



SECTION 4

Chemicals



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INTRODUCTION TO CHEMICALS

In order for a National Authority to effectively implement the CWC, it must understand why certain chemicals are subject to data monitoring and verification, including their capability for use for chemical weapons or non-prohibited purposes.

Overview of CWC Chemicals

- The CWC specifically addresses chemicals listed in three Schedules and “discrete organic chemicals.”
- The Schedules of Chemicals are contained in the treaty’s Annex on Chemicals.
- Scheduled chemicals are grouped based on their industrial or commercial uses and the potential risk they pose to the object and purpose of the CWC.
- Discrete organic chemicals are monitored under the CWC due to the process equipment used to produce them and the potential applicability of such equipment for use in chemical agent production.

Organisation of the Chemical Schedules

- Toxic chemicals are listed in the “A” part of the Schedules.
 - Defined as “any chemical which through its chemical action on life processes can cause death, temporary incapacitation, or permanent harm to humans or animals.”
- Precursor chemicals are known to have been used for production of toxic chemicals and are listed in the “B” part of the Schedules.
 - Defined in the treaty as “any chemical reactant which takes part at any stage in the production by whatever means of a toxic chemical.”

Chemical Weapons Nexus

- Not all chemicals listed in the CWC’s Annex on Chemicals are chemical weapon (CW) agents.
- The CW Applications document found on page 87 describes the chemical weapons applications (e.g., nerve, blood, blister agents) of toxic chemicals in the Annex on Chemicals and the relationship between the listed precursor and toxic chemical.



ANNEX ON CHEMICALS

A. Guidelines for Schedules of Chemicals

Schedule 1 Chemicals

1. The following criteria shall be taken into account in considering whether a toxic chemical or precursor should be included in Schedule 1:
 - (a) It has been developed, produced, stockpiled or used as a chemical weapon as defined in Article II;
 - (b) It poses otherwise a high risk to the object and purpose of this Convention by virtue of its high potential for use in activities prohibited under this Convention because one or more of the following conditions are met:
 - (i) It possesses a chemical structure closely related to that of other toxic chemicals listed in Schedule 1, and has, or can be expected to have, comparable properties;
 - (ii) It possesses such lethal or incapacitating toxicity as well as other properties that would enable it to be used as a chemical weapon;
 - (iii) It may be used as a precursor in the final single technological stage of production of a toxic chemical listed in Schedule 1, regardless of whether this stage takes place in facilities, in munitions or elsewhere;
 - (c) It has little or no use for purposes not prohibited under this Convention.

Schedule 2 Chemicals

2. The following criteria shall be taken into account in considering whether a toxic chemical not listed in Schedule 1 or a precursor to a Schedule 1 chemical or to a chemical listed in Schedule 2, part A, should be included in Schedule 2:
 - (a) It poses a significant risk to the object and purpose of this Convention because it possesses such lethal or incapacitating toxicity as well as other properties that could enable it to be used as a chemical weapon;
 - (b) It may be used as a precursor in one of the chemical reactions at the final stage of formation of a chemical listed in Schedule 1 or Schedule 2, part A;
 - (c) It poses a significant risk to the object and purpose of this Convention by virtue of its importance in the production of a chemical listed in Schedule 1 or Schedule 2, part A;
 - (d) It is not produced in large commercial quantities for purposes not prohibited under this Convention.

Schedule 3 Chemicals

3. The following criteria shall be taken into account in considering whether a toxic chemical or precursor, not listed in other Schedules, should be included in Schedule 3:
 - (a) It has been produced, stockpiled or used as a chemical weapon;
 - (b) It poses otherwise a risk to the object and purpose of this Convention because it possesses such lethal or incapacitating toxicity as well as other properties that might enable it to be used as a chemical weapon;
 - (c) It poses a risk to the object and purpose of this Convention by virtue of its importance in the production of one or more chemicals listed in Schedule 1 or Schedule 2, part B;
 - (d) It may be produced in large commercial quantities for purposes not prohibited under this Convention.



Schedules of Chemicals

Schedule 1		CAS registry number	HS Code
A. Toxic chemicals:			
(1)	O-Alkyl ($\leq C_{10}$, incl. cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr)-phosphonofluoridates e.g. Sarin: O-Isopropyl methylphosphonofluoridate Soman: O-Pinacolyl methylphosphonofluoridate	107-44-8 96-64-0	2931.00
(2)	O-Alkyl ($\leq C_{10}$, incl. cycloalkyl) N,N-dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidocyanidates e.g. Tabun: O-Ethyl N,N-dimethyl phosphoramidocyanidate	77-81-6	2931.00
(3)	O-Alkyl (H or $\leq C_{10}$, incl. cycloalkyl) S-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonothiolates and corresponding alkylated or protonated salts e.g. VX: O-Ethyl S-2-diisopropylaminoethyl methyl phosphonothiolate	50782-69-9	2930.90
(4)	Sulfur mustards: 2-Chloroethylchloromethylsulfide Mustard gas: Bis(2-chloroethyl)sulfide Bis(2-chloroethylthio)methane Sesquimustard: 1,2-Bis(2-chloroethylthio)ethane 1,3-Bis(2-chloroethylthio)-n-propane 1,4-Bis(2-chloroethylthio)-n-butane 1,5-Bis(2-chloroethylthio)-n-pentane Bis(2-chloroethylthiomethyl)ether O-Mustard: Bis(2-chloroethylthioethyl)ether	2625-76-5 505-60-2 63869-13-6 3563-36-8 63905-10-2 142868-93-7 142868-94-8 63918-90-1 63918-89-8	2930.90
(5)	Lewisites: Lewisite 1: 2-Chlorovinylchloroarsine Lewisite 2: Bis(2-chlorovinyl)chloroarsine Lewisite 3: Tris(2-chlorovinyl)arsine	541-25-3 40334-69-8 40334-70-1	2931.00
(6)	Nitrogen mustards: HN1: Bis(2-chloroethyl)ethylamine HN2: Bis(2-chloroethyl)methylamine HN3: Tris(2-chloroethyl)amine	538-07-8 51-75-2 555-77-1	2921.19 2930.90 3002.90
(7)	Saxitoxin	35523-89-8	3002.90
(8)	Ricin	9009-86-3	3002.90
B. Precursors:			
(9)	Alkyl (Me, Et, n-Pr or i-Pr) phosphonyldifluorides e.g. DF: Methylphosphonyldifluoride	676-99-3	
(10)	O-Alkyl (H or $\leq C_{10}$, incl. cycloalkyl) O-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonites and corresponding alkylated or protonated salts e.g. QL: O-Ethyl O-2-diisopropylaminoethyl methylphosphonite	57856-11-8	2931.00
(11)	Chlorosarin: O-Isopropyl methylphosphonochloridate	1445-76-7	2931.00
(12)	Chlorosoman: O-Pinacolyl methylphosphonochloridate	7040-57-5	2931.00



Schedules of Chemicals

Schedule 2		CAS registry number	HS Code
A. Toxic chemicals:			
(1)	Amiton: O,O-Diethyl S-[2-(diethylamino)ethyl] phosphorothiolate and corresponding alkylated or protonated salts	75-53-5	2930.90
(2)	PFIB: 1,1,3,3,3-Pentafluoro-2-(trifluoromethyl)-1-propene	382-21-8	2903.30
(3)	BZ: 3-Quinuclidinyl benzilate (*)	6581-06-2	2933.90
B. Precursors:			
(4)	Chemicals, except for those listed in Schedule 1, containing a phosphorus atom to which is bonded one methyl, ethyl or propyl (normal or iso) group but not further carbon atoms, e.g. Methylphosphonyl dichloride Dimethyl methylphosphonate Exemption: Fonofos: O-Ethyl S-phenyl Ethylphosphonothiothionate	676-97-1 756-79-6 944-22-9	2931.00
(5)	N,N-Dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidic dihalides		2929.90
(6)	Dialkyl (Me, Et, n-Pr or i-Pr) N,N-dialkyl Me, Et, n-Pr or i-Pr)-phosphoramidates		2929.00
(7)	Arsenic trichloride	7784-34-1	2812.10
(8)	2,2-Diphenyl-2-hydroxyacetic acid	76-93-7	2918.19
(9)	Quinuclidin-3-ol	1619-34-7	2933.39
(10)	N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethyl-2-chlorides and corresponding protonated salts		2921.19
(11)	N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-ols and corresponding protonated salts Exemptions: N,N-Dimethylaminoethanol and corresponding protonated salts N,N-Diethylaminoethanol and corresponding protonated salts	108-01-0 100-37-8	2922.19
(12)	N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-thiols and corresponding protonated salts		2930.90
(13)	Thiodiglycol: Bis(2-hydroxyethyl)sulfide	111-48-8	2930.90
(14)	Pinacolyl alcohol: 3,3-Dimethylbutan-2-ol	464-07-3	2905.14



Schedules of Chemicals

Schedule 3		CAS registry number	HS Code
A. Toxic chemicals:			
(1)	Phosgene: Carbonyl dichloride	75-44-5	2812.10
(2)	Cyanogen chloride	506-77-4	2851.00
(3)	Hydrogen cyanide	74-90-8	2811.19
(4)	Chloropicrin: Trichloronitromethane	76-06-2	2904.90
B. Precursors:			
(5)	Phosphorus oxychloride	10025-87-3	2812.10
(6)	Phosphorus trichloride	7719-12-2	2812.10
(7)	Phosphorus pentachloride	10026-13-8	2812.10
(8)	Trimethyl phosphite	121-45-9	2920.90
(9)	Triethyl phosphite	122-52-1	2920.90
(10)	Dimethyl phosphite	868-85-9	2921.19
(11)	Diethyl phosphite	762-04-9	2920.90
(12)	Sulfur monochloride	10025-67-9	2812.10
(13)	Sulfur dichloride	10545-99-0	2812.10
(14)	Thionyl chloride	7719-09-7	2812.10
(15)	Ethyldiethanolamine	139-87-7	2922.19
(16)	Methyldiethanolamine	105-59-9	2922.19
(17)	Triethanolamine	102-71-6	2922.13



DISCRETE ORGANIC CHEMICALS

Definition

Discrete organic chemical (DOC) means any chemical belonging to the class of chemical compounds consisting of all compounds of carbon except for its oxides, sulfides and metal carbonates identifiable by chemical name, by structural formula, if known, and by Chemical Abstract Service registry number, if assigned.

Exemptions

The following types of DOCs are not subject to declaration (See C-I/DEC.39):

- Oxides of carbon;
- Sulfides of carbon;
- Metal carbonates;
- Chemicals only containing carbon and metal; and
- Oligomers and polymers.

“Other chemical production facilities (OCPFs)” are not subject to declaration if they exclusively produce:

- Hydrocarbons (i.e., chemicals containing only carbon and hydrogen, irrespective of the number of carbon atoms in the compound); or
- Explosives (i.e., those chemicals listed in Class 1 of the United Nations Organisation hazard classification system).

Note: *The above exemption for OCPFs that “exclusively” produce hydrocarbons and explosives does not apply if any other type of DOCs are produced at the OCPF. In that case, the quantity of hydrocarbons and explosives produced would be aggregated to determine the total quantity of produced DOCs.*

Guidelines for Classifying Carbon Oxides, Carbon Sulfides, Metal Carbonates or Compounds of Metal and Carbon

To determine whether a DOC qualifies for exemption as a carbon oxide, carbon sulfide, metal carbonate or compound of metal and carbon, evaluate each chemical against the definitions below:

- Carbon oxides consist of chemical compounds that contain only the elements carbon and oxygen and have the chemical formula C_xO_y , where x and y denote integers. The two most common carbon oxides are carbon monoxide (CO) and carbon dioxide (CO₂). If a chemical produced at a plant site fits this definition, then it is classified as a carbon oxide.
- Carbon sulfides consist of chemical compounds that contain only the elements carbon and sulfur, and have the chemical formula C_aS_b , where a and b denote integers. The most common carbon sulfide is carbon disulfide (CS₂). If a chemical produced at a plant site fits this definition, then it is classified as a carbon sulfide.



- Metal carbonates consist of chemical compounds that contain a metal [i.e., the Group 1 Alkalis, Groups II Alkaline Earths, the Transition Metals, or the elements aluminum, gallium, indium, thallium, tin, lead, bismuth or polonium], and the elements carbon and oxygen. Metal carbonates have the chemical formula $M_d(CO_3)_e$, where d and e denote integers and M represents a metal. Common metal carbonates are sodium carbonate (Na_2CO_3) and calcium carbonate ($CaCO_3$). If a chemical produced at a plant site fits this definition then it is classified as a metal carbonate.
- Compounds of metal and carbon consist of those chemicals that contain only a metal (as described in the previous paragraph) and carbon, e.g., calcium carbide (CaC_2).

