers:**

U.S.: Petroleum manufacturers

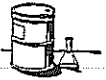
WESTERN EUROPE: Petroleum manufacturers

ASIA: Petroleum manufacturers

**Remarks:** Petroleum ether could be used to extract cocaine from coca leaves, however, the physical properties (flammability and volatility) make it less desirable than kerosene. It can also be used in the conversion process of cocaine base to cocaine hydrochloride.



# Phenylacetic Acid



**Other Names:** Benzeneacetic acid;  $\alpha$ -toluic acid.

**Molecular Formula:**  $C_8H_8O_2$

**Molecular Weight:** 136.14

**CSA Code:** 8791

**Harmonized Code:** 2916.33.1000

**Melting Point:** 76-77°C

**Description:** White powder with a very disagreeable pungent odor; salts usually sold as 50% aqueous solutions; available as sodium or potassium salts.

**Hazards:** Moderately toxic by ingestion; teratogen in experimental animals; when heated to decomposition it emits acid smoke and irritating fumes.

**Illicit Use:** Production of amphetamine, methamphetamine and P2P.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 1 Kg  
Import/Export 1 Kg

**Legitimate Uses:** Manufacture of perfumes, phenylacetic acid esters, herbicides, penicillin and other pharmaceutical products; flavoring agent for beverages and sweetened foods.

**Annual Production:**

U.S.: None

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 69 Kg (1990)  
4,033 Kg (1991)  
173 Kg (1992)  
401 Kg (1993)

**Annual U.S. Imports:** 45 MT (1990)  
56 MT (1991)  
20 MT (1992)  
23 MT (1993)

**Manufacturing Process:** Hydrolysis of benzyl cyanide using dilute sulfuric or hydrochloric acid.

**Shipping and Storage:** Solutions sold in 4,000 gallon lots, shipped by bulk tank car or truck; also sold in 55 gallon (208.2 liter) drums as the potassium or sodium salts in carbon steel tanks; sodium salt requires heating since it freezes at 10°C; non-salt form should be stored in dark bottles in a cool dry area.

**Manufacturers:**

U.S.: None

WESTERN EUROPE: Denmark; France; Germany; Spain; United Kingdom.

ASIA: Japan

**Remarks:** Phenylacetic acid is used in the two most frequently employed methods to synthesize P2P in clandestine laboratories. P2P is then used in the clandestine production of amphetamine and methamphetamine. Esters of phenylacetic acid (e.g. phenylacetic acid ethyl ester) can be easily converted to the parent compound by heating with an aqueous acid or base and are now regulated under the CSA.

# Phenylpropanolamine



**Other Names:**  $\alpha$ -(1-Aminoethyl)benzenemethanol; dl-norephedrine;  $\alpha$ -hydroxy- $\beta$ -aminopropylbenzene;  $\alpha$ -(1-aminoethyl)benzyl alcohol; PPA.

**Molecular Formula:** C<sub>9</sub>H<sub>13</sub>NO

**Molecular Weight:** 151.18

**CSA Code:** 1225

**Harmonized Code:** 2939.40.5000

**Melting Point:** 194°C (hydrochloride salt)

**Description:** Crystalline material with an odor resembling that of benzoic acid; available as the hydrochloride salt.

**Hazards:** A poison by ingestion causing sleep, increased pulse rate and pulmonary edema or congestion.

**Illicit Use:** Production of amphetamine and 4-methylaminorex.

**Where Controlled or Regulated:** CSA; OAS.

**Thresholds:** Domestic 2.5 Kg  
Import/Export 2.5 Kg

**Legitimate Uses:** Preparations containing the hydrochloride salt are used as vasoconstrictors to decongest mucous membranes; over-the-counter anorectic agent.

**Annual Production:**

U.S.: Proprietary Information  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 28 MT (1990)  
25 MT (1991)  
41 MT (1992)  
27 MT (1993)

**Annual U.S Imports:** 115 MT (1990)  
131 MT (1991)  
164 MT (1992)  
288 MT (1993)

**Manufacturing Process:** Reaction of propiophenone with an alkyl nitrite, followed by catalytic (palladium or platinum) hydrogenation.

**Manufacturers:**

U.S.: Arsynco, Inc.  
WESTERN EUROPE: Germany  
ASIA: Japan; Taiwan

**Remarks:** Phenylpropanolamine is the main precursor in an infrequently used synthesis for amphetamine; it is also the primary precursor in the synthesis of 4-methylaminorex, an amphetamine-like central nervous system stimulant.

# Phenyl-2-propanone



**Other Names:** 1-Phenyl-2-propanone; phenylacetone; P2P; benzyl methyl ketone; methyl benzyl ketone; BMK.

**Molecular Formula:** C<sub>9</sub>H<sub>10</sub>O

**Molecular Weight:** 134.18

**Harmonized Codes:** 2914.30.0000  
2914.31.0000

**Density:** 1.02

**Boiling Point:** 214°C

**Description:** Clear, moderately viscous liquid.

**Hazards:** Irritating to skin and eyes.

**Illicit Use:** Production of amphetamine and methamphetamine.

**Where Controlled or Regulated:** Controlled as an immediate precursor in Schedule II of the US CSA; UN; OAS.

**Legitimate Uses:** Production of amphetamine, methamphetamine and propylhexedrine; in organic syntheses.

**Annual Production:**

U.S.: Aggregate Production Quota is 3,352 kg (1994)

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 225 g (1993)

**Annual U.S. Imports:** 0 g (1993)

**Manufacturing Process:** From phenylacetic and acetic acids; from benzyl cyanide through  $\alpha$ -phenylacetoacetonitrile; from benzaldehyde and nitroethane through a nitropropene intermediate.

**Shipping and Storage:** Tightly closed containers in cool dry areas; 55 gallon drums (208.2 liters) containing 460 lbs (209.1 kg) net.

**Manufacturers:**

U.S.: Arenol Chemical Co.

WESTERN EUROPE: France

ASIA: Unknown

**Remarks:** P2P was the most widely used precursor in the synthesis of amphetamine/methamphetamine in the U.S. until its control in Schedule II of the CSA in 1980. It has been replaced by ephedrine as the most widely used precursor. P2P continues to be used in less than one-third of the amphetamine/ methamphetamine clandestine labs but most often it is synthesized in these laboratories.

# Piperidine



**Other Names:** Hexahydropyridine; hexazane; pentamethyleneimine.

**Molecular Formula:** C<sub>5</sub>H<sub>11</sub>N

**Molecular Weight:** 85.15

**CSA Code:** 2704

**Harmonized Codes:** 2933.39.5000  
2933.32.0000

**Density:** 0.86

**Boiling Point:** 106°C

**Description:** Colorless, combustible liquid with the odor of pepper and a soapy feel; salts (hydrochloride, nitrate, bitartrate, phosphate) are crystalline materials.

**Hazards:** Toxic by inhalation; may cause burns to skin; keep away from sources of ignition; strong irritant.

**Illicit Use:** Synthesis of PCP.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 500 g  
Import/Export 500 g

**Legitimate Uses:** Manufacture of local anesthetics, analgesics and other pharmaceutical products, wetting agents and germicides; intermediate for rubber vulcanization accelerators; hardening agent for epoxy resins; solvent; catalyst and complexing agent.

**Annual Production:**

U.S.: Unknown  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 255.7 MT (1990)  
799 MT (1991)  
1,358 MT (1992)  
243 MT (1993)

**Annual U.S. Imports:** 1,500 Kg (1990)  
205 Kg (1991)  
293 Kg (1992)  
160 Kg (1993)

**Manufacturing Process:** Electrolytic reduction of pyridine; heating piperine with alcoholic potassium hydroxide; small amounts in black pepper.

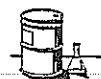
**Shipping and Storage:** Shipped in drums and stored in tightly closed containers in cool dry area.

