



## ORGANIC CHEMICALS POTENTIALLY CONTAINING POLYCHLORINATED BIPHENYLS

Note: The following was transcribed from copies of EPA rulemaking records from "Polychlorinated Biphenyls (PCBs); Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions: Exclusions, Exemptions and Use Authorizations" Doc No. OPTS-62032. Due to the poor quality of these photocopies, mistakes cannot be ruled out.

### ORGANIC CHEMICAL PROCESSES LEADING TO GENERATION OF INCIDENTAL POLYCHLORINATED BIPHENYLS

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**Table 1. Summary of organic chemical product classes potentially containing inadvertently generated PCBs. \***

Chlorinated Compounds Produced Using Direct Chlorination	Chlorinated Compounds Produced Using Chlorinated Feedstocks	Non-Chlorinated Compounds Produced Using Chlorinated Feedstocks	IPPEU No. **
Petroleum Feedstock: BENZENE			
Chlorinated benzenes	Chloronitrobenzenes	Phenol	8
Chlorinated phenols	Dichloronitrobenzenes	Aniline	9
Hexachlorocyclohexane	Dichloroanilines	o-Phenylenediamine	28
Chloroanilines	Chlorinated methyl phenols	o-, p-Nitroanilines	29
Trichloroanilines	Chlorophenyl phenylethers	Diphenylamine	34
	Chlorinated benzidines	Acetanilide	17

Petroleum Feedstock: ETHYLENE			
Mono, di-chloroacetic acid	Ethyl chloroacetate	Glycine	108
Sodium chloroacetate	Vinyl chloride	Cyanoacetic acid	111
Chlorinated ethanes	Vinylidene chloride	Sodium, carboxymethyl cellulose	112
Chlorinated ethylenes	Bis (2-chloroethyl) ether	Ethyl cellulose	118
Ethylene chlorohydrin	Chlorinated acetophenones	Ethylene diamine	134
Chlorinated, fluorinated ethanes	Choline chloride	Aminoethylethanolamine	135
Chlorinated, brominated ethylenes	Hexachlorobutadiene	Mono-, di-, and triethylene glycol ethers	150
Chlorinated, fluorinated ethylenes		Tetramethylethylene diamine	(3341)
Chlorinated acetaldehyde			
Chlorinated acetyl chloride			
Hexachlorobenzene			
Petroleum Feedstock: METHANE			
Chlorinated methanes	Chlorinated, fluorinated methanes	Carbon tetrabromide	162
Phosgene	Chlorinated, brominated methanes	Carbon tetrafluoride	(812)
Tetrachloroethane	Bis (chloromethyl) ether		
Chlorodifluoroethane (?)	Cyanuric chloride		
Perchloromethyl mercaptan (?)	Trichloroethylene		
Cyanogen chloride			
Petroleum Feedstock: NAPHTHALENE			
Chloronaphthalenes			
Tetrachlorophthalic anhydride			
Petroleum Feedstock: PARAFFINS			
n-Propyl chloride		n-Propylamine	231
Carbon tetrachloride		Butyronitrile	232
Perchloroethylene		Amyl amines	243
Hexachloroethane		Amyl alcohols	244
Amyl chlorides		Amyl Mercaptans	245
Chloroprene		Benzophenone	249
Hexachlorocyclopentadiene		Linear alkylbenzenes	(2417)
Methallyl Chloride			

Petroleum Feedstock: PROPYLENE			
Dichlorohydrin	Epichlorohydrin	Isopropylphenols	272
Chloranil	Bis(2-chloroisopropyl)ether	Propylene oxide	280
Propylene chlorohydrin		Anisols	302
Chlorinated propanes		Allyl alcohol	317
Chlorinated propylenes		Glycerol	318/319
		Propyl amines	(1446)
Petroleum Feedstock: TOLUENE			
Benzyl chloride	Benzoyl chloride	Benzyl alcohol	334
Benzyl dichloride		Benzyl amine	335
Benzyl trichloride		Benzamide	337
Chlorotoluenes		Toluenesulfonamide	358
Chlorobenzaldehyde		Benzoyl peroxide	(495)
Chlorobenzoic acids & esters			
Chlorobenzoyl chlorides			
Toluenesulfonyl chloride			
Chlorobenzotrichlorides			

\* This list was generated based on a systematic review of the organic chemical manufacturing process descriptions for approximately 600 chemicals presented in the following documents:

1. U.S. EPA – 1977. Industrial process profiles for environmental use: Chapter 6. The Industrial Organic Chemicals Industrial Cincinnati, Ohio: U.S. EPA, Office of Research and Development. EPA-600/2-77-0231
2. U.S. EPA – 1980. The Revised Organic Chemical Products Data Base System. Cincinnati, Ohio: U.S. EPA, Office of Research and Development. EPA-600/2-80-164.

\*\* The IPPEU No. refers to the process description in the 1977 U.S. EPA document cited above. Those numbers bracketed by parentheses refer to the OCPDB numbers in the 1980 U.S. EPA document cited above.