OVERVIEW OF INDUSTRY USES

Schedule 1 Chemicals

Overview

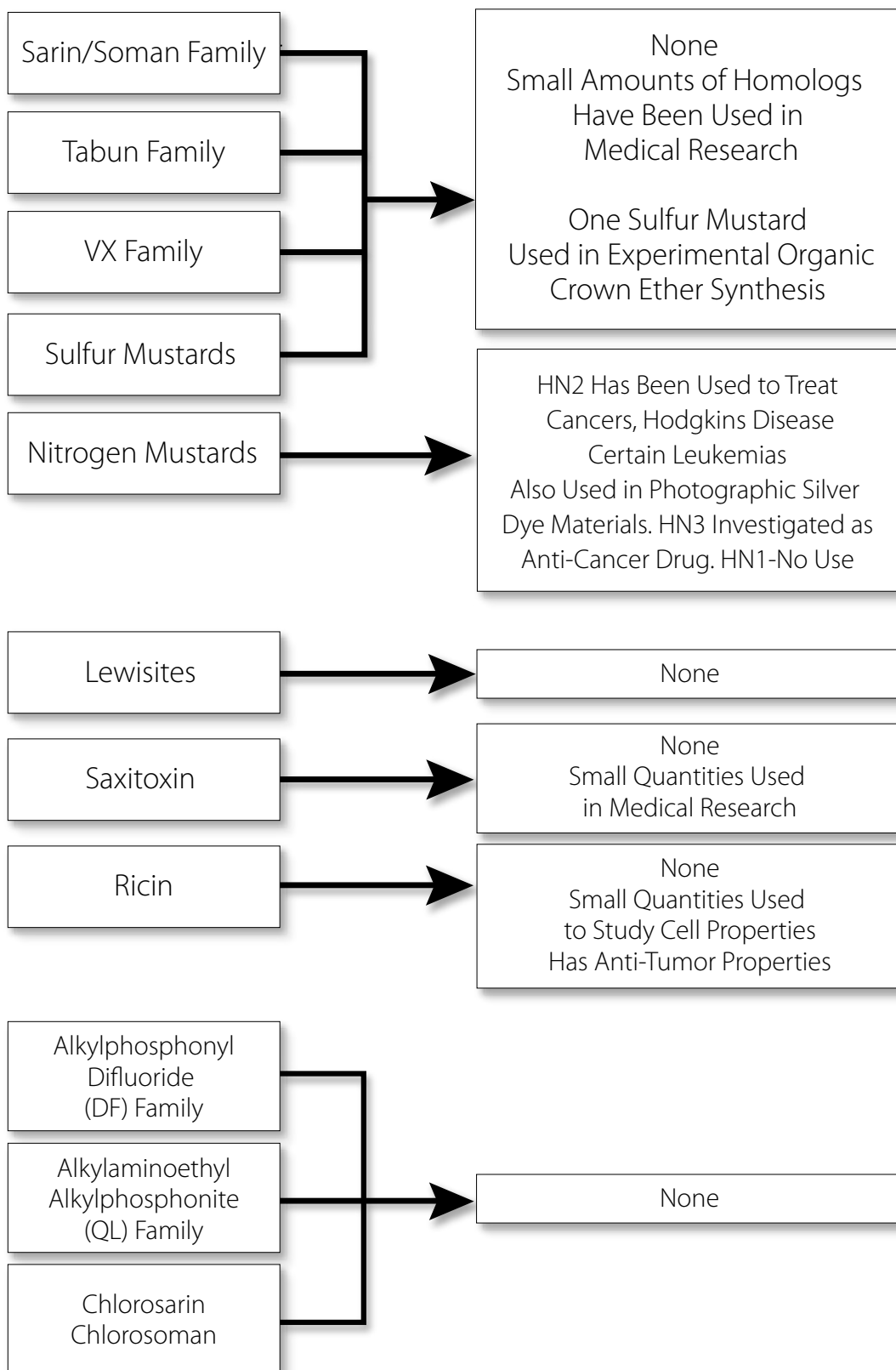
- Chemicals that pose a high risk to the object and purpose of the Convention but that have few or no industrial uses.
- Developed or used primarily for military purposes.
- Include specific listed chemicals and chemical classes or families.
- Examples of listed chemicals:
 - Mustard gas
 - Lewisite 1
- Examples of chemical families:
 - O Alkyl (<C10, incl. cycloalkyl) alkyl (Me, Et, n Pr or Pr) phosphonofluoridates (e.g., Sarin and Soman)
 - O Alkyl (<C10, incl. cycloalkyl) N,N dialkyl (Me, Et, n Pr or i Pr) phosphoramidocyanidates (e.g., Tabun).

Types or Categories of Products

- Pesticide development
- Insecticide development
- Medical and pharmaceutical preparations:
 - antineoplastic agents
 - neuromuscular blocking agents
 - monoclonal antibody preparations
 - intermediates for analgesics



EXAMPLES OF SCHEDULE 1 COMMERCIAL USES





Schedule 2 Chemicals

Overview

- Chemicals that pose a significant risk to the object and purpose of the Convention but that may be produced in large commercial quantities.
- Specific listed chemicals and chemical classes or families are listed in Schedule 2.
- Examples of specific chemicals include:
 - Arsenic trichloride
 - Thiodiglycol
- An example of a chemical family includes chemicals, except for those listed in Schedule 1, containing a phosphorus atom to which is bonded one methyl, ethyl or propyl (normal or iso) group but not further carbon atoms (e.g., dimethyl methylphosphonate (DMMP)).

Type or Categories of Products

- Insecticides
- Flame retardant additive research (plastics, resins, fibres)
- Medical and pharmaceutical preparations:
 - Anticholinergics
 - Arsenicals
 - Tranquiliser preparations
 - Hypotensive agent preparations
- Herbicides
- Fungicides
- Defoliant
- Rodenticides
- General product additives, such as:
 - Antioxidants (fuels, lubricants, etc.)
 - Colour stabilizers
 - Lubricant additives
- Dyes, and photographic industries:
 - Printing ink
 - Ball point pen fluids
 - Copy media
 - Paints, coatings, etc.
- Metal plating preparations
- Toiletries, including perfumes and scents
- Epoxy resins



COMMONLY PRODUCED SCHEDULE 2 CHEMICALS

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Methylphosphonic dichloride; Phosphonic dichloride, methyl-; DC; Dichloromethylphosphine oxide; Methanephosphonodichloridic acid; Methanephosphonyl chloride; Methanephosphonyl dichloride; Methylphosphonic acid dichloride; Methylphosphonodichloridic acid; Methylphosphonyl chloride; Methylphosphonyl dichloride; dichloro methyl phosphine oxide; Methanephosphonic dichloride; CH ₃ POCl ₂ ; Methanephosphonic acid dichloride; Phosphonodichloridic acid, methyl-.	2B04	676-97-1	2931.00	Chlorinating agent, chemical intermediate.
Dimethyl methylphosphonate; Phosphonic acid, methyl-, dimethyl ester; Dimethoxymethyl phosphine oxide; O,O-Dimethyl methylphosphonate; DMMP; Dimethyl methanephosphonate; Methylphosphonic acid dimethyl ester; Methanephosphonic acid dimethyl ester; Dimethyl Methylphosphonate, 99.5%; Dimethylmethylphosphonate; methylphosphonic acid dimethyl; Dimethyl ester of methylphosphonic acid; Dimethyl methylphosphonate~Methanephosphonic acid dimethyl ester.	2B04	756-79-6	2931.00	Flame retardant with application in: building materials, furnishings; transportation equipment and fittings; electrical industry (cables, housing); upholstery.



COMMONLY PRODUCED SCHEDULE 2 CHEMICALS

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Diethyl ethylphosphonate; Phosphonic acid, ethyl-, diethyl ester; Diethoxyethylphosphine oxide; Diethyl ethanephosphonate; Ethanephosphonic acid, diethyl ester; Diethylethylphosphonate; Ethyl Phosphonic Acid, Ethylphosphonic acid, Ethylphosphonic acid diethyl ester.	2B04	78-38-6	2931.00	Gasoline additive; raw material for insecticides; flameproofing agent; stabilizer and antioxidant for plastics.
Bis(2-hydroxyethyl)sulfide; Ethanol, 2,2'-thiobis -; Bis(2-hydroxyethyl) sulfide; .beta.,.beta.'-Dihydroxydiethyl sulfide; .beta.,.beta.'-Dihydroxyethyl sulfide; .beta.-Thiodiglycol; 2,2'-Thiobisethanol; 2,2'-Thiodiethanol; 2,2'-Thiodiglycol; 3-Thiapentane-1,5-diol; Bis(.beta.-hydroxyethyl) sulfide; Bis(2-hydroxyethyl) thioether; Di(2-hydroxyethyl) sulfide; Diethanol sulfide; Ethanol, 2,2'-thiodi-; Thiodiethylene glycol; Thiodiglycol; omega, omega'-Dihydroxyethyl sulfide; Sulfide, bis(2-hydroxyethyl); Thiodiethanol; 2,2'-thiobis -ethanol; 2-Hydroxyethyl sulphide.	2B13	111-48-8	2930.90	Textile industry (textile printing and fabric softener); solvents; cosmetics; anti-arthritis drugs; plastics; elastomers; lubricants; stabilizers; antioxidants; inks; dyes; photographic; copying; antistatic agent; epoxides; coating; metal plating.

**COMMONLY PRODUCED SCHEDULE 2 CHEMICALS**

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
2-N,N-Diethylaminoethyl chloride hydrochloride; Ethanamine, 2-chloro-N,N-diethyl-, hydrochloride; 2-Chloro-N,N-dimethylethanaminium chloride; (2-Chloroethyl)diethylamine monohydrochloride; (N,N-Diethylamino)ethyl chloride hydrochloride; .beta.-(Diethylamino)ethyl chloride hydrochloride; .beta.-Chloroethyldiethylamine hydrochloride; 1-Chloro-2-(diethylamino)ethane hydrochloride; 2-(Diethylamino)ethyl chloride hydrochloric acid salt; 2-(Diethylamino)ethyl chloride hydrochloride; 2-(N,N-Diethylamino)ethyl chloride hydrochloride; 2-Chloroethyldiethylammonium chloride; 2-Chloroethyl-N,N-diethylamine hydrochloride; 2-Chloro-N,N-diethylethylamine hydrochloride; 2-Chlorotriethylamine hydrochloride; N-(2-Chloroethyl)diethylamine hydrochloride; N,N-Diethyl-.beta.-chloroethylamine hydrochloride; N,N-Diethyl-2-chloroethylamine hydrochloride; n,n-diethylaminoethylchloridehydrochloride; N-2-Chloroethyl-N,N-diethylammonium hydrochloride; Triethylamine, 2-chloro-, hydrochloride; 2-Chloroethyl diethylamine HCl; 2-Chloro-N,n-Diethylethylaminehydrochloride.	2B10	869-24-9	2921.19	Gasoline additive; application in the removal of acids from solutions.
Phosphonic acid, methyl-, compound with (Aminoiminomethyl) Urea(1:1); Methylphosphonic acid compound with (aminoiminomethyl)-,methylphosphonate (1:1); Urea, (aminoiminomethyl)-,methylphosphonate (1:1).	2B04	84402-58-4	2931.00	Application as a flame retardant (specifically for polyesters, polyurethane foams); application as cleaning agents and emulsifiers, textile imp rovers, anticorrosion agents.



COMMONLY PRODUCED SCHEDULE 2 CHEMICALS

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
<p>Mixture of Methylphosphonsaeure (5 ethyl 2 methyl 1,3,2 dioxaphosphorinan 5yl) methyl methyl ester, p-oxide and Methyl phosphonsaeure bis[(5 ethyl 2 methyl 2 oxido 1,3,2 dioxaphosphorinan 5yl) methyl] ester. Corresponding CAS #s are: 41203-81-0 and 42595-45-9, respectively.</p> <p><u>SYNONYMS:</u></p> <p>Phosphonic acid, methyl(5-methyl-2-methyl-1,3,2-dioxaphosphorinan-5-yl) methyl,methyl ester, P-oxide (CAS # 41203-81-0); Phosphonic acid, methyl(5-methyl-2-methyl-1,3,2-dioxaphosphorinan-5-y) ester,P,P'-oxide (CAS # 42595-45-9); Methyl phosphonic acid (5-ethyl-2-methyl-1,3,2-dioxaphosphorinan-5-yl) methyl methyl ester, P-oxide (CAS # 41203-81-0); Methylphosphonyl-bis [(5-ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphorinan-5-yl)methyl] ester (CAS # 42595-45-9); Phosphonic acid, methyl-, bis((5-ethyl-2-methyl-1,3,2-dioxaphosphorinan-5-yl)methyl ester, P,P'-dioxide) (CAS # 42595-45-9); Methylphosphonic acid bis[(5-ethyl-2-methyl-1,3,2-dioxaphosphorinan-5-yl)methyl ester, P,P'-dioxide] (CAS # 42595-45-9); 1,3,2-dioxaphosphorinane (CAS # 42595-45-9).</p>	2B04	170836-68-7	2931.00	These products (41203-81-0 & 42595-45-9) are cyclic phosphonate esters and are sold as a mixture which is used as a durable flame retardant for polyester fabrics and it is also used in textile coating applications.