**Manufacturers:**

U.S.: Air Products and Chemicals, Inc.; Reilly Industries, Inc..  
WESTERN EUROPE: France; Germany; United Kingdom.  
ASIA: Japan

**Remarks:** Piperidine is used along with sodium cyanide, cyclohexanone and sodium metabisulfite in the first step of the most widely used method to make PCP. It can be replaced by other chemicals (morpholine, pyrrolidine) to produce pharmacologically similar analogues such as PCMor PCPy.

# Piperonal

**Other Names:**

3,4-(Methylenedioxy)benzaldehyde; heliotropin; piperonylaldehyde

**Molecular Formula:** C<sub>8</sub>H<sub>6</sub>O<sub>3</sub>

**Molecular Weight:** 150.13

**Harmonized Codes:** 2932.90.4100  
2932.93.0000

**Melting Point:** 37°C

**Description:** Colorless, lustrous needle-shaped crystals with a characteristic fragrance.

**Hazards:** Moderately toxic by ingestion and intraperitoneal routes; irritating to skin; may cause central nervous system depression; combustible when exposed to heat or flame; can react with oxidizing materials.

**Illicit Use:** Production of MDA, MDMA, MDE or N-hydroxy-MDA.

**Where Controlled or Regulated:** CSA; UN.

**Thresholds:** Domestic 4 Kg  
Import/Export 4 Kg

**Legitimate Uses:** Fragrance in perfumes; flavoring agent in cherry and vanilla flavors; organic syntheses.

**Annual Production:**

U.S.: Proprietary Information  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 0 Kg (1991)  
6,673 Kg (1992)  
4,218 Kg (1993)

**Annual U.S. Imports:** 2 MT (1991)  
212 MT (1992)  
341 MT (1993)

**Manufacturing Process:** Reaction of isosafrole with sodium dichromate and sulfuric acid; from vanillin, aluminum chloride and methylene chloride or dibromomethane in dimethylformamide or dimethylsulfoxide.

**Shipping and Storage:** Keep in cool place protected from light.

**Manufacturers:**

U.S.: American Bio-Synthetics Corp.  
WESTERN EUROPE: Austria; France; United Kingdom.  
ASIA: Japan; Taiwan.

**Remarks:** Piperonal is used to produce MDA or its analogues, MDMA, MDE, N-hydroxy-MDA, using a method which proceeds through a nitrostyrene intermediate. This process has been used in clandestine MDA and MDMA laboratories in the U.S. and is a good alternative to the process using 3,4-methylenedioxyphenyl-2-propanone. Other chemicals used in the synthesis are nitroethane and a strong reducing agent such as lithium aluminum hydride. Piperonal is available from U.S. chemical suppliers such as Aldrich. The U.S. imports substantial quantities from China and other countries.

# Potassium Carbonate



**Other Names:** Salt of tartar; pearl ash.

**Molecular Formula:**  $K_2CO_3$

**Molecular Weight:** 138.2

**Harmonized Code:** 2836.40.0000

**Melting Point:** 891°C

**Description:** Hygroscopic, odorless granules or granular powder that is insoluble in alcohol. Its aqueous solution is strongly alkaline.

**Hazards:** Poisonous if ingested; strong caustic.

**Illicit Use:** Alkaline material that can be used in the production of coca paste, cocaine base and other clandestinely produced substances.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Manufacture of soaps, liquid shampoos, glass, pottery, and potassium salts; engraving and lithography; tanning and finishing leather; removal of water from organic liquids; alkalizer.

**Annual U.S. Exports:** 2,044 MT (1993)

**Annual U.S. Imports:** 2,319 MT (1993)

**Manufacturing Process:** Obtained by treating potassium hydroxide with carbon dioxide; heating potassium chloride under pressure with magnesium carbonate, water and carbon dioxide.

**Shipping and Storage:** Glass containers, polyethylene containers, fiber drums.

**Manufacturers:**

U.S.: Armand Products Co.; Ashta Chemicals, Inc.; Johnson Matthey, Inc.

WESTERN EUROPE: Belgium; France; Germany; Italy; Spain; United Kingdom.

ASIA: South Korea; Taiwan.

**Remarks:** An alkaline material is essential for the production of cocaine. Potassium carbonate is one of a number of alkaline substances such as sodium or calcium carbonate, sodium hydroxide or calcium oxide, which may be used in the production of cocaine and other substances.

# Potassium Cyanide



**Molecular Formula:** KCN

**Molecular Weight:** 65.11

**Harmonized Code:** 2837.19.0010

**Density:** 1.52

**Melting Point:** 634°C

**Description:** White, granular, hygroscopic powder with a slight odor of hydrogen cyanide (odor of bitter almond).

**Hazards:** Highly poisonous; poisoning may occur by ingestion, absorption through injured skin or inhalation of hydrogen cyanide gas, liberated by action of carbon dioxide or other acids; strong solutions are corrosive to skin; when mixed with acids will produce hydrogen cyanide gas which can be lethal if exposures of 300 ppm exceed a few minutes.

**Illicit Use:** Production of PCP and its analogues.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Similar to sodium cyanide; electroplating; metal surface hardening; organic and inorganic synthesis; extracting gold and silver from ores; fumigating citrus and other fruit trees.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 189 MT (1993)

**Annual U.S. Imports:** 567 MT (1993)

**Manufacturing Process:** Reaction of a solution of potassium hydroxide with liquid or gaseous hydrogen cyanide (Costner Process).

**Shipping and Storage:** Steel drum stored in a dry place and protected from corrosion; solutions must be stored in steel/stainless steel containers.

**Manufacturers:**

U.S.: Du Pont Co.; Hampshire Chemical Corp.

WESTERN EUROPE: Germany; Italy; United Kingdom.

ASIA: Japan

**Remarks:** Potassium cyanide is used along with piperidine, cyclohexanone and sodium metabisulfite to produce the PCP intermediate (PCC) which is reacted with a Grignard reagent (phenylmagnesium bromide) to synthesize PCP. Sodium cyanide is more commonly used.

# Potassium Dichromate



**Other Names:** Potassium bichromate

**Molecular Formula:**  $K_2Cr_2O_7$

**Molecular Weight:** 294.21

**Harmonized Code:** 2841.40.0000

**Density:** 2.68

**Description:** Bright orange-red crystals.

**Hazards:** Irritating to eyes, respiratory system and skin; may cause sensitization by skin contact; internally a corrosive poison; contact produces caustic effect.

**Illicit Use:** Oxidizing agent in the manufacture of methcathinone.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Oxidizer in the manufacture of organic chemicals; tanning leather, dyeing, painting, decorating porcelain, printing, photolithography, pigment-prints, staining wood, pyrotechnics, and safety matches; for bleaching palm oil, wax and sponges; waterproofing fabrics; in electric batteries as depolarizer for dry cells.

**Manufacturing Process:** Reaction of potassium chloride on sodium dichromate.

**Shipping and Storage:** Keep in tightly closed containers and away from heat.

**Manufacturers:**

U.S.: Unknown

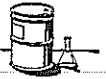
WESTERN EUROPE: Germany; United Kingdom.

ASIA: Japan; Taiwan.

**Remarks:** Potassium dichromate is used to oxidize ephedrine in the synthesis of methcathinone. Sodium dichromate is a stronger oxidizing agent and is most often used in this synthesis.



# Potassium Hydroxide



**Other Names:** Potassium hydrate; caustic potash; potassa.

**Molecular Formula:** KOH

**Molecular Weight:** 56.1

**Harmonized Code:** 2815.20.0000

**Melting Point:** 360°C; 380°C when anhydrous.

**Description:** White or slightly yellow lumps, rods or pellets which rapidly adsorb moisture and carbon dioxide when exposed to air.

**Hazards:** Extremely corrosive to the eyes, skin and mucous membranes; poisonous by ingestion; eye irritant and severe skin irritant.

**Illicit Use:** Alkaline material used in the production of coca paste, cocaine base and other controlled substances.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Manufacture of liquid soap, printing inks, paint and varnish removers; in electroplating, photo engraving; as a pharmaceutical aid (alkalizer), carbon dioxide adsorbant, mordant for wood.