**COMMONLY PRODUCED SCHEDULE 2 CHEMICALS**

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
<p>Ethanamine,2-chloro-N,N-dimethyl-,hydrochloride; 2-N,N-Dimethylaminoethyl chloride hydrochloride; 2-Chloro-N,N-dimethylethanaminium chloride; (.beta.-Chloroethyl)dimethylamine-hydrochloride; (2-Chloroethyl)dimethylamine hydrochloride; .beta.-Dimethylaminoethyl chloride hydrochloride; 1-Chloro-2-(dimethylamino)ethane hydrochloride; 2-(Dimethylamino)chloroethane hydrochloride; 2-(Dimethylamino)ethyl chloride hydrochloride; 2-(N,N-Dimethylamino)ethyl chloride hydrochloride; 2-Chloroethyl dimethyl ammonium chloride; 2-Chloroethyldimethylamine monohydrochloride; 2-Chloro-N,N-dimethylamine hydrochloride; 2-Chloro-N,N-dimethylethylamine hydrochloride; Chloro(dimethylamino)ethane hydrochloride; Chloroethyldimethylamine hydrochloride; Dimethylaminoethyl chloride hydrochloride; Ethylamine, 2-chloro-N,N-dimethyl-, hydrochloride; N-(2-Chloroethyl)dimethylamine hydrochloride; N-(2-Chloroethyl)-N,N-dimethylammonium chloride; N,N-Dimethyl-2-chloroethylamine hydrochloride; N-N-Dimethylaminoethyl-2-chloride hydrochloride; N-N-Dimethyl-N-(2-chloroethyl)amine hydrochloride; b-Chloroethyldimethylamine Hydrochloride, 96%.</p>	2B10	4584-46-7	2921.19	Pharmaceuticals; speciality surfactants; flocculants; agricultural chemicals; pyrrolopyridine preparation; anti-inflammatory.



COMMONLY PRODUCED SCHEDULE 2 CHEMICALS

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Phosphonic acid, methyl-, (5-ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphorinan-5-yl)methyl methyl ester; 1,3,2-Dioxaphosphorinane, phosphonic acid derivatives; Trimethylolpropane cyclic methylphosphonate (1:1) methyl methanephosphonate; Trimethylolpropane cyclic methylphosphonate (1:1)methyl methylphosphonate; Phosphonothioic acid, methyl-, (5-ethyl-2 methyl- 1,3,2 -dioxaphorinan-5-yl)methyl methyl ester, P-oxide; Trimethylolpropane cyclic methylphosphonate/methyl methanephosphonate; Methylphosphonic acid (5-ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphorinan-5-yl)-methyl methyl ester.	2B04	41203-81-0	2931.00	
Phosphonic acid, methyl-, dimethyl ester, polymer with oxirane and phosphorus oxide (P ₂ O ₅); Dimethyl methylphosphonate, polymer with phosphorus pentoxide and ethylene oxide.	2B04	70715-06-9	2931.00	
2-(Diethylamino)ethanethiol; 2-N,N-Diethylaminoethanethiol; Ethanethiol, 2-(diethylamino)-; 2-(diethylamino)ethyl hydrosulfide; 2-(Diethylamino)ethyl mercaptan; 2-N,N-(Diethylamino)ethanethiol; Diethyl(2-mercaptoethyl)amine; Diethylcysteamine; N,N-Diethylaminoethane-2-thiol; n,n-diethylaminoethanethiol; n,n-diethylaminoethylthiol; N,N-Diethylcysteamine.	2B12	100-38-9	2930.90	

**COMMONLY PRODUCED SCHEDULE 2 CHEMICALS**

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Ethanol, 2-[bis(1-methylethyl)amino]-; 2-N,N-Diisopropylaminoethanol; (N,N-Diisopropylamino)ethanol; 2-(Diisopropylamino)ethanol; 2-(Diisopropylamino)ethyl alcohol; 2-diisopropylaminoethanol; diisopropylaminoethanol; Ethanol, 2-(diisopropylamino)-; N,N-Diisopropyl-2-aminoethanol; N,N-Diisopropylaminoethane-2-ol; N,N-Diisopropylethanolamine; UN 2825; Ethanol, diisopropylamino-; Ethanol, 2-(diisopropylamino)-; Diisopropylethanolamine; N,N-Diisopropylaminoethanol; 2-(Diisopropylamino)ethanol; N,N-Di-isopropylethanolamine; Diisopropylaminoethanol, Pract; N,N-Diisopropyl-beta-aminoethanol.	2B11	96-80-0	2922.19	Pharmaceuticals: Benzamide preparation; treatment digestive tract disorder.
Phosphonic acid, methyl-, mono[3-(trihydroxysilyl) propyl ester, monosodium salt; 3-Trihydroxysilylpropylmethylphosphonate, sodium salt; Methylphosphonic acid mono[3-(trihydroxysilyl)propyl] ester, monosodium salt.	2B04	84962-98-1	2931.00	Corrosion inhibitor
Phosphonic acid, methyl-, bis(5-ethyl-2-methyl-2-oxido-1,2,3-dioxaphosphorinan-5-yl) methyl ester; 1,3,2-dioxaphosphorinane	2B04	42595-45-9	2931.00	
Methyl phosphonaeurepolyglycolester; methyl phosphonaeureethoxylat.	2B04	294675-51-7	unknown	



COMMONLY PRODUCED SCHEDULE 2 CHEMICALS

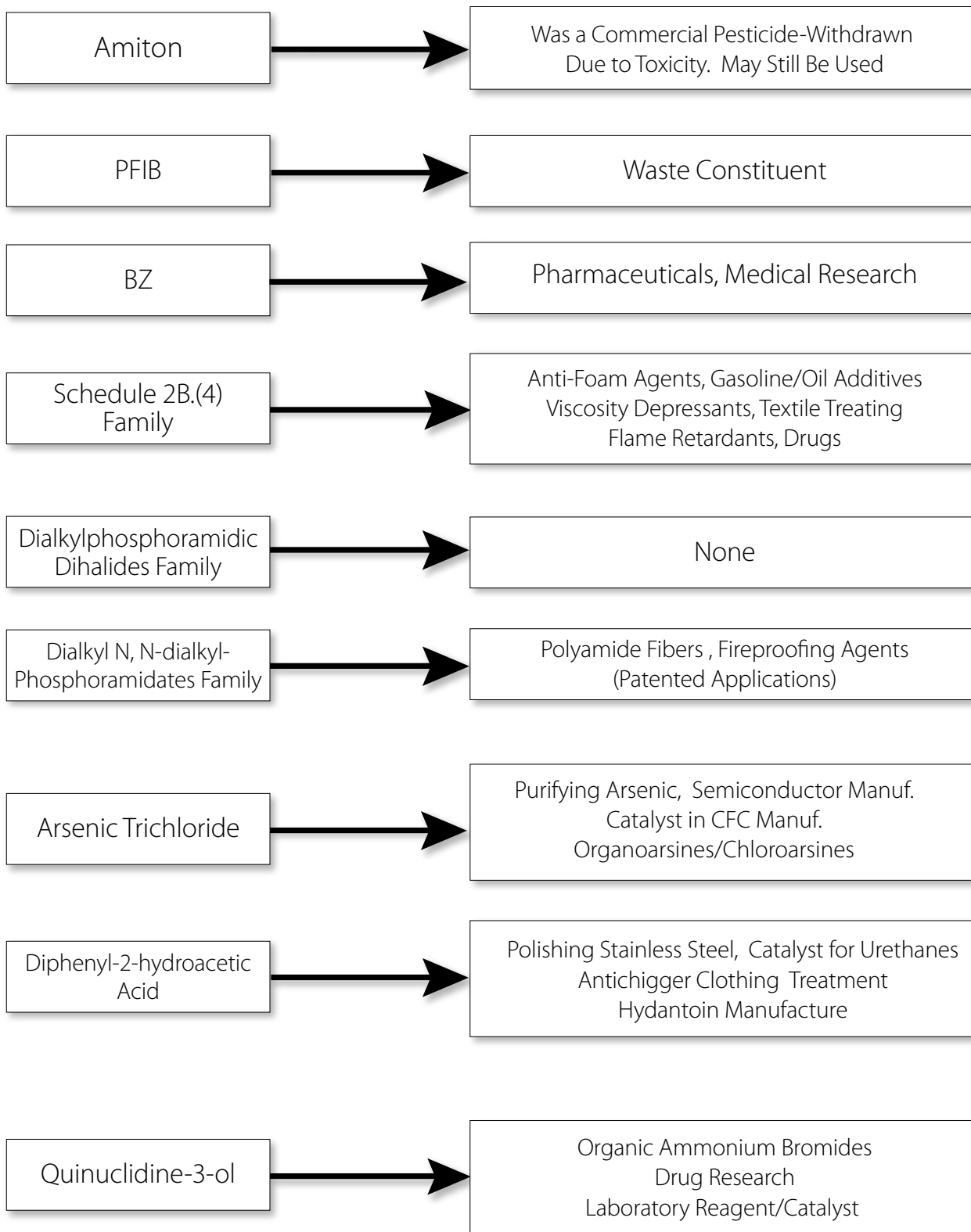
Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
<p>N-(2-Chloroethyl)-N-isopropylpropan-2-aminium chloride; 2-N,N-Diisopropylaminoethyl chloride hydrochloride; 2-Propanamine, N-(2-chloroethyl)-N-(1-methylethyl)-,hydrochloride; (.beta.-Chloroethyl)diisopropylamine hydrochloride; 2-(Diisopropylamino)ethyl chloride hydrochloride; N-(2-Chloroethyl)diisopropylamine hydrochloride; N,N-Diisopropylaminoethyl-2-chloride hydrochloride; Triethylamine, 2"-chloro-1,1'-dimethyl-,hydrochloride; DIC hydrochloride; 2-Diisopropylaminoethyl Chloride Hydrochloride, 96%; B-diisopropylaminoethyl chloride hydrochloride; N-(2-chloroethyl)-N-(1-methylethyl)-2-propaneamine,hydrochloride; N-(2-Chloroethyl)-diisopropylamine hydrochloride; Diisopropylamino ethyl chloride hydrochloride; 2-Chloro-N,N-diisopropylethylamine hydrochloride; Beta-diisopropylaminoethylchloride HCl.</p>	2B10	4261-68-1	2921.19	Pharmaceuticals: Anticancer flavanone analog preparation.

**COMMONLY PRODUCED SCHEDULE 2 CHEMICALS**

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
2,2-Diphenyl-2-hydroxyacetic acid; Benzeneacetic acid, .alpha.-hydroxy-.alpha.-phenyl-; .alpha.,.alpha.-Diphenyl-.alpha.-hydroxy acetic acid; .alpha.,.alpha.-Diphenylglycolic acid; .alpha.-Hydroxy-.alpha.-phenylbenzeneacetic acid; .alpha.-Hydroxy-2,2-diphenylacetic acid; .alpha.-Hydroxydiphenylacetic acid; 2-Hydroxy-2,2-diphenylacetic acid; Benzilic acid; Diphenylglycolic acid; Diphenylhydroxyacetic acid; Hydroxy(diphenyl)acetic acid; Hydroxydiphenylacetic acid; 2-Hydroxy-2,2-diphenylethanoic acid.	2B08	76-93-7	2918.19	Commercial use comes under the broad spectrum of organic synthesis, especially as an intermediate in preparation of pharmaceuticals. Pharmaceuticals: treatment of urinary incontinence and their preparation.
2,4,6-Tripropyl-1,3,5,2,4,6-trioxatriphosphinane 2,4,6-trioxide; 1,3,5,2,4,6-Trioxatriphosphorinane, 2,4,6-tripropyl-,2,4,6-trioxide; 1-Propanephosphonic acid cyclic anhydride; 1-Propanephosphonic acid cyclic anhydride, 50% in ethyl acetate; n-Propylphosphonic cyclic anhydride; Propylphosphonic anhydride; 1-Propanephosphonic acid anhydride, cyclic trimer; 1-Propanephosphonic anhydride; 1-Propylphosphonic acid cyclic anhydride; Propylphosphonic anhydride Solution; n-Propylphosphonic acid anhydride, cyclic trimer; 2,4,6-Tripropyl-2,4,6-trioxo-1,3,5,2,4,6-trioxatriphosphorinane; Propane phosphonic acid anhydride.	2B04	68957-94-8	2931.00	
Phosphonic Acid, methyl-, polyglycol ester.	2B04	unknown	unknown	

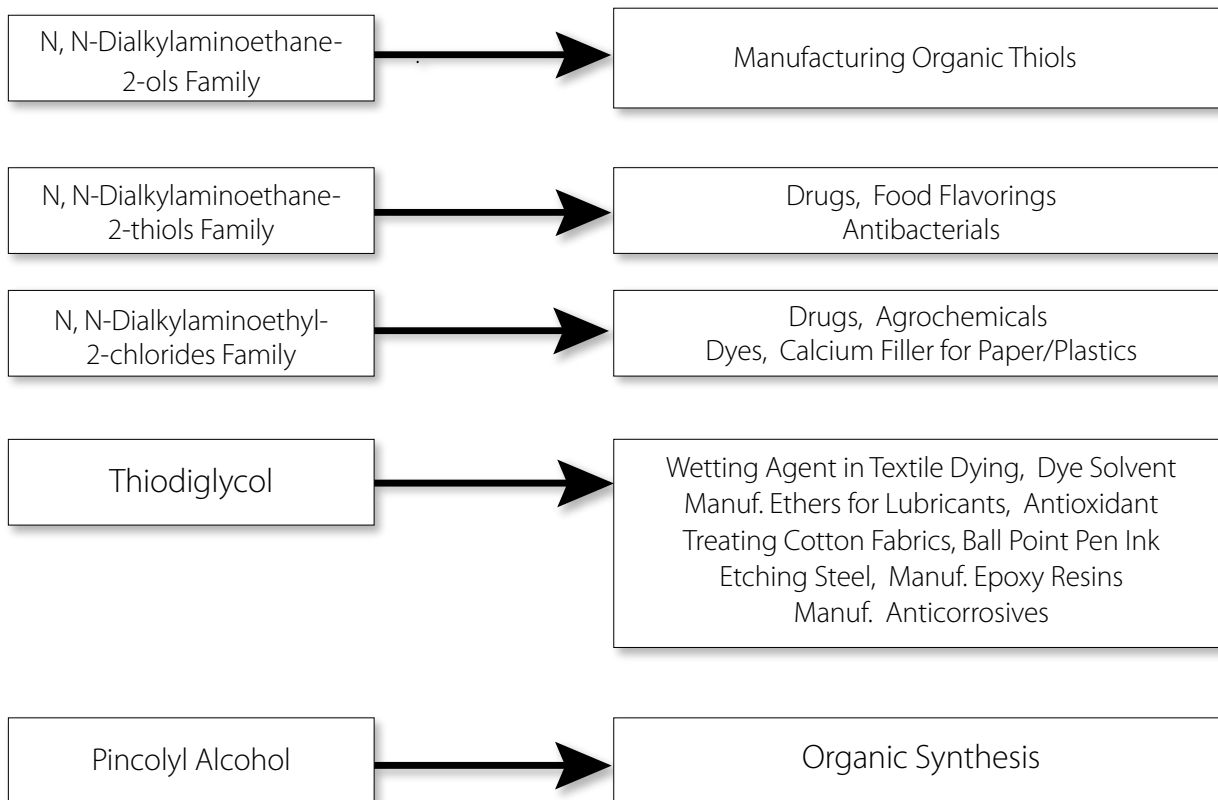


EXAMPLES OF SCHEDULE 2 COMMERCIAL USES





EXAMPLES OF SCHEDULE 2 COMMERCIAL USES



Schedule 3 Chemicals

Overview

- Chemicals that pose a risk to the object and purpose of the Convention and that are produced in large commercial quantities.
- Only specific chemicals are listed in Schedule 3.

Type or Categories of Products

- Resin and plastic production:
 - Polycarbonates
 - Polyester carbonates
 - Polyurethanes
 - Polymethylmetacrylate
 - Polysulphides
- Isocyanates
- Toiletries



- Cosmetics
- Pharmaceuticals
- Pesticides
- Herbicides
- Insecticides
- Amine manufacture
- Acrylonitrile manufacture
- Cyanic acid manufacture
- Cyanogen manufacture
- Cyanogen chloride manufacture
- Gold and other noble metal extraction solutions
- Metal plating preparations
- Soil fumigants
- Organic phosphate esters (hydraulic fluids, flame retardants, surfactants, sequestering agents)
- Organic phosphites (stabilisers, antioxidants, flame retardants, lubricants, plasticizers)
- Vulcanising agents for rubber
- Batteries
- Leather tannery and finishing supplies
- Surfactants for detergents, oil drilling emulsions, cutting oils, soaps and toiletries
- Corrosion inhibitors
- Cement manufacture supplies

**COMMONLY PRODUCED SCHEDULE 3 CHEMICALS**

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Triethanolamine; Ethanol, 2,2',2''-nitrilotris-; Tris(2-hydroxyethyl)amine; 2,2',2''-Nitrilotriethanol; 2,2',2''-Nitrilotris(ethanol); Ethanol, 2,2',2''-nitrilotri-; Nitrilotriethanol; TEA; TEA (amino alcohol); TEOA; Triethanolamin; Tris(.beta.-hydroxyethyl)amine; tris-(2-Hydroxyethyl)amine; N(CH ₂ CH ₂ OH) ₃ ; Tri(hydroxyethyl)amine; Triethylamine, 2,2',2''-trihydroxy-; Nitrilo-2,2',2''-Triethanol; Nitrilotris(ethanol); Triethylolamine; Tris(hydroxyethyl)amine; Trihydroxytriethylamine; Trihydroxytriethylamine-Arc; 2,2',2''-trihydroxytriethylamine; Triethanolamine Free Base; Tris(hydroxyethyl)amine-Arc.; Tris(hydroxyethyl)amine.	3B17	102-71-6	2922.13	Application in production of: emulsifiers, detergents, textile and leather chemicals, drilling and cutting oils (impregnating materials), medicinal soaps and high-quality cosmetics and toiletries, agricultural products, pharmaceuticals. Production of cleaners: all-purpose cleaners, cleaners that involve skin contact because of the mildness of this chemical, waterless hand cleaners. Production of wax formulations: cream waxes and polishes used for furniture, floors and automotive car wax. Production of cement and concrete: milling additive. Production of adhesives. Application in coatings technology: metal coating preparations, glass coating (shatter proofing, anti-frosting, anti-fogging and-dirt resistant films on glass and plastics), accelerator for photo-polymerisation coating (improves thermal properties and reduces cracking in prepared wire coatings). Application as corrosion inhibitor, used in gas purification processes, metal working, mining, petroleum and coal, polymers, textiles, pigment dispersion, pesticides and herbicides.



COMMONLY PRODUCED SCHEDULE 3 CHEMICALS

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Methyldiethanolamine; Ethanol, 2,2'-(methylimino)bis-; N,N-Bis(2-hydroxyethyl)methylamine; 2,2'-(Methylimino)diethanol; Diethanolmethylamine; Ethanol, 2,2'-(methylimino)di-; Eve; MDEA; Methylbis(2-hydroxyethyl)amine; Methyliminodiethanol; N-(2-Hydroxyethyl)-N-methylethanolamine; N-Methylaminodiglycol; N-Methyldiethanolamine; N-Methyliminodiethanol; N-methyl-2,2'-iminodiethanol; Bis(2-hydroxyethyl); Methyl Diethanolamine; 2,2'-(Methylimino)bisethanol; Ethanol, 2,2'-(methylimino)di-; Bis(2-hydroxyethyl)methylamine; N-Methylimino-2,2'-diethanol; N-Methyl-2,2'-iminodiethanol; 2-(N-2-Hydroxyethyl-N-methylamino)ethanol.	3B16	105-59-9	2922.19	Application in: treatment of natural gas (removal of acidic components); photographic chemicals; pharmaceutical precursor.
Thionyl chloride; Thionyl dichloride; Sulfinyl chloride; Sulfinyl dichloride; Sulfur chloride oxide (Cl ₂ SO); Sulfur chloride oxide (SCI ₂ O); Sulfur oxychloride; Sulfur oxychloride (SOCl ₂); Sulfurous dichloride; Sulfurous oxychloride; Thionyl chloride (SOCl ₂); Thionylchloride; SOCl ₂ ; UN 1836; Sulfur dichloride oxide; Sulfurous chloride.	3B14	7719-09-7	2812.10	One of the most important chlorinating agents in organic chemistry. Application in the production of: crop-protection agents (herbicides and insecticides); pharmaceuticals (drugs and vitamins); dyes; paper and textile auxiliaries.
Phosphorous trichloride; Phosphine, trichloro-; Phosphorous chloride; Phosphoroustrichloride; Phosphorus chloride (Cl ₆ P ₂); Phosphorus chloride (PCl ₃); Trichlorophosphine; Chloride of phosphorous; Phosphorous (III) chloride; UN 1809; PCl ₃ ; Foforo(tricloruro di); Fosfortrichloride; Trojchlorek fosforu; Phosphore(trichlorure de); Phosphortrichlorid.	3B06	7719-12-2	2812.10	Used as chlorinating agents and catalyst. Starting material in production of organophosphorus and inorganic compounds: phosphoryl chloride, phosphorus pentachloride, phosphonic acid. Reacts with pure oxygen to produce an important intermediate used for the production of: synthetic colourants; pharmaceutical products; organic phosphates (insecticides, fire-retardants, plasticisers, metal extraction solvents).

**COMMONLY PRODUCED SCHEDULE 3 CHEMICALS**

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Phosphorous oxychloride; Phosphoric trichloride; Phosphonyl trichloride; Phosphoric chloride; Phosphoroychloride; Phosphoroytrichloride; Phosphorus chloride oxide (PCI3O); Phosphorus chloride oxide (POCl3); Phosphorus monoxide trichloride; Phosphorus oxide trichloride; Phosphorus oxychloride; Phosphorus oxytrichloride; Phosphorus trichloride oxide; Phosphoryl chloride; Phosphoryl trichloride; Trichlorophosphine oxide; Trichlorophosphorus oxide; POCl3; Phosphorus oxide chloride; Fosforoxychlorid; Oxychlorid fosforecny; UN1810; OPCl3; Phosphorus chloride; Phosphorous (V) trichloride oxide; Phosphorous oxychloride (phosphoryl chloride); Phosphorus oxide; Phosphoryl Oxychloride.	3B05	10025-87-3	2812.10	Application as: precursor for pesticides; catalyst and reactant. Used to manufacture alkyl and aryl orthophosphate tri-esters, and the tri-esters thus produced are used in the production of: hydraulic fluids; plastic and elastomer additives; flame retardant; oil stabilisers; pesticides; medicinal intermediates; metal extraction solvents.
Trichloronitromethane; Methane, trichloronitro-; Trichloro(nitro)methane; Chloropicrin; Chloropicrin; Nitrochloroform; Nitrotrichloromethane; Chloropicrin, absorbed; UN 1580; UN 1583; NA 1583; NA 1955; NA 2929; Nitromethane, 1,1,1-trichloro-; Methane, trichloronitro-, (absorbed); Chloropicrin mixture; Dojyopicrin; Tricloro-nitro-metano; Chloroform, nitro-; Chloorpikrine; Chlorpikrin; Cloropicrina; Trichloornitromethaan; Trichloronitromethan.	3A04	76-06-2	2904.90	Mainly used as a soil disinfectant for control of nematodes, soil insects, soil fungi and weed seeds. Is also used for fumigation of stored grain to control insects and rodents, and for glass houses and mushroom house fumigation. Often used in combination with methyl bromide and other fumigants. Is used as a tear gas because of its lachrymatory properties. Is used in the chemical industry as a raw material in organic synthesis, i.e. in manufacturing dyes.



COMMONLY PRODUCED SCHEDULE 3 CHEMICALS

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Phosphorous acid, trimethyl ester; Trimethyl Phosphite; Trimethoxyphosphine; Trimethyl ester of phosphorous acid; UN 2329; P(OCH ₃) ₃ ; Methyl phosphite; Methyl phosphite ((MeO) ₃ P); Trimethoxyfosfin; Trimethylfosfit; Trimethyl phosphonate; Trimethylphosphite; Phosphorous acid, trimethyl; TMP.	3B08	121-45-9	2920.90	Key intermediate in the manufacture of phosphatic pesticides. Is also used as a stabilizer for PVC neoprene and as a raw material in the production of fire resistant and fire retardant materials. Also used as a plasticizer in nylons, as a catalyst in polymerization reaction, and as a reagent in organic synthesis. Further uses include: dyestuffs, optical brighteners, plasticizers and lubricants.
Phosphonic acid, dimethyl ester; Dimethyl phosphite; Dimethyl hydrogen phosphite; Dimethoxyphosphine oxide; Dimethyl acid phosphite; Dimethyl hydrogen phosphonate; Dimethyl phosphonate; Hydrogen dimethyl phosphite; Methyl phosphonate ((MeO) ₂ HPO); DMHP; DMPI; Phosphorous acid dimethyl ester; O,O-Dimethyl phosphonate; (CH ₃ O) ₂ PHO; Dimethylester kyseliny fosforite; Dimethylfosfit; Dimethylfosfonat; Dimethyl ester of phosphonic acid; DMP.	3B10	868-85-9	2920.90	Main areas of application are in the production of phosphonic acid derivatives, insecticides, and plastic additives. Is required in the manufacture of phosphonates. Is applied in the manufacture of crop protection agents and flame-retardants, e.g. for textile fibers. Organic synthesis: lubricant additive.
Triethyl phosphite; Phosphorous acid, triethyl ester; Triethoxyphosphine; Tris(ethoxy)phosphine; (C ₂ H ₅ O) ₃ P; Ethyl phosphite, (EtO) ₃ P; UN 2323; Phosphorus ether; TEPI; Triethyl phosphonate; TEP.	3B09	122-52-1	2920.90	Is used in the manufacture of flame-retardants for rigid polyurethane foam, fluorescent whitening agents, insecticides, and active ingredients for pharmaceuticals (e.g. penicillin). Organic synthesis: plasticizers, lubricant additives. Is converted into insecticidal vinyl esters of phosphoric acid. The long-chained compounds are mainly used as antioxidants for plastics. Is a widely used organophosphorus reagent.