**Annual U.S. Production:** 395,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 47,302 MT (1993)

**Annual U.S. Imports:** 1,957 MT (1993)

**Manufacturing Process:** Electrolysis of potassium chloride.

**Shipping and Storage:** Containers of glass, metal, plastic or fiber board, fiberboard boxes with inside paper bags not over 50 pounds, fiberboard with plastic bags, metal drums, fiber drums, plastic drums, fiberglass or rubber tanks, metal sift-proof cargo tank or tank car, or hopper type bulk vehicle.

**Manufacturers:**

U.S.: Occidental Chemical Corp.; Ashta Chemicals, Inc.; Los Angeles Chemical Co.; Vulcan Materials Co.

WESTERN EUROPE: Belgium; France; Germany; Italy; Spain; Sweden; United Kingdom.

ASIA: Japan; South Korea; Taiwan.

**Remarks:** Potassium hydroxide has been found at clandestine cocaine production sites. An alkaline material is essential for the production of cocaine. Potassium hydroxide is one of a number of alkaline substances such as sodium, calcium or potassium carbonate, sodium hydroxide or calcium oxide, which may be used in the production of cocaine and other substances.

# Potassium Permanganate



**Other Names:** Permanganic acid potassium salt; chameleon mineral.

**Molecular Formula:**  $\text{KMnO}_4$

**Molecular Weight:** 158.03

**CSA Code:** 6579

**Harmonized Codes:** 2841.60.0010  
2841.61.0000

**Melting Point:** 240°C (decomposition)

**Description:** Dark purple crystals with blue metallic sheen. Sweetish astringent taste; odorless. Soluble in water and acetone; decomposed by alcohol.

**Hazards:** Great caution must be exercised in handling, as explosions may occur if it is brought in contact with organic or other readily oxidizable substances. Harmful if swallowed; dilute solutions are mildly irritating and high concentrations are caustic; explosive if it comes in contact with acid.

**Illicit Use:** Oxidizing agent to remove impurities in coca paste.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 55 Kg  
Import/Export 500 Kg

**Legitimate Uses:** Bleaching resins, waxes, fats, oils, straw, cotton, silk and other fibers; dyeing wood brown; printing fabrics; washing carbon dioxide in manufacturing mineral waters; photography; insecticide; tanning leathers; purifying water; disinfectant; as an important reagent in analytical and synthetic organic chemistry. Medicinal applications include use as an antibacterial and antifungal agent in treating eczema and poison ivy and in treatment of poisoning after oral ingestion of barbiturates, chloral hydrate and many alkaloids.

**Annual U.S. Production:** Proprietary Information

**Annual U.S. Exports:** 957 MT (1991)  
814 MT (1992)  
698 MT (1993)

**Annual U.S. Imports:** 847 MT (1991)  
1,323 MT (1992)  
2,245 MT (1993)

**Manufacturing Process:** Electrolytic oxidation of manganese ore.

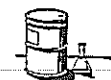
**Shipping and Storage:** Bottles and drums; preserved in well closed containers at ambient temperature with open vents.

**Manufacturers:**

U.S.: Carus Chemical Company  
WESTERN EUROPE: Germany; Spain.  
ASIA: Japan; Taiwan; China.  
EASTERN EUROPE: Czech Republic

**Remarks:** It is used to remove cinnamoylcocaine and other oxidizable alkaloids from cocaine. Potassium permanganate is still the most commonly used oxidizing agent due to its violet pink color in solution which is used as an indicator. It can be used to oxidize ephedrine to ephedrone (N-methylcathinone), a central nervous system stimulant. Other permanganate salts such as calcium and sodium, are strong oxidizing agents which can be substituted for potassium permanganate.

# Propionic Anhydride



**Other Names:** Propionic acid anhydride; propanoic anhydride; methylacetic anhydride.

**Molecular Formula:** C<sub>6</sub>H<sub>10</sub>O<sub>3</sub>

**Molecular Weight:** 130.14

**CSA Code:** 8320

**Harmonized Code:** 2915.90.5000

**Density:** 1.01

**Boiling Point:** 167°C

**Description:** Colorless liquid with a pungent odor.

**Hazards:** Moderately toxic if ingested; mildly toxic through skin contact; corrosive irritant to skin, eyes and mucous membranes.

**Illicit Use:** Production of fentanyl and its analogues.

**Where Controlled or Regulated:** CSA

**Thresholds:** Domestic 1 g  
Import/Export 1 g

**Legitimate Uses:** Esterifying agent for certain perfume oils, fats, oils and especially cellulose; production of alkyd resins, dyes and drugs; dehydrating agent in sulfonation and nitration processes.

**Annual Production:**

U.S.: 890 MT (1993 est. cap.)  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 227 MT (1992)  
584 MT (1993)

**Annual U.S. Imports:** 0 Kg (10/91 - 12/91)  
0 Kg (1992)  
2 Kg (1993)

**Manufacturing Process:** Dehydration of propionic acid; carbonylation of esters of propionic acid; catalyzed oxidation of propionaldehyde; from carbon monoxide and ethanol.

**Shipping and Storage:** Dark, dry and tightly closed containers to prevent decomposition due to moisture; Tank cars.

**Manufacturers:**

U.S.: Eastman Chemical Company  
WESTERN EUROPE: Germany  
ASIA: Japan

**Remarks:** Propionic anhydride is a precursor used in one of the syntheses of fentanyl, meperidine and their analogues.

# Pseudoephedrine



**Other Names:**  $\alpha$ -[1-(Methylamino)ethyl]-benzenemethanol; 2-methylamino-1-phenyl-1-propanol; 1-phenyl-1-hydroxy-2-methylamino-propane;  $\alpha$ -hydroxy- $\beta$ -methylaminopropylbenzene;  $\alpha$ -[1-(methylamino)ethyl]benzyl alcohol.

**Molecular Formula:** C<sub>10</sub>H<sub>15</sub>NO

**Molecular Weight:** 165.23

**CSA Code:** 8112

**Harmonized Codes:** 2939.40.1000  
2939.42.0000

**Melting Point:** 117-119° C

**Description:** Base and salts (hydrochloride and sulfate) are crystalline materials.

**Hazards:** Harmful if swallowed in large quantities; do not breathe dust; avoid contact with skin and eyes.

**Illicit Use:** Production of methamphetamine and methcathinone.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 1 Kg  
Import/Export 1 Kg

**Legitimate Uses:** Pharmaceutical preparations as nasal decongestants (*d*-form) and bronchodilators (*l*-form).

**Annual Production:**

U.S.: 150 MT (1993 est. cap.)  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 10.8 MT (1990)  
8.5 MT (1991)  
22 MT (1992)  
20 MT (1993)

**Annual U.S. Imports:** 239 MT (1990)  
402 MT (1991)  
420 MT (1992)  
411 MT (1993)

**Manufacturing Process:** Extracted from several species of the plant genus Ephedra; produced from ephedrine.

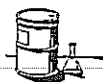
**Shipping and Storage:** Keep in well-closed container and protected from light.

**Manufacturers:**

U.S.: Ganes Chemicals, Inc.  
WESTERN EUROPE: Germany  
ASIA: None

**Remarks:** Pseudoephedrine is used in the same way as ephedrine in the clandestine synthesis of methamphetamine. It is produced in the U.S. from ephedrine which is imported into the U.S. Pseudoephedrine is an ingredient in over-the-counter preparations such as Sudafed and is sold by generic firms. D-Pseudoephedrine is the preferred form since this is converted to d-methamphetamine.

# Red Phosphorus



**Atomic Symbol:** P

**Atomic Weight:** 30.97

**Harmonized Code:** 2804.70.0000

**Description:** Red to violet powder. Insoluble in organic solvents.

**Hazards:** Vapor from ignited phosphorous irritates the nose, throat, lungs and eyes.

**Illicit Use:** Manufacture of methamphetamine.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Pyrotechnics; manufacture of safety matches; organic synthesis; manufacture of phosphoric acid, phosphine, phosphoric anhydride and phosphorous hydrochloride; manufacture of fertilizers, pesticides, incendiary shells, smoke bombs and tracer bullets.

**Annual Production:**

U.S.: 257,684 MT (1993); includes all elemental forms)

WESTERN EUROPE: 150,000 MT (1993 est.cap.; includes all elemental forms)

ASIA: Unknown

**Annual U.S. Exports:** 3.6 MT (1993)

**Annual U.S. Imports:** 415 MT (1993)

**Manufacturing Process:** Purified from mineral phosphates: chlorapatite, fluorapatite, vivianite and phosphorite.

**Manufacturer(s):**

U.S.: FMC Corp.; Monsanto Co.; Rhone-Poulenc Inc.

WESTERN EUROPE: France; Germany; Italy; The Netherlands.

ASIA: Japan

**Remarks:** Phosphorus exists in three allotropic forms: white, black and red. Only the red form is used. It is a catalyst in the HI reduction of ephedrine to methamphetamine. It also catalyzes the formation of HI from iodine and water.

# Safrole



**Other Names:** 5-(2-Propenyl)-1,3-benzodioxole; 4-allyl-1,2-methylenedioxybenzene; allylcatechol methylene ether.

**Molecular Formula:** C<sub>10</sub>H<sub>10</sub>O<sub>2</sub>

**Molecular Weight:** 162.18

**CSA Code:** 8323

**Harmonized Codes:** 2932.90.3700  
2932.94.0000

**Density:** 1.10

**Boiling Point:** 232-234°C

**Description:** Colorless or slightly yellow liquid with sassafras odor.

**Hazards:** Poisonous by intraperitoneal and intravenous routes; moderately toxic by oral ingestion and subcutaneous routes; produces carcinogenic and adverse effects on the reproductive system in experimental animals; a skin irritant; combustible when exposed to heat or flame; when heated to decomposition it emits acrid smoke and irritating fumes.

**Illicit Use:** Production of MDA, MDMA, MDE or N-hydroxy-MDA.

**Where Controlled or Regulated:** CSA; UN.

**Thresholds:** Domestic 4 Kg  
Import/Export 4 Kg

**Legitimate Uses:** Flavoring and fragrance industry; soap manufacturing; production of piperonal.

**Annual Production:**  
U.S.: 455 kg (1993)  
WESTERN EUROPE: Unknown  
ASIA: Unknown

**Annual U.S. Exports:** 7,228 Kg (10/91 - 12/91)  
1,916 Kg (1992)  
865 Kg (1993)

**Annual U.S. Imports:** 85,281 Kg (1992)  
49,626 Kg (1993)

**Manufacturing Process:** Extraction of several essential oils, notably sassafras (75%); from 3,4-methylenedioxybenzene through a 1-bromo-intermediate.

**Shipping and Storage:** Keep in cool place and protected from light.

**Manufacturers:**  
U.S.: Polarome Manufacturing Company, Inc.  
WESTERN EUROPE: None  
ASIA: Taiwan

**Remarks:** Safrole can be used to synthesize isosafrole, piperonal or 3,4-methylenedioxyphenyl-2-propanone, each of which can be converted to MDA, MDMA, MDE or N-hydroxy-MDA. Safrole has been identified in clandestine laboratories producing MDA or its analogues in the U.S. It is available from U.S. chemical suppliers such as Aldrich. It is also obtained from sassafras oil which contains greater than seventy percent safrole and is considered regulated.

# Sodium Bicarbonate



**Other Names:** Baking soda; sodium hydrogen carbonate; sodium acid carbonate.

**Molecular Formula:** NaHCO<sub>3</sub>

**Molecular Weight:** 84.00

**Harmonized Code:** 2836.30.0000

**Melting Point:** Begins to lose carbon dioxide at 50°C and is converted to sodium carbonate at 100°C.

**Description:** White crystalline powder or granules; commercial U.S.P. product is 99.9% pure.

**Illicit Use:** Alkaline material used in the production of coca paste, cocaine base and other substances.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Manufacture of sodium salts; source of carbon dioxide; ingredient in baking powder, effervescent salts and beverages; in fire extinguishers and cleaning materials; antacid, urinary and systematic alkalizer in humans and animals; used locally on burns and to dissolve mucus, exudates and scabs in animals.

## **Annual Production:**

U.S.: 495,000 MT (1993 est. cap.)  
WESTERN EUROPE: Unknown  
ASIA: 129,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 11,821 MT (1993)

**Annual U.S. Imports:** 3,612 MT (1993)

**Manufacturing Process:** Prepared from sodium carbonate, water and carbon dioxide.

**Shipping and Storage:** Non-hazardous material available in 50 and 100 pound bags; 25 and 50 kilogram drums; bulk sold in hopper cars.

## **Manufacturers:**

U.S.: Church & Dwight Co., Inc.; FMC Corp; Natrium Products; Rhone-Poulenc Inc.  
WESTERN EUROPE: Austria; France; Germany; Italy; Portugal; Spain; United Kingdom.  
ASIA: Japan; Korea; Taiwan.

**Remarks:** Sodium bicarbonate has been identified at some cocaine processing laboratories. An alkaline material is essential for the production of cocaine. Sodium bicarbonate is one of a number of alkaline substances such as sodium, calcium or potassium carbonate, sodium hydroxide or calcium oxide, which may be used in the illicit production of cocaine and other substances.

# Sodium Carbonate



**Other Names:** Solvay soda; soda ash; washing soda.

**Molecular Formula:**  $\text{Na}_2\text{CO}_3$

**Molecular Weight:** 106.00

**Harmonized Code:** 2836.20.0000

**Melting Point:** 851°C; begins to lose carbon dioxide at 400°C.

**Description:** Odorless, transparent crystals or white crystalline powder.

**Hazards:** Moderately toxic by inhalation and subcutaneous routes; mildly toxic by oral ingestion; irritating to skin and eyes.

**Illicit Use:** Alkaline material used in the production of coca paste, cocaine base and other substances.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Manufacture sodium salts, glass and soap; bleaching linen and cotton; washing fabric and textiles; general cleanser; photographic industry; reagent in analytical chemistry.

**Annual Production:**

U.S.: 9,899,390 MT (1993)

WESTERNEUROPE: 7,085,000 MT (1993 est. cap.)

ASIA: 1,604,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 2,498,586 MT (1993)

**Annual U.S. Imports:** 3,774 MT (1993)

**Manufacturing Process:** Naturally occurring as the hydrate (thermonatrite) and decahydrate (natron or natrite); Solvay Process (ammonia-soda process); electrolysis of salt water.

**Shipping and Storage:** Sold in 25, 50 and 100 pound bags, 275 and 400 pound drums and bulk in hopper cars and trucks; 58% solutions are sold in 4 pound pails or 25 pound containers; no special handling requirements.

**Manufacturers:**

U.S.: FMC Corp.; General Chemical Corp.; North American Chemical Co.; Rhone-Poulenc Co.; Solvay Minerals, Inc.; Tg Soda Ash, Inc.

WESTERN EUROPE: Austria; Belgium; France; Germany; Italy; The Netherlands; Portugal; Spain; United Kingdom.

ASIA: Japan; South Korea.

**Remarks:** Sodium carbonate has been identified at cocaine processing laboratories. An alkaline material is essential for the production of cocaine. Sodium carbonate is one of a number of alkaline substances such as calcium or potassium carbonate, sodium hydroxide or calcium oxide, which may be used in the production of cocaine and other substances.