COMMONLY PRODUCED SCHEDULE 3 CHEMICALS

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Phosphorane, pentachloro-; Phosphorous pentachloride; Pentachlorophosphorane; Pentachlorophosphorus; Phosphoric chloride; Phosphorus chloride (PCl ₅); Phosphorus pentachloride; Phosphorus perchloride; Phosphorus(V) chloride; UN 1806; Fosforo(pentacloruro di); Fosforpentachloride; Pieciochlorek fosforu; Phosphore(pentachlorure de); Phosphoric perchloride; Phosphorpentachlorid; PCl ₅ ; Phosphorus(5) chloride.	3B07	10026-13-8	2812.10	Used as a dehydrating agent for the synthesis of a variety of inorganic and organic phosphorous derivatives, water treatment chemicals, flame-retardants, plasticizers, and stabilizers for plastic elastomers, lube oil and paint additives. Used in the pharmaceutical industry in the manufacture of penicillin and cephalosporin antibiotics. In aluminium metallurgy, it is used as a grain refiner for Al-Si alloys and as a grain structure improver in metal casting.
Sulfur monochloride; Sulfur chloride (S ₂ Cl ₂); Disulfur dichloride; Chlorosulfane; Dichlorodisulfane; Sulfur chloride; Sulfur monochloride (S ₂ Cl ₂); Sulfur subchloride; Thiosulfurous dichloride; chloride of sulfur; Sulfur chloride (mono); UN 1828; CISSCl; S ₂ Cl ₂ ; Sulfur(I) chloride; Chloride of sulfur; Siarki chlorek; Chlorschwefel; Sulfur chloride (di).	3B12	10025-67-9	2812.10	Used in the production of many chemical products, mainly in the manufacture of vulcanising agents for rubber, lubricant additives, gum erasers, rubber additives, rubber substitutes, sulfur dyes, antioxidants, pesticides, herbicides, insecticides, pharmaceuticals, paper and textile auxiliaries, plastics, and in the synthesis of various organic chemicals. The principle commercial uses of this chemical are in the manufacture of lubricant additives and vulcanising agent for rubber.



COMMONLY PRODUCED SCHEDULE 3 CHEMICALS

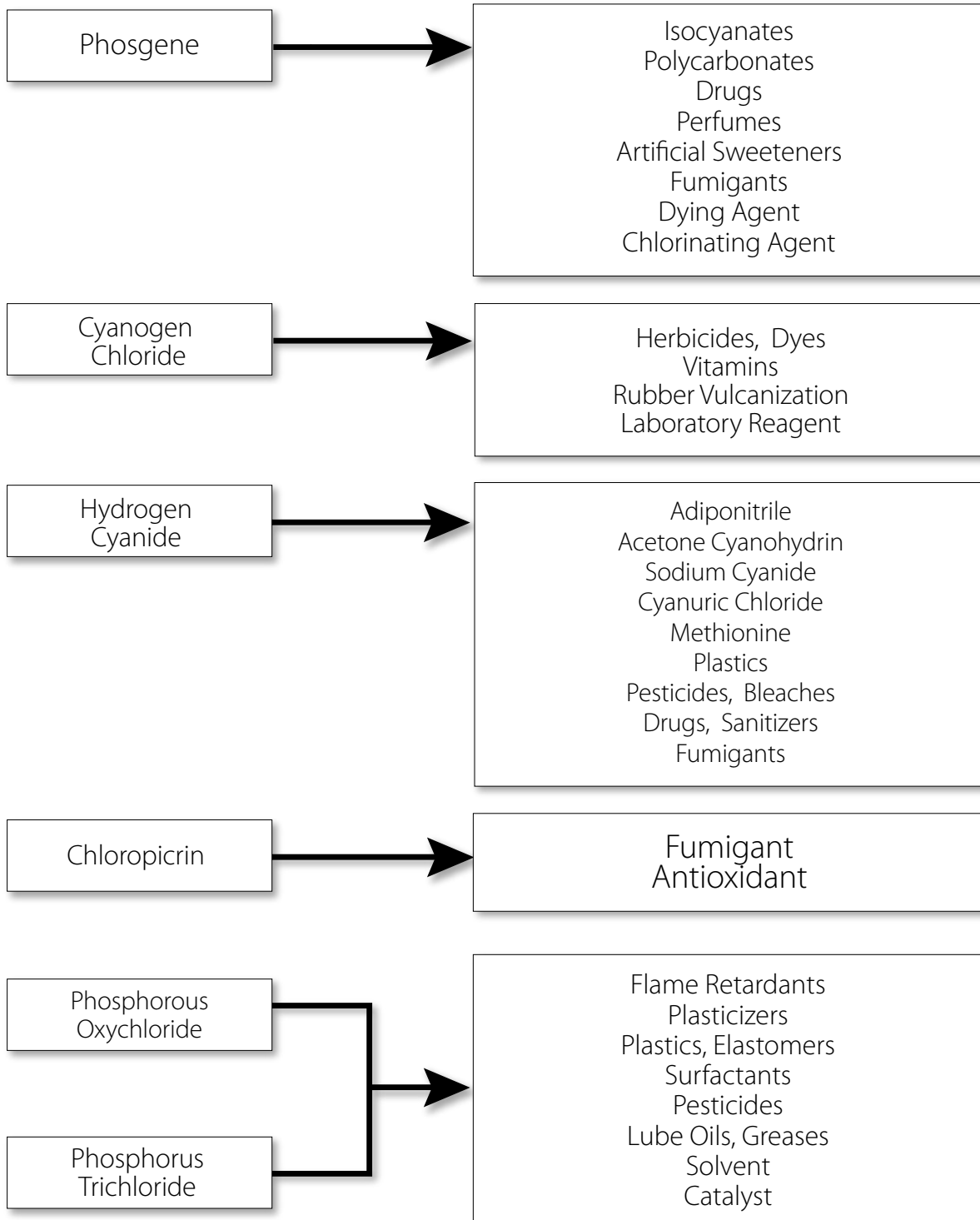
Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Sulfur dichloride; Sulfur chloride (SCl ₂); Dichlorosulfane; Monosulfur dichloride; Sulfur chloride; Dichloro sulfide; Chlorine sulfide (Cl ₂ S); Sulfur(II) chloride; Chloride of sulfur; Chlorine sulfide; Sulfur chloride(mono); UN 1828; chlorine sulfide (Cl ₂ S); sulfur dichloride (SCl ₂); dichloro sulfide; sulfur chloride (SCl ₂); SCl ₂ .	3B13	10545-99-0	2812.10	Uses are similar to that of sulfur monochloride (SEE ABOVE). Lubricating oil additives of types similar to those produced using sulfur monochloride are a significant application for sulfur dichloride. Also useful in the rapid vulcanisation of rubber, and the cross-linking ability of sulfur dichloride is also utilized to modify drying oils for varnishes and inks. Used to make an insecticide intermediate (4,4' - thiobisphenol), and is also an ingredient in the production of the fungicide captafol. Used as a chlorinating agent in the manufacture of parathion insecticide intermediates. Is also used in the food industry in the purification of sugar juices.
Carbonyl dichloride; Carbonic dichloride; Carbon dichloride oxide; Carbon oxychloride; Carbonyl chloride; Chloroformyl chloride; Dichloroformaldehyde; Phosgene; Diphosgene; Phosgene Solution.	3A01	75-44-5	2812.10	Its many different reactions make phosgene an important starting compound in the production of intermediates and products in many branches of large-scale industrial chemistry. Most phosgene is used for the production of di-isocyanates as starting materials of polyurethane chemistry. The reaction of phosgene with alcohols to form chloroformic esters is very important for industrial applications. These esters are exceptionally versatile intermediates for the production of, for example, carbonic esters, as well as for many other applications (e.g. use in the pharmaceutical industry and the production of pesticides). In inorganic chemistry, phosgene is used as an intermediate for the large-scale production of aluminium chloride.

**COMMONLY PRODUCED SCHEDULE 3 CHEMICALS**

Chemicals Names and Synonyms	Schedule	CAS #	HS Code	Commercial Applications/Industrial Uses
Phosphonic acid, diethyl ester; Diethyl phosphite; Diethyl hydrogen phosphite; Diethoxyphosphine oxide; Diethyl acid phosphite; Diethyl hydrogen phosphonate; Diethyl phosphite; Diethyl phosphonate; Hydrogen diethyl phosphite; Ethyl Phosphite; Phosphorous acid diethyl ester; DEPI; O,O-Diethyl phosphonate; OPH(OC ₂ H ₅) ₂ ; Ethyl phosphonate ((EtO) ₂ HPO); Phosphorous acid, diethyl ester; DEP.	3B11	762-04-9	2920.90	Used as a paint solvent, lubricant additive, antioxidant for plastics, reducing agent, intermediate in flame retardants (e.g. in the manufacture of rigid polyurethane foams), and crop protection agents (insecticides), and as a phosphorylating agent. Organic synthesis: is a reactive intermediate for use in chemical synthesis.
Ethyldiethanolamine; Ethanol, 2,2'-(ethylimino)bis-; N,N-Bis(2-hydroxyethyl)ethylamine; 2,2'-(Ethylimino)diethanol; Diethanoethylamine; Ethanol, 2,2'-(ethylimino)di-; Ethylbis(2-hydroxyethyl)amine; N-Ethyl-2,2'-iminodiethanol; N-ethyldiethanolamine; Bis(2-hydroxyethyl)ethylamine; 2,2'-Ethyliminodiethanol; N-Ethyl-Bis(2-Hydroxyethyl)amine; Ethylamine, bis(2-hydroxyethyl)-; N-Bis(2-hydroxyethyl)-N-ethylamine; 2-(N-Ethyl-N-2-hydroxyethylamino)ethanol; 2-[Ethyl-(2-hydroxy-ethyl)-amino]-ethanol, EDEA.	3B15	139-87-7	2922.19	Used in pharmaceutical, agricultural, textile, detergent, cosmetic and metallurgic industries. Used mainly as intermediates, especially in the production of pharmaceuticals, crop protection agents and flocculants. Also important in the preparation of chemicals for the paper and leather industries. Use in the production of plastics has risen substantially in recent years. Direct uses include gas purification methods for removing acidic gases.
Hydrogen cyanide; Hydrocyanic acid; Nitrilomethane; Carbon hydride nitride (CHN); Formic anammonide; Formonitrile; Prussic acid; HCN; Cyclon; Hydrogen cyanide, anhydrous, stabilized (absorbed); carbon hydride nitride; Cyanide of Hydrogen.	3A03	74-90-8	2811.19	Manufacturing of metal polishes, acrylates, cyanide salts, dyes, rodenticides, pesticides, synthetic fibers, plastics, and electroplating solutions. Used in metallurgical and photographic processes, and to produce cyanuric acid. Used as a starting material for nylon 66. Used to fumigate ships and warehouses, and in ore-extracting processes. It is an intermediate for methyl methacrylate, sodium cyanide, aminopolycarboxylic and acid chelating agents, and a raw material for nitriloacids.