# Sodium Cyanide



**Other Names:** Cyanogran

**Molecular Formula:** NaCN

**Molecular Weight:** 49.02

**Harmonized Code:** 2837.11.0000

**Melting Point:** 634°C

**Description:** Colorless, hygroscopic granules with a slight odor of bitter almond from hydrogen cyanide gas.

**Hazards:** Serious risk of poisoning by ingestion, absorption through skin or inhalation of hydrogen cyanide gas liberated on contact with acids; may cause weakness and heaviness of the arms and legs, increased difficulty in breathing, headache, dizziness, nausea and vomiting, possibly followed by pallor, unconsciousness, cessation of breathing and death; when mixed with acids will produce hydrogen cyanide gas which can be lethal if exposure to 300 ppm exceeds a few minutes.

**Illicit Use:** Production of PCP and its analogues.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Extracting gold or silver from ores; electroplating; fumigating citrus and other fruit trees; manufacturing hydrocyanic acids and many other cyanides; inorganic synthesis.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: 132,000 MT (1993 est. cap.)

ASIA: Unknown

**Annual U.S. Exports:** 45,889 MT (1993)

**Annual U.S. Imports:** 2,787 MT (1993)

**Manufacturing Process:** Reaction of a solution of sodium hydroxide with liquid or gaseous hydrogen cyanide (Costner Process); heating sodium carbonate, powdered coal and nitrogen in the presence of an iron catalyst; fusion of calcium cyanide with sodium carbonate and carbon.

**Shipping and Storage:** Steel drums stored in a dry place and protected from corrosion; solutions must be stored in steel/stainless steel containers.

**Manufacturers:**

U.S.: Cyano Co.; Degussa Corp.; DuPont Co.; FMC Corp.; Sterling chemicals, Inc.

WESTERN EUROPE: Belgium; France; Germany; Italy; The Netherlands; Spain; United Kingdom.

ASIA: Japan; South Korea; Taiwan.

**Remarks:** Sodium cyanide is used along with piperidine, cyclohexanone and sodium metabisulfate to produce the PCP intermediate (PCC) which is then reacted with a Grignard reagent (phenylmagnesium bromide) to synthesize PCP.

# Sodium Dichromate



**Other Names:** Sodium bichromate; bichromate of soda.

**Molecular Formula:**  $\text{Na}_2\text{Cr}_2\text{O}_7$

**Molecular Weight:** 261.96

**Harmonized Code:** 2841.30.0000

**Density:** 2.35

**Description:** Reddish to bright orange, somewhat deliquescent crystals; becomes anhydrous with prolonged exposure to heat.

**Hazards:** Irritating to eyes, respiratory system and skin.

**Illicit Use:** Oxidizing agent in the manufacture of methcathinone.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Oxidizing agent in the manufacture of dyes, synthetic organic chemicals and inks; in chrome-tanning of hides; electric batteries; bleaching fats, oils, sponges and resins; refining petroleum; manufacture of chromic acid, other chromates and chrome pigments; corrosion inhibitors and corrosive inhibiting paints; metal treatments; electroengraving of copper; mordant in dyeing; for hardening gelatin; for defoliation of cotton plants and other plants and shrubs.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** From sodium chromate and sulfuric acid.

**Shipping and Storage:** Keep in tightly closed containers and away from heat.

**Manufacturers:**

U.S.: American Chrome & Chemicals, Inc.;  
Occidental Chemical Corp.

WESTERN EUROPE: Germany; Italy; United Kingdom.

ASIA: Japan

**Remarks:** Sodium dichromate is a strong oxidizing agent in acid and is stronger than potassium dichromate. It is used to oxidize ephedrine to methcathinone.

# Sodium Hydroxide



**Other Names:** Caustic soda; soda lye; sodium hydrate.

**Molecular Formula:** NaOH

**Molecular Weight:** 40.01

**Harmonized Codes:** 2815.11.0000  
2815.12.0000

**Melting Point:** 318°C

**Description:** White hygroscopic powder or white flakes, plates, pellets or sticks; rapidly absorbs water from the air; available as commercial solutions of 15%, 27%, 31%, and 50% or 97-98% solid.

**Hazards:** Concentrated material is very corrosive to human tissue; generates considerable heat when dissolved in water or when mixed with acid; solids and strong solutions cause severe burns of the eyes and skin; ingestion may cause severe internal irritation and damage.

**Illicit Use:** Alkaline material used in the production of coca paste, cocaine base and other substances.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Solutions are used to neutralize acids and make sodium salts, e.g., in petroleum refining to remove sulfuric and organic acids; to treat cellulose in making viscose rayon and cellophane; in reclaiming rubber to dissolve out the fabric; in making plastics; to hydrolyze fats and form soaps; to precipitate alkaloids (bases such as cocaine) and most metals (as hydroxides) from water solutions of their salts; in the preparation of glycerin suppositories.

**Annual Production:**

U.S.: 12,466,454 MT (1993)  
WESTERN EUROPE: 11,511,000 MT (1993 est. cap.)  
ASIA: 6,214,000 MT (1993 est. cap.)  
MEXICO: 429 MT (1990 actual)

**Annual U.S. Exports:** 2,471,773 MT (1993)

**Annual U.S. Imports:** 562,812 MT (1993)

**Manufacturing Process:** Electrolysis of sodium chloride; reaction of calcium hydroxide with sodium carbonate; from sodium metal and water vapor at low temperature.

**Shipping and Storage:** Solid is hygroscopic and must be kept in tightly sealed containers made of glass, metal, plastic or fiber board; sold in 50 pound bags, 100, 450, 500, and 750 pound drums; bulk sold in tank cars, tank trucks and barges; liquid sold as 50% solutions in 15 and 55 gallon drums, tank cars and tank trucks.

**Manufacturers:**

U.S.: Approx. 20 companies including Elf Atochem North America; Dow Chemical USA; Occidental Chemical Corp.; Olin Corp.; PPG Industries, Inc.

WESTERN EUROPE: Austria; Belgium; Finland; France; Germany; Greece; Ireland; Italy; The Netherlands; Norway; Portugal; Spain; Sweden; Switzerland; United Kingdom.

ASIA: Indonesia; Japan; Taiwan; Singapore; Malaysia; Philippines.

**Remarks:** An alkaline material is essential for the production of cocaine. Sodium hydroxide has been found in clandestine cocaine laboratories. Sodium hydroxide is one of a number of alkaline substances such as sodium, calcium or potassium carbonate or calcium oxide, which may be used in the production of cocaine and other substances.

# Sodium Hypochlorite



**Other Names:** Antifomin

**Molecular Formula:** NaClO

**Molecular Weight:** 74.44

**Harmonized Code:**

**Melting Point:** 18 C° Pentahydrate crystals

**Description:** Pentahydrate crystals are highly unstable alone, but stable in solution; alkaline solution is yellow, clear with an odor of hypochlorites.

**Hazards:** Bleaches and may burn skin; will cause internal irritation and damage if ingested; contact with acids liberates toxic gas; irritating to eyes and skin.

**Illicit Use:** Potential oxidizing agent for cocaine.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Bleach; germicide; disinfectant; deodorizer.

**Annual Production:**

U.S.: 309,325 MT (1993)

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 314 MT (1993)

**Annual U.S. Imports:** 20 MT (1993)

**Manufacturing Process:** Prepared from sodium hydroxide and chlorine gas in the presence of water.

**Manufacturers:**

U.S.: About 20 companies including The Clorox Company; Jones Chemicals, Inc.; All Pure Chemical Co.; Olin Corp.; Vertex Chemical Corp.

WESTERN EUROPE: Austria; Belgium; Finland; France; Germany; Greece; Italy; The Netherlands; Norway; Portugal; Spain; Sweden; Switzerland; United Kingdom.

ASIA: Indonesia; Japan; Korea; Malaysia; Philipines; Singapore; Taiwan; Thailand.

**Remarks:** Exclusively marketed as a 5-16 % solution as a laundry bleach under such names as Clorox, Purex, and Dazzle. Sodium hypochlorite may be used as an oxidizing agent in the purification of cocaine, but current intelligence indicates that it is not being utilized at this time.

# Sodium Sulfate



**Other Names:** Occurs in nature as the minerals mirabilite, thenardite. salt cake (anhydrous); Glauber's salt (decahydrate).

**Molecular Formula:** Na<sub>2</sub>SO<sub>4</sub>

**Molecular Weight:** 142.06

**Harmonized Code:** 2883.19.0000

**Melting Point:** 800°C

**Description:** The anhydrous form is a white powder or orthorhombic bipyramidal crystals; the decahydrate is odorless, efflorescent crystals or granules.

**Hazards:** Moderately toxic by intravenous routes; mildly toxic by ingestion.

**Illicit Use:** Used in clandestine operations to remove water during recycling of organic solvents.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Drying and printing textiles; standardizing dyes; freezing mixtures; laboratory use; manufacture of glass and paper pulp; anhydrous form used to dry organic liquids.

**Annual Production:**

U.S.: 718,000 MT (1993)

WESTERN EUROPE: 1,979,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 161,043 MT (4/92 - 3/93)

**Annual U.S. Imports:** 132 MT (4/92 - 3/93)

**Manufacturing Process:** Naturally occurring; by-product of hydrochloric acid production; sodium dichromate by-product; rayon by-product.

**Shipping and Storage:** Glass containers, polyethylene containers, fiber drums.

**Manufacturers:**

U.S.: Approx. 18 companies including: Elf Atochem North America; Occidental Chemical Corp; North American Chemical Company.

WESTERN EUROPE: Austria; Belgium; Finland; France; Germany; Greece; Italy; The Netherlands; Norway; Portugal; Spain; Sweden; United Kingdom.

ASIA: Indonesia; Japan; South Korea; Taiwan; Thailand.

**Remarks:** Sodium sulfate is occasionally found in clandestine cocaine laboratories in South America. It is not a critical chemical in the cocaine manufacturing process. It could be used to remove water from solvents (ether, acetone etc.) in one form of recycling.

# Sodium Thiosulfate



**Other Names:** Sodium hyposulfite; "hypo"; antichlor; sodothiol; sulfothiorine; ametox.

**Molecular Formula:**  $\text{Na}_2\text{O}_3\text{S}_2$

**Molecular Weight:** 158.13

**Harmonized Code:** 2832.30.0000

**Density:** 1.69

**Description:** Powder; odorless crystals or granules which melt at 48 degrees when rapidly heated.

**Hazards:** Moderately toxic by subcutaneous routes.

**Illicit Use:** Clandestine manufacture of methamphetamine.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Removes chlorine from solutions; antichlor in bleaching of paper pulp; fixer in photography; extraction of silver from ores; mordant in dyeing and printing textiles; reducer in chrome dyeing; manufacturing leather; bleaching bone, straw and ivory.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

**Shipping and Storage:** Keep in cool, dry place.

**Manufacturers:**

U.S.: Calabrian Corp.; Ferro Corp.; General Chemical Corp.; PVS Chemicals, Inc.

WESTERN EUROPE: Germany; Spain; United Kingdom.

ASIA: Japan; Taiwan.

**Remarks:** Sodium thiosulfate is used in some clandestine methamphetamine laboratories which use the ephedrine-HI reduction method. It removes the remaining iodine from solution which makes the product less colored.

# Sulfuric Acid



**Other Names:** Oil of vitriol; hydrogen sulfate.

**Molecular Formula:** H<sub>2</sub>SO<sub>4</sub>

**Molecular Weight:** 98.08

**CSA Code:** 6552

**Harmonized Code:** 2807.00.0000

**Density:** 1.84 (concentrated solution)

**Boiling Point:** 290 C°

**Description:** Clear, colorless, odorless, oily liquid; considerably more viscous than water; concentrated sulfuric acid is 93-98% hydrogen sulfate in water.

**Hazards:** Concentrated acid is extremely corrosive to skin; causes severe burns; when mixed with other liquids it should be added slowly, stirring constantly; when diluting always add acid to water, never add water to acid; reacts with water or steam to produce heat.

**Illicit Use:** Dilute solutions (5-10%) are used in the extraction of cocaine from coca leaves and in the conversion of the paste to the base; production of sulfate salts of controlled substances.

**Where Controlled or Regulated:** OAS; CSA; UN.

**Thresholds:** Export 50 Gal (exports to selected South American countries)

**Legitimate Uses:** Manufacture of fertilizers, explosives, dyestuffs, other acids, paper and glue; purification of petroleum; oxidation of metals and other materials; drying agent; component of toilet bowl cleaners, drain cleaners, metal cleaners and antirust compounds and automobile battery fluids.

**Annual Production:**

U.S.: 39,347,599 MT (1993)

WESTERN EUROPE: 26,192,000 (1993 est. cap.)

ASIA: 13,347,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 251 MT (10/92 - 12/92)  
7,433 MT (1993)

**Annual U.S. Imports:** 0 Kg (1993)

**Manufacturing Process:** Catalytic oxidation of sulfur dioxide to sulfur trioxide which is converted to sulfuric acid by the "Contact Process"; reaction of sulfur dioxide, oxygen, water vapor and nitrogen oxides in a lead-lined chamber (lead-chamber process).

**Shipping and Storage:** Corrosive substance; shipped in glass carboys in boxed, steel portable tanks, lined tank cars and trucks and metal barrels and drums, depending on the concentration of the sulfuric acid; stored in airtight containers of glass or other inert material.

**Manufacturers:**

U.S.: Approximately 64 companies including Cargill Inc.; CF Industries, Inc.; DuPont; Freeport-McMoran Resource Partners; IMC Fertilizer Group; Occidental Chemical Corp.; Rhone-Poulenc Inc.; Texasgulf, Inc.

WESTERN EUROPE: Austria; Belgium; Denmark; Finland; France; Germany; Greece; Italy; The Netherlands; Norway; Portugal; Spain; Sweden; Switzerland; United Kingdom.

ASIA: India; Indonesia; Japan; Korea; Taiwan; Thailand; Malaysia; Philippines; Singapore.

SOUTH AMERICA: Colombia; Bolivia; Peru.

MIDDLE EAST: Syria

**Remarks:** More sulfuric acid is produced in the U.S. and the world than any other chemical. U.S. exports are relatively low compared to production; sulfuric acid is produced and available throughout the world. An acid such as sulfuric acid is essential to the production of coca paste and cocaine base. Although other acids such as nitric, hydrochloric or phosphoric may be used, sulfuric acid is most commonly used when available. A procedure for the extraction of cocaine alkaloids from coca leaves using less organic solvent (kerosene) is being seen in South America. Dilute sulfuric acid is added to the leaves to convert the cocaine alkaloids into water soluble sulfate salts which are dissolved in the acid solution, made alkaline and extracted with kerosene.

# Tartaric Acid



**Other Names:** Dihydroxysuccinic acid; 2,3-dihydroxybutanedioic acid; occurs as d-tartaric acid, l-tartaric acid, meso-tartaric acid and racemic tartaric acid.

**Molecular Formula:** C<sub>4</sub>H<sub>6</sub>O<sub>6</sub>

**Molecular Weight:** 150.09

**Harmonized Code:** 2918.12.0000

**Melting Point:** 167-169°C

**Description:** Colorless crystals or white granular to fine crystalline powder with strong acidic taste.

**Hazards:** Moderately toxic by intravenous routes; mildly toxic by oral ingestion.

**Illicit Use:** Purification of morphine base prior to its conversion to heroin; preparation of tartrate salts of heroin and other substances.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Soft drink industry, confectionary products, bakery products, gelatin desserts; photographic, tanning and ceramics industries; manufacture of tartrate salts and in pharmaceutical products as a buffering agent.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Annual U.S. Exports:** 14 MT (1993)

**Annual U.S. Imports:** 2,459 MT (1993)

**Manufacturing Process:** Levo-tartaric acid occurs naturally in many fruits; it is found as the potassium salt deposited as a fine crystalline crust during fermentation of grape juice; prepared from this material by neutralization with calcium carbonate followed by addition of sulfuric acid.