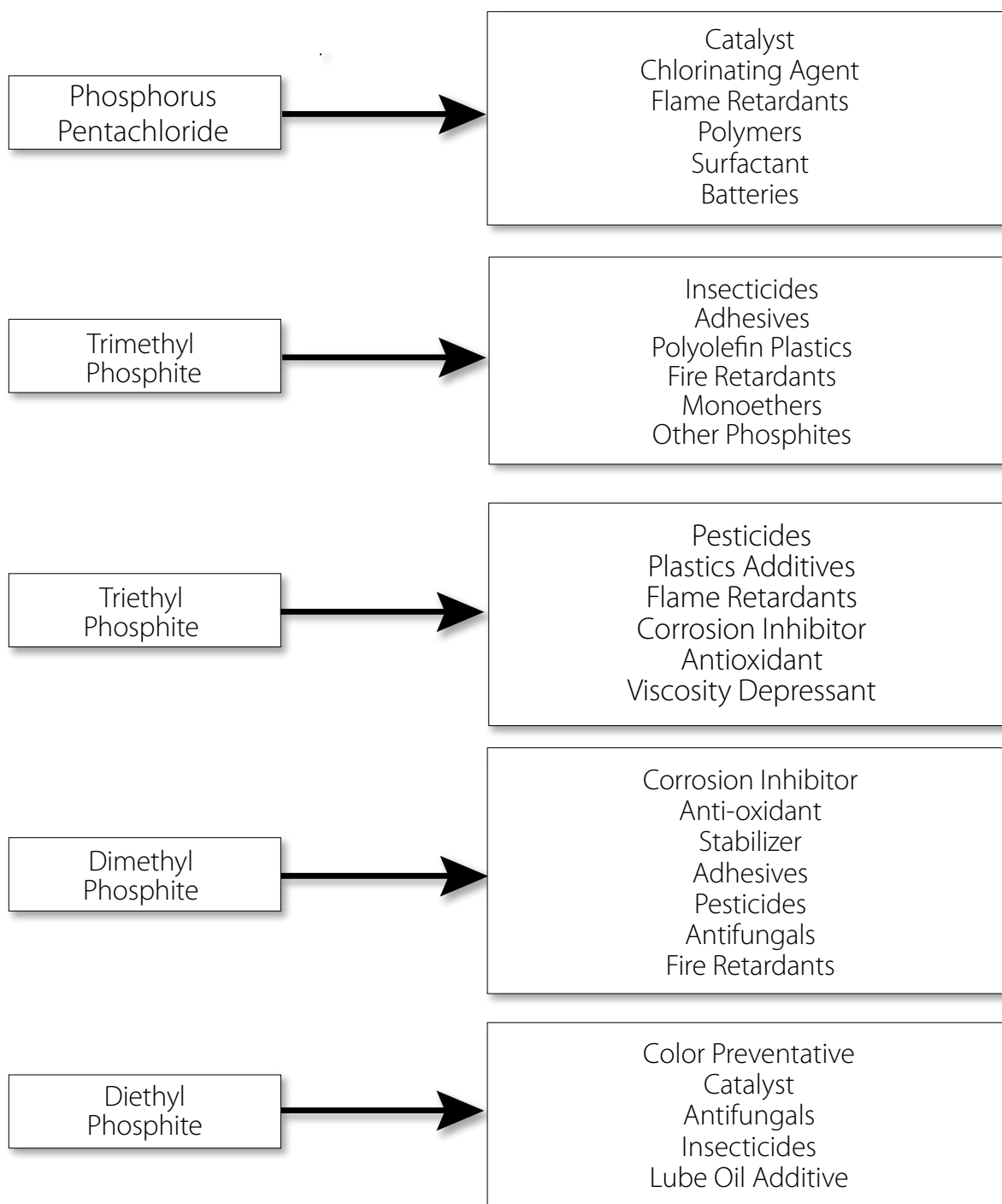


EXAMPLES OF SCHEDULE 3 COMMERCIAL USES



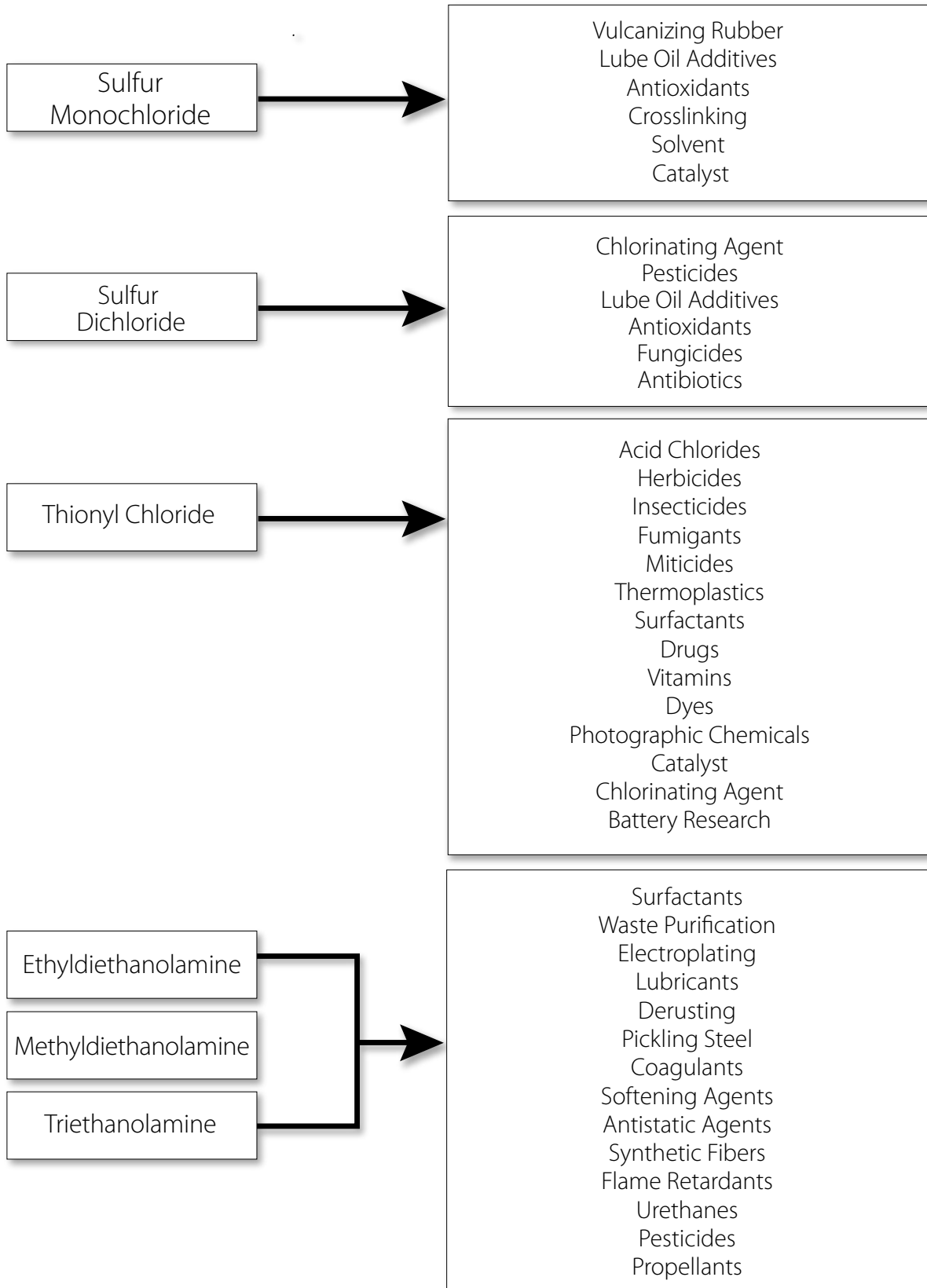


EXAMPLES OF SCHEDULE 3 COMMERCIAL USES





EXAMPLES OF SCHEDULE 3 COMMERCIAL USES





HOW TO IDENTIFY YOUR CHEMICAL INDUSTRY

Overview

- A broad range of chemicals may be subject to data monitoring under the CWC.
- The preceding examples of Scheduled chemical commercial uses illustrate the potential targets for an outreach programme to educate your chemical industry on the data monitoring requirements of the CWC.
- To ensure compliance with the CWC, it is critical to establish a methodology for identifying persons, facilities or trading companies that will be subject to Article VI requirements.

Determination of a Declarable Chemical Industry

- The task of identifying facilities likely to be subject to the CWC is complex.
 - There is no single source of information or general recipe for analysis.
 - There are great differences in the way chemical industries, research and technology are organised between State Parties.
 - There may be little or no government collection of national data regarding chemical activities.
- The OPCW's website, <http://www.opcw.org>, has a methodology for determining the presence or absence of a declarable chemical industry.
- The methodology was developed by the Technical Secretariat through informal consultations with:
 - Governments of States Parties and their agencies;
 - Chemical industry associations; and
 - Chemical industry marketing and manufacturing managers.
- The methodology was also developed by consulting other international chemical organisations and available chemical databases.

Potential Resources to Identify Facilities - Basis for a Search Method

- Schedules of Chemicals in the Annex on Chemicals. (*See Annex on Chemicals found on page 53*).
- Technical Secretariat's Handbook on Chemicals, which can be found at <http://www.opcw.org>.
- Lists of types or categories of Scheduled chemicals.
- Government, association and other organisation databases:
 - Computerised databases;
 - Governmental records and databases, such as:
 - Import and export licenses;
 - Environmental permit records;



- Transportation permits;
 - Port authority permits;
 - Ministry of Finance records;
 - Government enterprise records; and
 - Patent office information.
- Chemical industry associations;
 - Chambers of commerce;
 - Commercial listings and publications;
 - United Nations bodies; and
 - Non-profit public interest institutions.

Approach for Facilities Involved in Scheduled Chemicals

- Review each of the Schedules of Chemicals in the CWC.
- Conduct a study using the Handbook on Chemicals developed by the Technical Secretariat.
- Perform a search for a correlation between types or categories of products, their raw material precursors and/or intermediates and the chemicals.
- Conduct a search within the possible information resources for those industrial facilities involved with relevant types or categories of products.
- Identify facilities possibly involved with Scheduled chemicals with a view to producing an initial list of facilities.
- Refine the initial list of facilities with a view to producing a national industrial facility list for declaration purposes; and
- Use the refined initial list to gather information on the production, processing, consumption, export and import volumes of Scheduled chemicals.

Approach for Facilities Producing Unscheduled Discrete Organic Chemicals (DOCs), Including PSF (Phosphorous, Sulphur, Fluorine) Chemicals

- Conduct a search for a correlation between the chemicals included under the definition of unscheduled DOCs, including PSF-chemicals, and those covered by the lists in Chapters 28 and 29 of the Harmonised System (HS) code.
- Conduct a search within the possible information resources for industrial facilities covered by Chapter 29 of the HS code, with a view to producing an initial list of OCPFs.
- Contact those facilities on the initial list to identify whether they have anything to declare taking into account the thresholds for DOCs and/or PSF chemicals established in Part IX of the Verification Annex.



- Refine the initial list of facilities to produce a national OCPF list for declaration purposes.

Identification of Declarable Activities - Determination of the Presence or Absence of a Declarable Chemicals Industry

- For additional information see page 91 for the Technical Secretariat's paper entitled "Identification of Declarable Activities - Determination of the Presence or Absence of a Declarable Chemicals Industry".

HOW TO DETERMINE IF A CHEMICAL IS SUBJECT TO DECLARATION

Establishing a Chemical Classification Mechanism

- To assist persons, facilities (including plant sites and plants) and trading companies determine whether their chemicals and activities are subject to data monitoring, a State Party should establish a mechanism for conducting chemical classifications.
- The National Authority's staff should include or have access to personnel such as chemists or chemical engineers.

Chemical Classification Process

- A State Party should establish procedures for conducting chemical classifications, such as accepting or receiving a written request or email from a person, facility or trading company.
- The classification request should include the following information:
 - Chemical name and Chemical Abstracts Service (CAS) registry number, if assigned;
 - If a CAS registry number is unknown, identify the structural formula of the chemical
 - Activity involved (i.e., production, processing, consumption, export, import);
 - Quantities, if known; and
 - Purity of chemical in a mixture.
- Upon receipt of the request, the National Authority should consult chemical reference databases or publications to confirm whether a chemical is Scheduled or an unscheduled discrete organic chemical (DOC). Examples include:
 - The OPCW's Chemical Weapons Convention (CWC) chemical database in the Declaration Handbook <http://www.opcw.org/handbook>, which lists chemicals by Schedule.
 - The National Institutes of Health's databases on toxicology, hazardous chemicals, and related areas, www.toxnet.nlm.nih.gov, which can provide a chemical name if you have a CAS registry number or can determine a



CAS registry number for a chemical. This site also shows the structural formula and lists chemical properties.

- Dictionary of Chemical Names and Synonyms, Philip H. Howard, Lewis Publishers, 1992, which can provide a chemical name if you have a CAS registry number or can determine a CAS registry number for a chemical. This publication also contains commonly used names or synonyms for chemicals.

Scheduled Chemicals

- Using reference databases or publications, compare the chemical information supplied by the person, facility or trading company (chemical name and/or the CAS registry number) to determine if it is a Scheduled chemical. If so, conduct the following analysis.
 - Determine if the activity related to that chemical (i.e., production, processing, consumption, export, import) is subject to data monitoring under the CWC.
 - Determine if the concentration of the chemical in a mixture exceeds the thresholds established by the OPCW (e.g., 30% for a Schedule 2B or 3 chemical).
 - Determine if the quantities involved exceed the relevant activity and quantity thresholds for the chemical (e.g., 1 metric tonne for production of a Schedule 2B chemical, 30 metric tonnes for production of a Schedule 3 chemical).
- An affirmative classification for all three aforementioned steps is required for a person, facility or trading company to be subject to declaration.

Unscheduled DOC

- If the chemical is not listed on a Schedule, determine if the chemical is an unscheduled discrete organic chemical (DOC). If so, conduct the following analysis.
 - Determine if the activity related to that chemical (i.e., production by synthesis) is subject to data monitoring under the CWC.
 - Determine if any DOC exemptions apply.
 - Determine if the quantities involved exceed the relevant quantity thresholds for an Other Chemical Production Facility (OCPF) (i.e., 200 metric tonnes of DOCs for a plant site, 30 metric tonnes of a PSF-chemical at one or more plants for a plant site).
- An affirmative classification for all three aforementioned steps is required for an OCPF to be subject to declaration.

Responding to a Chemical Classification Request

- If the National Authority determines that the chemical is not listed on Schedule 1, 2 or 3 does not meet the definition of an unscheduled DOC, or does not meet the threshold requirements for Scheduled or unscheduled DOCs, it should



advise the person, facility, or trading company in writing that the chemical is not subject to data monitoring under the Convention.

- This correspondence establishes an audit trail in the event of a clarification request regarding the declarability of the activities of a person, facility, or trading company.
- If the National Authority determines that the chemical is listed on Schedule 1, 2 or 3, or meets the definition of an unscheduled DOC, and meets the appropriate threshold requirements, it should advise the person, facility, or trading company in writing that the chemical is subject to data monitoring under the Convention.
 - The National Authority should advise the person, facility, or trading company of its obligations to declare pursuant to Parts VI-IX of the CWC's Verification Annex.