**Shipping and Storage:** Non-hazardous substance sold in 50 or 100 pound bags and drums.

**Manufacturers:**

U.S.: None

WESTERN EUROPE: France; Germany; Italy; Spain; Switzerland.

ASIA: Japan

**Remarks:** Tartaric acid is found in some heroin laboratories. The use of tartaric acid is not critical to the production of heroin but its use increases the purity of heroin obtained.



# Thionyl Chloride



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**Other Names:** Sulfurous oxychloride

**Molecular Formula:**  $\text{SOCl}_2$

**Molecular Weight:** 118.98

**Harmonized Code:** 2827.39.0000

**Boiling Point:** 76° C

**Description:** Colorless to pale yellow or reddish, fuming, refractive liquid.

**Hazards:** Reacts violently with water; contact causes burns; irritating to respiratory system if inhaled; may ignite other combustible material.

**Illicit Use:** Manufacture of methamphetamine.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Making acyl chlorides, to replace OH or SH groups with chlorine atoms; reacts with grignard reagents to form sulfoxides.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** Oxidation of sulfur dichloride with sulfur trioxide.

**Shipping and Storage:** Keep away from temperatures greater than 140°; hydrolyzed by water.

**Manufacturers:**

U.S.: Miles Inc.; Occidental Chemical Corp.

WESTERN EUROPE: Germany; Switzerland.

ASIA: Japan

**Remarks:** Thionyl chloride is used in a two step synthesis of methamphetamine occasionally seen at clandestine laboratories. Ephedrine or pseudoephedrine is reacted with thionyl chloride to form an intermediate which is reduced with hydrogen gas in the presence of a catalyst (palladium or platinum) to yield methamphetamine. Phosphorus pentachloride can be substituted for thionyl chloride in this synthesis.

# Toluene



**Other Names:** Methylbenzene; toluol; phenylmethane; Methacide.

**Molecular Formula:** C<sub>7</sub>H<sub>8</sub>

**Molecular Weight:** 92.13

**CSA Code:** 6594

**Harmonized Codes:** 2902.30.0000  
2707.20.0000

**Density:** 0.87

**Boiling Point:** 110.6°C

**Description:** Refractive liquid with a benzene-like odor.

**Hazards:** Flammable; avoid inhalation; may burn or irritate mucous membranes, eyes and respiratory tract; severe exposure may result in pulmonary edema; incompatible with strong oxidants; vapors may cause dizziness.

**Illicit Use:** Solvent used in the production of cocaine hydrochloride and other controlled substances.

**Where Controlled or Regulated:** CSA; OAS; UN.

**Thresholds:** Domestic 159 Kg 50 Gal  
Import/Export 1591 Kg 500 Gal

**Legitimate Uses:** Manufacture of benzoic acid, benzaldehyde, explosives, dyes, and many other organic substances; solvent for paints, lacquers, gums, resins; extraction of various plant principals; gasoline additive; substitute for benzene in chemical laboratories; production of toluene diisocyanate which is used to make polyurethane foams and other elastomers; about 45% of the toluene in the U.S. is converted to benzene.

**Annual Production:**

U.S.: 2,743,036 MT (1993)  
WESTERN EUROPE: 2,635,000 MT (1993 est. cap.)  
ASIA: 2,847,000 MT (1993 est. cap.)  
MEXICO: 368,000 MT (1990 actual);  
465,000 MT (1991 est. cap.)  
SOUTH AMERICA: 534,000 MT (1991 est. cap.)

**Annual U.S. Exports:** 417,022 MT (1990)  
252,626 MT (1991)  
319,268 MT (1992)  
238,254 MT (1993)

**Annual U.S. Imports:** 336,221 MT (1990)  
254,974 MT (1991)  
257,689 MT (1992)  
297,797 MT (1993)

**Manufacturing Process:** Obtained from tar oil and petroleum.

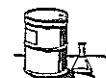
**Shipping and Storage:** Shipped in glass carboys, metal barrels and drums, fiberboard boxes lined with glass or earthenware; tank cars, tank trucks, barges, tankers and ocean vessels; store in airtight containers.

**Manufacturers:**

U.S.: Approx. 23 companies including: BP Oil Co.; Exxon Chemical Co.; Mobil Oil Corp.; Shell Chemical Co.  
WESTERN EUROPE: Austria; Belgium; France; Germany; Italy; The Netherlands; Portugal; Spain; United Kingdom.  
ASIA: Japan; South Korea; Taiwan; Singapore.  
SOUTH AMERICA: Argentina; Brazil; Chile; Colombia.

**Remarks:** Toluene is a solvent used in the conversion of cocaine base to cocaine hydrochloride. It is identified in cocaine hydrochloride samples seized in the U.S. It is also found in fuels.

# ortho-Toluidine



**Other Names:** 2-Aminotoluene; ortho-methylaniline; o-toluidine.

**Molecular Formula:** C<sub>7</sub>H<sub>9</sub>N

**Molecular Weight:** 107.15

**Harmonized Code:** 2921.43.0000

**Density:** 1.01

**Boiling Point:** 200 - 202°C

**Description:** Light yellow liquid becoming reddish-brown when exposed to air and light.

**Hazards:** Excessive breathing of vapor, ingestion or absorption through the skin may cause headaches, drowsiness, cyanosis, mental confusion and in severe cases, convulsions; vapor is dangerous to the eyes; it is a suspected carcinogen.

**Illicit Use:** Clandestine manufacture of methaqualone.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Manufacture of various dyes; printing textiles blue-black; making colors fast to acids.

**Annual Production:**

U.S.: Unknown

WESTERN EUROPE: Unknown

ASIA: Unknown

**Manufacturing Process:** Amination of toluene with methylhydroxylamine or hydroxylammonium salts in the presence of aluminum trichloride.

**Shipping and Storage:** Keep well closed and protected from light or air.

**Manufacturers:**

U.S.: DuPont; Eastman Kodak Company; First Chemical Corp.; GFS Chemicals Inc.; Olin Corp.

WESTERN EUROPE: France; Germany; Italy; United Kingdom.

ASIA: Japan

**Remarks:** Ortho-toluidine is reacted with N-acetylanthranilic acid in the presence of a catalyst to produce methaqualone.

# Trichloroethylene



**Other Names:** Trichloroethene; ethinyl trichloride, Trilene; Triclene; Trichloran; Trichloren.

**Molecular Formula:**  $C_2HCl_3$

**Molecular Weight:** 131.40

**Harmonized Code:** 2903.22.0000

**Density:** 1.47

**Boiling Point:** 86.7°C

**Description:** Colorless, nonflammable liquid with a chloroform-like odor; industrial grades contain stabilizers (triethanolamine stearate and cresol).

**Hazards:** Inhalation of vapor may cause headache, dizziness and nausea; high concentrations may cause unconsciousness; ingestion produces similar effects; vapor and liquid irritate the eyes; moderate exposure can cause intoxication; high concentrations produce central nervous system depressant effects. High acute doses may cause hepatic and renal failure, coma and death. Sudden death may occur possibly due to the induction of ventricular fibrillation. Possible human carcinogen; must be used with adequate ventilation. Avoid prolonged exposure to light or heat to prevent decomposition.

**Illicit Use:** Solvent used alone or with other solvents in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** OAS

**Legitimate Uses:** Solvent for fats, waxes, resins, oils, rubber, paints, varnishes, cellulose esters and ethers; solvent extraction in many industries (coffee, spices); degreasing and dry cleaning; manufacture of organic chemicals and pharmaceutical products.

**Annual Production:**

U.S.: 320,000 MT (1993 est. cap.)

WESTERN EUROPE: 265,000 MT (1993 est. cap.)

ASIA: 85,000 MT (1993 est. cap.)

**Annual U.S. Exports:** 23,399 MT (1993)

**Annual U.S. Imports:** 6,768 MT (1993)

**Manufacturing Process:** Prepared from tetrachloroethane by boiling with lime; passing tetrachloroethane vapor over heated calcium chloride catalyst.

**Shipping and Storage:** Stored in sealed, light-resistant ampuls or glass tubes; avoid prolonged exposure to excessive heat; shipped in 55 gallon drums, tank cars, trucks, barges and ships.

**Manufacturers:**

U.S.: Dow Chemical USA; PPG Industries, Inc.

WESTERN EUROPE: France; Germany.

ASIA: Japan

**Remarks:** There have been no documented reports of the use of trichloroethylene in cocaine hydrochloride laboratories. Its general solvent characteristics indicate that it could be used, either alone or in combination with other solvents, in cocaine hydrochloride laboratories. It is being replaced by less toxic substances (trichloroethane, methylene chloride) in industrial and household applications.

# Urea



**Other Names:** Carbamide; carbonyldiamide.

**Molecular Formula:** CH<sub>4</sub>N<sub>2</sub>O

**Molecular Weight:** 60.06

**Harmonized Code:** 3102.10.0000

**Melting Point:** 132.7°C

**Description:** Colorless tetragonal crystals with the odor of ammonia.

**Hazards:** Moderately toxic by ingestion, intravenous and subcutaneous routes; irritating to skin.

**Illicit Use:** Alkaline material used in the production of coca paste and cocaine base; synthesis of barbituric acid.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** High nitrogen content fertilizer (73%); animal feeds (6.5%); manufacture of resins (urea-formaldehyde) (5%) and plastics (melamine) (2.5%); paper industry to soften cellulose; diuretic.

**Annual Production:**

U.S.: 7,832,000 MT (1993)

WESTERN EUROPE: 7,283,000 (1993 est. cap.)

ASIA: 8,027,000 MT (1993 est. cap.)

MEXICO: 3,168,000 MT (1991 est. cap)

SOUTH AMERICA: 5,587,000 (1991 est. cap)

**Manufacturing Process:** Reaction of ammonia and carbon dioxide at high temperature followed by dehydration to urea; hydrolysis of cyanamide; product of protein metabolism.

**Shipping and Storage:** Non-hazardous substance; available in 50 and 100 pound bags, 200 pound drums, tank cars, tank trucks and hopper cars; also available as 50% and 73% aqueous solutions.

**Manufacturers:**

U.S.: 20 companies including Arcadian Fertilizer L.P.; CF Industries, Inc.; Freeport-McMoRan Resource Partners and Unocal Corp.

WESTERN EUROPE: Austria; Belgium; France; Germany; Ireland; Italy; The Netherlands; Portugal; Spain.

ASIA: Indonesia; Japan; Korea; Taiwan; Malaysia.

SOUTH AMERICA: Argentina; Bolivia; Brazil; Chile; Colombia; Peru; Venezuela.

MIDDLE EAST: Syria

EASTERN EUROPE: Estonia

**Remarks:** Urea has been identified at cocaine processing laboratories. An alkaline material is essential for the production of cocaine. Urea is one of a number of alkaline substances such as sodium, calcium or potassium carbonate, sodium hydroxide or calcium oxide, which may be used in the production of cocaine and other substances. U.S. exports are relatively low. Urea is available wherever farm fertilizers are used.

# Xylenes



**Other Names:** Dimethylbenzene; xylol; mixed xylenes; ortho-xylene (o-xylene; 1,2-dimethyl-benzene); meta-xylene (1,3-dimethylbenzene); para-xylene (p-xylene; 1,4 dimethylbenzene).

**Molecular Formula:** C<sub>8</sub>H<sub>10</sub>

**Molecular Weight:** 106.16

**Harmonized Codes:** ortho- 2902.41.0000  
2707.30.0020  
meta - 2902.42.0000  
2707.30.0010  
para - 2902.43.0000  
2707.30.0030

**Density:** 0.86

**Boiling Point:** 137-140°C

**Description:** The xylenes are flammable. Xylene refers to either a mixture of the ortho, meta and para isomers of xylene or any of the individual isomers. Commercial xylene is a mixture of the three isomers and generally contains small amounts of toluene, ethylbenzene, phenol, trimethylbenzene and other substances. Mixed xylenes - mobile liquid; ortho-xylene and meta-xylene - colorless liquids; para-xylene - colorless plates or prisms at low temperature, colorless liquid at 13-14°C.

**Hazards:** Inhalation of the vapor may cause dizziness, headache, nausea and mental confusion; vapor and liquid irritate the eyes, skin, mucous membranes and respiratory tract; absorption through the skin and ingestion causes poisoning; repeated breathing of vapor over long periods may cause blood disease; prolonged skin contact may cause dermatitis; they are respiratory depressants which produce nausea, headache and ataxia at low doses and confusion, respiratory depression and coma at high doses.

**Illicit Use:** Solvent used in the conversion of cocaine base to cocaine hydrochloride.

**Where Controlled or Regulated:** Unknown

**Legitimate Uses:** Mixed xylenes are used as octane boosters in gasoline and for aviation fuel. Ortho-xylene is used in the production of phthalic anhydride for use in the manufacture of polyester fibers and in the manufacture of pesticides. Meta-xylene is used in the production of isophthalic acid which is used for paints, finishes and resin manufacture and for the production of isophthalonitrile used in the manufacture of agricultural chemicals. Para-xylene is the most important xylene commercially; it is primarily used to produce terephthalic acid which is used in the manufacture of polyester; small amounts are used as solvents and in the manufacture of coatings and pesticides.

**Annual Production:**

U.S.: Mixed xylenes - 3,018,636 MT (1993)  
ortho-xylene - 401,818 MT (1993);  
para-xylene - 2,616,818 MT (1993)  
WESTERN EUROPE: Mixed xylenes - 2,872,000 MT; ortho-xylene - 727,000 MT; para-xylene - 1,342,000 MT (all 1993 est. cap.)  
ASIA: Mixed xylenes - 5,775,000 MT; ortho-xylene - 532,000 MT; para-xylene - 3,550,000 MT (all 1993 est. cap.)  
MEXICO: 404,000 MT (1990 actual)

**Annual U.S. Exports:** 1,077,178 MT (combined total of xylenes 1993)

**Annual U.S. Imports:** 94,421 MT (combined total of xylenes 1993)

**Manufacturing Process:** Mixed xylenes are obtained from aromatic streams in oil refineries for further refinement into individual isomers (ortho - 16%, meta - 3% and para - 81%, based on end use). They are converted to the individual isomers through a metal-catalyzed process using high temperature and a hydrogen environment. Toluene and other aromatics can be converted to xylene.

**Shipping and Storage:** Flammable liquid; shipped in glass carboys, metal barrels and drums and fiberboard boxes lined with glass or earthenware; Sold in 55 gallon drums, tank cars, tank trucks, barges, tankers and ocean vessels.

**Manufacturers:**

U.S.: Mixed xylenes - Approx. 20 companies including: Amoco Oil Co.; Chevron Chemical Co.; Exxon Chemical Co.; Phillips Petroleum Co. ortho-xylene - Exxon Chemical Co.; Koch Refining Co.; Lyondell Petrochemical Co.; Mobil Oil Corp. and Phillips Puerto Rico Core Inc. para-xylene - Amoco Chemical Co.; Chevron Chemical Co.; Exxon Chemical Co.; Koch Refining Co.; Lyondell Petrochemical Co.; Mobil Oil Corp.; Phillips Puerto Rico Core Inc.

WESTERN EUROPE: Austria; Belgium; France; Germany; Italy; The Netherlands; Portugal; Spain; United Kingdom.

ASIA: Japan; Korea; Taiwan; Singapore.

MEXICO: Pemex.

**Remarks:** Xylene, usually in combination with other solvents, has been identified by DEA laboratories in cocaine samples. The xylenes have solvent properties similar to those of toluene. They have not been specifically reported at cocaine laboratories except possibly as aviation fuel.