Potential Chemical Weapons (CW) Application

Schedule No.	Chemical Name	CAS No.	CW Application
1A(1)	O-Alkyl ($\leq C_{10}$, incl. cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr)-phosphonofluoridates, e.g.,		
	Sarin: O-Isopropyl methylphosphonofluoridate	107-44-8	Nerve agent
	Soman: O-Pinacolyl methylphosphonofluoridate	96-64-0	Nerve agent
1A(2)	O-Alkyl ($\leq C_{10}$, incl. cycloalkyl) N,N-dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidocyanidates, e.g.,		
	Tabun: O-Ethyl N,N-dimethylphosphoramidocyanidate	77-81-6	Nerve agent
1A(3)	O-Alkyl (H or $\leq C_{10}$, incl. cycloalkyl) S-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonothiolates and corresponding alkylated or protonated salts, e.g.,		
	VX: O-Ethyl S-2-diisopropylaminoethyl methyl phosphonothiolate	50782-69-9	Nerve agent
1(A)4	Sulfur mustards, i.e.,		
	2-Chloroethylchloromethylsulfide	625-76-5	Blister agent
	Mustard gas: Bis(2-chloroethyl)sulfide	505-60-2	Blister agent
	Bis(2-chloroethylthio)methane	63869-13-6	Blister agent
	Sesquimustard: 1,2-Bis(2-chloroethylthio)ethane	3563-36-8	Blister agent
	1,3-Bis(2-chloroethylthio)-n-propane	63905-10-2	Blister agent
	1,4-Bis(2-chloroethylthio)-n-butane	142868-93-7	Blister agent
	1,5-Bis(2-chloroethylthio)-n-pentane	142868-94-8	Blister agent
	Bis(2-chloroethylthiomethyl)ether	63918-90-1	Blister agent
	O-Mustard: Bis(2-chloroethylthioethyl)ether	63918-89-8	Blister agent
1A(5)	Lewisites:		
	Lewisite 1: 2-Chlorovinylchloroarsine	541-25-3	Blister agent
	Lewisite 2: Bis(2-chlorovinyl)chloroarsine	40334-69-8	Blister agent
	Lewisite 3: Tris(2-chlorovinyl)arsine	40334-70-1	Blister agent
1A(6)	Nitrogen Mustards:		
	HN1: Bis(2-chloroethyl)ethylamine (538-07-8)	538-07-8	Blister agent
	HN2: Bis(2-chloroethyl)methylamine	51-75-2	Blister agent



	HN3: Tris(2-chloroethyl)amine	555-77-1	Blister agent
1A(7)	Saxitoxin	35523-89-8	Toxin
1A(8)	Ricin	9009-86-3	Toxin
1B(9)	Alkyl (Me, Et, n-Pr or i-Pr) phosphonyldifluorides, e.g.,		
	DF: Methylphosphonyldifluoride	676-99-3	Precursor to Sarin/Soman
1B(10)	O-Alkyl (H or $\leq C_{10}$, incl. cycloalkyl) O-2-dialkyl(Me, Et, n-Pr or i-Pr)-aminoethyl alkyl(Me, Et, n-Pr or i-Pr) phosphonites and corresponding alkylated or protonated salts, e.g.,		
	QL: O-Ethyl O-2-diisopropylaminoethylmethylphosphonite	57856-11-8	Precursor to VX family
1B(11)	Chlorosarin: O-Isopropyl methylphosphonochloridate	1445-76-7	Precursor to Sarin
1B(12)	Chlorosoman: O-Pinacolyl methylphosphonochloridate	7040-57-5	Precursor to Soman
2A(1)	Amiton: O,O-DiethylS-[2-(diethylamino)ethyl]phosphorothiolate and corresponding alkylated or protonated salts	78-53-5	Insecticide with high mammalian toxicity
2A(2)	PFIB: 1,1,3,3,3-Pentafluoro-2-(trifluoromethyl)-1-propene	382-21-8	Choking agent
2A(3)	BZ: 3-Quinuclidinyl benzilate (*)	6581-06-2	Psychoactive agent
2B(4)	Chemicals, except for those listed in Schedule 1, containing a phosphorus atom to which is bonded one methyl, ethyl or propyl (normal or iso) group but not further carbon atoms (Exemption: Fonofos: O-Ethyl S-phenylethylphosphonothiolothionate, CAS 944-22-9), e.g.,		
	Methylphosphonyl dichloride	676-97-1	Precursor to VX, DF, Sarin, chlorosarin and chlorosoman
	Dimethyl methylphosphonate	756-79-6	Precursor to VX, DF, Sarin, chlorosarin and chlorosoman
2B(5)	N,N-Dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidic dihalides		Precursors to Tabun
2B(6)	Dialkyl (Me, Et, n-Pr or i-Pr) N,N-dialkyl (Me, Et, n-Pr or i-Pr)-phosphoramidates		Precursors to Tabun
2B(7)	Arsenic trichloride	7784-34-1	Precursor to Lewisites
2B(8)	2,2-Diphenyl-2-hydroxyacetic acid	76-93-7	Precursor to BZ
2B(9)	Quinuclidin-3-ol	1619-34-7	Precursor to BZ
2B(10)	N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethyl-2-chlorides and corresponding protonated salts		Precursors to VX



2B(11)	N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-ols and corresponding protonated salts		Precursors to VX family, Sarin and Amiton
2B(12)	N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-thiols and corresponding protonated salts		Precursors to VX and Amiton
2B(13)	Thiodiglycol: Bis(2-hydroxyethyl)sulfide	111-48-8	Precursor to mustards (H,Q,T)
2B(14)	Pinacolyl alcohol: 3,3-Dimethylbutan-2-ol	464-07-3	Precursor to Sarin/Soman families
3A(1)	Phosgene: Carbonyl dichloride	75-44-5	Choking agent
3A(2)	Cyanogen chloride	506-77-4	Blood agent
3A(3)	Hydrogen cyanide	74-90-8	Blood agent
3A(4)	Chloropicrin: Trichloronitromethane	76-06-2	Blood agent
3B(5)	Phosphorus oxychloride	10025-87-3	Precursor to VX, DF, Sarin, chlorosarin and chlorosoman
3B(6)	Phosphorus trichloride	7719-12-2	Precursor to VX, DF, Sarin, chlorosarin and chlorosoman
3B(7)	Phosphorus pentachloride	10026-13-8	Precursor to VX, DF, Sarin, chlorosarin, and chlorosoman
3B(8)	Trimethyl phosphite	121-45-9	Precursor to VX, DF, chlorosarin and chlorosoman
3B(9)	Triethyl phosphite	122-52-1	Precursor to nerve agents
3B(10)	Dimethyl phosphite	868-85-9	Precursor to VX, DF, chlorosarin and chlorosoman
3B(11)	Diethyl phosphite	762-04-9	Precursor to nerve agents
3B(12)	Sulfur monochloride	10025-67-9	Precursor to Mustard (H), arsenic trichloride
3B(13)	Sulfur dichloride	10545-99-0	Precursor to Mustard (H)
3B(14)	Thionyl chloride	7719-09-7	Precursor to sulfur mustards, nitrogen mustards, arsenic trichloride, VX, DF, chlorosarin and chlorosoman



3B(15)	Ethyldiethanolamine	139-87-7	Precursor to HN1
3B(16)	Methyldiethanolamine	105-59-9	Precursor to HN2
3B(17)	Triethanolamine	102-71-6	Precursor to HN3



IDENTIFICATION OF DECLARABLE ACTIVITIES DETERMINATION OF THE PRESENCE OR ABSENCE OF A DECLARABLE CHEMICAL INDUSTRY

1. Introduction

The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction requires a State Party to the Convention to declare all relevant military and civilian facilities which are subject to declaration not later than 30 days after the Convention enters into force (EIF) for it and subsequently on an annual basis.

Most military and Schedule 1 facilities are under the centralised control of the governmental authorities of States Parties and are, therefore, much easier for a government to identify. Civilian industrial facilities, however, particularly in countries with a free market economy or in economic transition, are less likely to be subject to central government control and accountability. Therefore, industry databases available to government agencies, including the CWC National Authority, might not be suitable to identify accurately those facilities probably subject to the provisions of the CWC. This makes the task of identifying facilities likely to be covered by the Convention, in particular with regard to facilities possibly involved in activities with scheduled chemicals, complex and rather difficult.

In the light of this difficulty, some States Parties have requested advice from the Technical Secretariat and have urged the development of a search methodology as a guideline to tracking down civilian chemical industry facilities covered by the CWC.

In an attempt to respond to these requests, the Technical Secretariat conducted informal consultations with:

1. governments of States Parties and their agencies;
2. chemical industry associations; and
3. chemical industry marketing and manufacturing managers.

In addition, the Technical Secretariat consulted other international chemical organisations and available chemical databases.

It was clear that there is no unified source or a general recipe for readily identifying the presence or absence of chemical facilities that might be subject to the Convention. Complications in the identification arise, inter alia, from the absence of direct links between kinds of products, product names, chemical trade names, and scientific chemical nomenclature. Such complications make the design and execution of data searches in compendia of data from technical literature, government agencies, trade organisations, marketing surveys, customs records, and other resources very difficult.



There are also great differences in the way chemical technology, research facilities, and chemical industries are organised from one State Party to another. Declarable chemical activities may be carried out in medical institutes, pharmaceutical production facilities, industrial plant sites, pilot plants or laboratories, either under private ownership or under government control.

Oversight of chemical activities by environmental, labour or other agencies may or may not exist. Even where such oversight is carried out, the national legislation may preclude the use of data gathered for one purpose being used for any other purpose. Moreover, in many cases there is simply no national list of all products and chemicals which are produced, processed or consumed within a country's borders.

2. General Approach To Identifying Facilities Probably Covered By The CWC

Bearing in mind the above considerations, the Technical Secretariat has developed a general suggested approach to help in identifying facilities to be declared under the provisions of the CWC. This approach is based on a list of potential resources that States Parties may be able to access, together with general guidance on how to utilise these resources to facilitate the identification process.

2.1 Potential Resources

Among the many available resources on the basis of which a search method can be designed to identify declarable and inspectable facilities, the following should be mentioned:

- (a) Schedules of chemicals, as they appear in the Annex on Chemicals and the definition of discrete organic chemical (DOC), including unscheduled discrete organic chemicals containing the elements phosphorus, sulfur, or fluorine (PSF-chemicals) as defined in the Verification Annex, Part I, paragraph 4 and Part IX, paragraph 1;
- (b) The Handbook on Chemicals developed by the Technical Secretariat as an aid to States Parties in identifying declarable activities. This lists nearly 1000 individual chemicals that fall in the Schedules of chemicals in the CWC in the Annex on Chemicals and is particularly useful to assist in recognising chemicals included in the various groups listed in Schedules 1 and 2;
- (c) Lists of types or categories of products that could include scheduled chemicals in their manufacturing steps, whether as raw materials, precursors, intermediates or products. An illustrative and non-exhaustive list of types or categories of products is available. A list of Schedule 2 and 3 Chemicals - Products/Applications per Industry Sector known to the Secretariat has also been drafted and will be maintained to reflect new information as it becomes available. Moreover, illustrative groups of organic chemical products taken from Chapter 29 of the Harmonised System (HS) code of the World Customs Organisation (WCO) could be used as a compendium of chemical activity areas, in particular regarding



the identification of manufacturers of DOCs. Chapter 28 of the HS code covers some other scheduled chemicals;

(d) Possible information resources where a link between facilities and products is available, namely:

- computerised commercial databases;
- government records and databases (in particular, customs records);
- chemical and related industry associations;
- chambers of commerce;
- non-computerised commercial listings and information;
- relevant UN bodies and non-profit public interest international foundations and institutions, non-governmental organisations, etc.; and
- the Internet.

2.2 General Guidance

The proposed approach for setting up a general search sequence is presented below for scheduled chemicals under (a) and for DOCs including PSF-chemicals under (b). This approach is based on the assumption that the potential resources listed in subparagraph 2.1 c. above are available and are made accessible to National Authorities or to other agencies charged with the identification of facilities. It must be emphasised that the search can begin at any point in the process, e.g. a National Authority with an excellent industry facility database might simply compare this database with the chemicals mentioned in the CWC in order to establish an initial facility list. For National Authorities with less precise information resources the whole procedure may need to be completed.

(a) Approach for facilities involved in scheduled chemicals

In general, the approach for facilities involved in scheduled chemicals entails the following:

- a review of each of the Schedules of chemicals in the CWC;
- this can be augmented with a study of the Handbook on Chemicals developed by the Secretariat;
- a search for a correlation between types or categories of products, their raw material precursors and/or intermediates and the scheduled chemicals;
- a search within the possible information resources for those industrial facilities involved with relevant types or categories of products;
- the identification of facilities possibly involved with scheduled chemicals with a view to producing an initial list of facilities; and
- the refinement of the initial list of facilities with a view to producing a national industrial facility list for declaration purposes; and the use of the refined initial list to gather information on the production, processing, consumption, import and export volumes of scheduled chemicals.



(b) Approach for facilities producing unscheduled discrete organic chemicals including PSF-chemicals

The definition of discrete organic chemical (DOC) is contained in the Verification Annex, Part I, paragraph 4:

"Discrete Organic Chemical" means any chemical belonging to the class of chemical compounds consisting of all compounds of carbon except for its oxides, sulfides and metal carbonates, identifiable by chemical name, by structural formula, if known, and by Chemical Abstracts Service registry number, if assigned.

PSF chemicals are defined in the Verification Annex, Part IX, paragraph 1:

...an unscheduled discrete organic chemical containing the elements phosphorus, sulfur or fluorine (hereinafter referred to as ... "PSF-chemical").

The proposed approach for facilities producing unscheduled discrete organic chemicals including PSF-chemicals differs somewhat from that considered for scheduled chemicals. The difference arises because the term "discrete organic chemical" could be applied to virtually any organic chemical as compared with those included in the schedules of chemicals of the CWC, which are specific chemicals (even if these chemicals are noted as a group).

Thus, in this case, the approach can be the following:

- a search for a correlation between the chemicals included under the definition of unscheduled discrete organic chemicals including PSF-chemicals and those covered by the lists in types or categories of products and/or groups of products covered under Chapter 29 of the Harmonised System (HS) code, as well as Chapter 28 of the HS code, including their starting materials and intermediates;
- a search within the possible information resources for industrial facilities involved with types or categories of products or chemicals covered by Chapter 29 of the Harmonised System (HS) code, with a view to producing an initial list of facilities;
- contacts with those facilities on the initial list to identify whether they have anything to declare taking into account the thresholds and ranges for DOCs and/or PSF-chemicals established in Part IX of the Verification Annex; and
- the refinement of the initial list of facilities to produce a national industrial facility list for declaration purposes.

(c) Remarks

During the search process it should be borne in mind that the Convention establishes a verification regime only for:

- Schedule 1 chemical production facilities;
- Schedule 2 chemical production, processing and consumption plants;
- Schedule 3 chemical production facilities; and



- Other chemical production facilities (OCPFs) manufacturing unscheduled discrete organic chemicals (DOCs) including PSF-chemicals.

On the other hand, there are certain chemical activities that are specifically excluded from consideration. These chemical activities are those dealing with:

- Oxides and sulfides of carbon and metal carbonates;
- Plant sites that EXCLUSIVELY produce hydrocarbons (i.e. chemicals containing only carbon and hydrogen, irrespective of the number of carbon atoms in the compound);
- Plant sites that EXCLUSIVELY produced explosives;
- Oligomers and polymers (per the decision of the First Conference of the States Parties, C-I/DEC.39 of 16 May 1997);
- Compounds containing only carbon and metal (per the decision of the First Conference of the States Parties, C-I/DEC.39 of 16 May 1997);
- Compounding/processing plants except those that process Schedule 2 chemicals (e.g. polymer compounding plants or formulating plants); and
- Extraction or purification activities -- except for Schedule 2 chemicals -- where no chemical change occurs to the chemical in question during the activity.

The chemical facilities identified in any search, but which are considered excluded in terms of the above should, however, be periodically reviewed at a national level, in order to make sure that they do not include other activities likely to be covered by declaration and inspection procedures. For example, it is possible that a plant site that produces only polyurethane polymers is nevertheless declarable because it is compounding the polymers with the Schedule 2 fire-retardant chemicals DMMP or DEEP. Similarly, a petroleum refinery might, on the same site, be manufacturing additives that are DOC or PSF chemicals, for the purpose of formulating them into lubricating oils or petroleum fuels.

A general approach such as that just described here will not of itself guarantee the completeness of the eventual list of facilities. The effectiveness of any search methodology is only as good as the information in the accessed resources and the quality of the effort to make effective use of the information. In relation to the last point, it is clear that the National Authority should be in a position not only to thoroughly know the provisions of the Convention and be aware of the current status of their interpretation within the OPCW, but to understand the implications of the results of a search process and be able to judge technically from this how to proceed. It has been shown in practice that it is highly beneficial for a National Authority to have on its staff at least one person knowledgeable in organic chemistry and also familiar with the chemical industry. Alternatively, the National Authority could contract in the services of such expertise on a consultancy basis to assist it in preparing its declarations.

The approach outlined here could quite possibly overestimate the number of declarable facilities, as the correlation between the Schedules of chemicals and the types or categories of products is not as straightforward as may appear to be the case.



Any initial list of facilities generated by the proposed search procedure will probably include facilities that are neither involved with any scheduled chemicals nor with relevant unscheduled DOCs. Whether or not the listed facilities actually produce, process, or consume scheduled chemicals will require further inquiries involving contact with the facility management.

Even if it turns out that a facility does produce, process or consume scheduled chemicals, a further screening must be conducted in relation to the quantities and concentrations of the chemical(s) involved in order to confirm whether the activity is declarable or not. The search methodology is thus an approach that compiles a list of potential declarable sites and then eliminates from that list those sites that do not in fact qualify for declarations.

It is important to note that available information resources will differ from one country to another. A successful effort in one country will, therefore, not guarantee a similarly successful effort in another.

In the case of a country planning to ratify or accede to the Convention, it is essential that an effective National Authority be identified as early as possible and empowered to prepare for the submission of the initial declarations. The National Authority will need to start conducting surveys for the purpose of data acquisition, particularly where governmental data is concerned, at the earliest possible time. As noted above, there are but 30 days after entry into force (EIF) of the Convention for each State Party to make its declarations to the OPCW. In this way the National Authority will be able to:

- estimate the amount of work and the costs involved in implementing the Convention at EIF;
- compile aggregate information about chemical facilities, plants and plant sites; and
- identify those resources which can assist the national implementation and legislation process.

In the case of an existing State Party, it should be emphasised that the preparation for the submission of the initial declarations, whilst a formidable task, cannot be considered to be the final activity in the implementation process. The chemical industry is, especially in volatile economic times, an extremely variable sector of the economies of most countries. There is a never-ending succession of mergers, acquisitions, bankruptcies, reorganisations, etc. which frequently impacts on the list of facilities that are declarable and inspectable in terms of the CWC. It is thus of paramount importance that the data acquisition process described above should be an ongoing activity of the National Authority, to ensure that the annual declarations are correct. The OPCW can only be as effective and efficient in its verification activities as the quality of these declarations allow.

It is hoped that this general approach will assist States Parties in their continuous implementation efforts. The Secretariat can, upon request, provide necessary advice and assistance to States Parties with regard to the implementation of this approach.



Possible Information Resources for Identifying Declarable Activities

How to associate products with facilities

1. Computerised databases

In principle it must be said that there is no computerised, commercially available database that is designed to provide a user with the ability to directly correlate lists of chemicals with lists of organisations which produce, process or consume those chemicals. However, it is possible to locate some data for some of the scheduled chemicals for facilities in some countries. Databases that have the ability to search their data by chemical name or by chemical identification numbers such as CAS or EINECS (European Inventory Existing Commercial Chemical Substances) are particularly useful. Databases are published and licensed by a number of commercial firms, for example the Scientific and Technical Information Network, International (STN) headquartered in Karlsruhe, Germany and Dialogue Information Services, Inc., located in Palo Alto, California, USA. These companies will license users to access specific databases via telephone modems and will then charge the users for the computer time spent using the databases. inter alia:

Chemical Abstracts	Can be searched by chemical and will contain source data including names of organisations and chemical industry facilities; worldwide coverage.
Chemical Business News Base	Includes chemicals, pharmaceuticals, agrochemicals with News Base correlations to companies and countries. Possible source of manufacturing volume information; worldwide coverage.
Cheminform RX	Correlates products with their chemical reactants.
Chemical Industry Notes	Correlates specific chemicals with business activities; worldwide coverage.
Chem Sources (CSCHEM)	Correlates chemical products and suppliers; worldwide coverage.



CSCORP	Correlates chemical products and suppliers; worldwide coverage.
Gmelin	Primarily scientific information, but will also access patent data which can be used for organisation/company correlations; worldwide coverage.
Phar	Correlates company names with products and associated chemicals; worldwide coverage.
Beistein Online	Primarily scientific information, but will also access patent data which can be used for organisation/company correlations; worldwide coverage.
Derwent World Patents Index	Can correlate chemicals and organisation/companies; worldwide coverage.
EINECS	European listing of 100,000 substances including very toxic substances (available on CD-ROM).

2. Governmental records and databases

All governments collect and organise import/export, financial, transport, tax, employment data etc. Most governments will try to organise this data in a such way as to allow it to be readily available for planning and reference purposes. Examples are the following:

Import and Export Licenses

The majority of States employ a so-called Harmonised System (HS) of tariffs which is based on numerical designators for products. Since the licenses are applied for by organisations and companies, a correlation can then be made between a type (or category) of product of the HS and the organisation/company. In many countries the HS records are amplified in the case of chemical products to include indication of specific chemicals identified by CAS or EINECS numbers. Unfortunately this detailed information, which is directly applicable to the facility identification process, is often protected by privacy legislation. In many countries the chemical industry is required to notify certain governmental agencies of the use of chemical substances to produce products. Familiar lists include the European Community's EINECS list, the United States of America's Toxic



Substances Control Act Inventory, the Australian Inventory of Chemical Substances, the Japanese Ministry of Trade and Industry List, etc. These lists are supported by detailed information on chemical production locations and production volumes. Any changes are periodically updated so that these lists and their supporting data remain evergreen. However, as in the cases of import and export data, privacy laws often preclude access to the information.

Environmental Permit Records

Many countries have environmental laws which require extensive application procedures to prove that chemical industry production and plant construction plans are consistent with the environmental interests of the country. This process involves the provision of precise chemical process and facility location information. Where this information is organised on a regional or national level it will be an excellent source of chemical versus facility information.

Transportation Permits

Environmental and safety concerns have led many countries to require permits to move chemical products by rail, barge, ship, and truck. These permits will include the name of the chemical(s) and facility source/destination information. Where this information is organised on a regional or national level, it can be used to identify facilities involved with specific chemicals.

Port Authority Permits

Closely related to the transportation permits are permits to berth ships laden with chemicals. These permits will contain specific chemical, ownership and transporter information.

Ministry of Finance Records, Government Enterprise Records, Patent Office Information

The ways in which countries tax organisations and companies operate on their territory is highly variable. The information concerning organisation/company operations, coincident with collection of financial data, is also variable. In countries with nationalised industry (governmentally owned and operated chemical plants/operations), and/or military operated chemical facilities, the National Authority may be able to directly access chemical and production volume data. In this case, considerations concerning security may affect access. Most countries have patent offices which will have carefully cross-referenced information on the organisations/companies which have applied for patent coverage for their products. Searches can be pursued by manual or electronic means to correlate specific chemical and organisation/company identifications. Because the patent applications will also contain pertinent references to other organisations/companies which pursue related chemical activities, the location of one useful patent will often result in leads to additional organisations and companies. After the patent application process is complete, the patents and their information are a matter of public record and are readily accessible to researchers.



3. Chemical Industry Associations

In many countries chemical industrial firms have established organisations which are supported by the financial contributions from member firms and which function to promote interests common to most members. These organisations will have a large proportion of member companies which are basic producers of chemicals. They will also tend to have larger chemical companies as members as opposed to smaller processors and consumers. Thus these associations cannot be expected to represent or even know of all chemical users in their respective countries. However, they will typically cover the firms responsible for a majority of chemical production activities. Some of these organisations have also undertaken activities in relation to the interests of specific subdivisions of their membership. Thus, subcommittees may exist for work on projects related to organophosphorus chemicals, phosgenes, etc. These organisations are excellent sources to canvas for facility information. Whereas it is difficult to search for generic chemical information in an electronic database, a panel of technical and business experts can easily address generic subject matter.

Other industry associations can also be used as resources. In some cases chemicals and facilities which pursue activities relevant to the Convention are members of organisations which do not consider themselves to be "chemical". These can include pharmaceutical, pesticide, and agrochemical associations. As in the chemical industry, these associations promote the common interests of their membership.

4. Chambers of Commerce

Many countries have national and regional chambers of commerce, which are organisations geared to promote the commercial and financial interests of their membership. Although these organisations are not typically focused on the chemical industry, they do have a spectrum of kinds of businesses. This diversity can be especially valuable in locating facilities in which venture projects might be using small quantities of Schedule 1 chemicals for research; or in locating companies which might be involved in the processing or consumption of Schedule 2 chemicals at low volumes in terms of production, but are still above Convention threshold use levels. Organisations such as these may not be members of chemical or other industry associations, and therefore will not be "counted" by these production-oriented organisations. Thus, chambers of commerce can be used to supplement the information available through the larger chemical industry and related organisations and, in relation to Schedule 2, to identify downstream industries that may be declarable.

5. Commercial Listings and Publications

The focus of this resource entry is on those listings or reference volumes which are available in book, magazine or newspaper format. It should be noted that some of those that are periodical in nature may also be available in electronic format or even through an on-line data system. These resources include, *inter alia*:



Chem Sources International 1996 Edition
Directory of World Chemical Producers
OPD Chemical Buyers Directory
Ullman's Encyclopaedia of Industrial Chemistry
Pesticide Manufacturing and Toxic Substances Control
Stanford Research Institute Index (SRI)
Pharmaceutical Manufacturing Encyclopaedia, 2nd Edition
Thomas Directory
Handbook on Scheduled Chemicals, Canada, August 1993
Kirk Othmer E.C.T., 4rd edition, John Wiley, NY
Catalogue of the US Congress Library.

6. Illustrative United Nations Bodies and Non-Profit Public Interest Foundations/Institutions

The following organisations are presented as examples of possible information resources. The listing is not complete and does not constitute an endorsement of the work of these organisations by the Secretariat.

UNIDO- United Nations Industrial Development Organisation
UNFAO- United Nations Food and Agriculture Organisation
ILO- International Labour Organisation
ECETOC- European Centre for Ecotoxicology and Toxicology of Chemicals
CSIC- Centre for Strategic and International Studies
SIPRI - Stockholm International Peace Research Institute
Monterey Institute of International Studies
The Henry L. Stimson Centre