**Table 2. Additional organic chemical product classes potentially containing inadvertently generated PCBs not specifically listed in Table 1.**

Petroleum Feedstock: ETHYLENE

Chlorinated acetonitriles  
 Chlorodifluoro acetic acid  
 Chlorinated ethylamines  
 2-Chloroethyl phosphonic acid

Petroleum Feedstock: METHANE

Alkyl chloroformates  
 Aryl chloroformates  
 Chloromethyl phosphonic dichloride  
 2,2,2-Trifluoroethyl trichloromethane sulfonate  
 Trichloromethane sulfonyl chloride  
 Chloromethyl phenyl sulfide  
 Chloromethyl methyl sulfide

Petroleum Feedstock: PROPYLENE

Chlorinated propanols  
 Chlorinated propanediols  
 Aliphatic-chloroacrylates  
 Chloral  
 2-Chloropropionamide  
 Ethyl-chloropropionamide  
 Ethyl-chloropropionate  
 B-Chloropropionitrile  
 Chloroacetone  
 2-Chloro-N,N-dimethyl (n an diso) propylamine  
 3-Chloro-2-hydroxypropane sulfuric acid

Petroleum Feedstock: TOLUENE

Chlorinated benzylamines  
 Chlorogenic diesters  
 Fluorobenzyl chloride  
 Fluorobenzoyl chloride  
 Chlorotrifluorotoluene  
 Dichlorobenzotrifluoride  
 Dichlorobenzotrifluoride  
 Amino-chlorobenzotrifluoride  
 Chlorofluorotoluene  
 Dimethoxy benzoyl chloride  
 Chlorofluorobenzyl chloride  
 Chlorobenzyl mercaptan  
 Chlorobenzyl hydroxyethyl sulfide

Petroleum Feedstock: NAPHTHALENE

Chloronaphthol  
 Ethoxynaphthoyl chloride  
 Diethylamino naphthalene sulfonyl chloride

Petroleum Feedstock: PARAFFINS

Chlorinated unsaturated paraffins  
 Chlorinated saturated paraffins  
 Chlorobutanol  
 Chlorobutyronitrile

Dichloro dibutyl ether  
 Chlorolactic acid  
 Chlorophenetole

Petroleum Feedstock: BENZENE

Chlorosalicylic acid  
 Chlorosalicylaldehyde  
 Hexachloroparaxylene  
 Biphenyl, 4,4' – disulfonyl chloride  
 Dimethoxy benzophenones  
 Dimethyl benzophenones  
 p-Chloromercuriphenol  
 Alkylbenzene sulfonic acids & salts  
 Nitrochloroacetanilide  
 Nitrochloroaniline  
 Chlorofluoroaniline  
 Chlorodimethoxy aniline  
 Chloro-hydroxy-dimethoxy naphthanilide  
 Chloro-hydroxy-naphth-o-toluidide  
 Chlorosalicylanilide  
 Chlorotoluidide  
 Diethyl and dimethyl amino benzene diazonium chloride salts  
 Chlorinated phenyl isocyanates  
 Chlorohydroquinones  
 Chlorocresol  
 Chloroxylenol  
 Chlorobenzophenol  
 Chloroansidine  
 Chloroanisol  
 Chlorostyrene  
 Chlorobenzene sulfonamide  
 Chlorobenzotriazole  
 Dichloroaminotriazole  
 Chlorophenylenediamine  
 Chlorophenyldiethanolamine  
 Dichlorobenzil  
 Chlorophenyl acetonitrile  
 Chlorothymol  
 Chlorofluorobenzene  
 Chlorofluoronitrobenzene  
 Chloroxylene  
 Trichlorophenoxy acetic acid  
 Chloronitrobenzoic acid  
 Chlorobenzene sulfonic acid & esters  
 Nitrophenyl sulfonyl chloride  
 Dichlorophenyl acetic acid  
 Chlorophenyl thioacetoneitrile  
 Chlorophenyl hydroxyethyl sulfide  
 Chlorophenyl chloromethyl sulfide  
 Chlorophenyl chloroethyl sulfide  
 Chlorobenzene thiol

CHLOROSILANES

Phenylchlorosilane  
 Vinyl trichlorosilane  
 Methyl chlorosilane

Chloromethyl dimethylchlorosilane  
Trimethylchlorosilane  
Dichloromethylsilane  
Trichloromethylsilane

ALKYL AND ARYL PHOSPHINES AND PHOSPHATES

Methyl phosphoro dichloride  
Methyl phosphonic dichloride  
Benzene phosphorous dichloride  
Benzene phosphorous thiochloride  
Tri-(B-chloroethyl) phosphate  
Tri-(dichloropropyl) phosphate  
Ethyl phosponothiolic dichloride  
Ethyl phosphorus dichloride  
Methyl phosphonothioic dichloride  
Diethyl chlorophosphate  
Diethyl phosphorochloridothioate  
Bis-(2-chloroethyl) phosphonate  
Bis-(2-chloroethyl) vinyl phosphonate

CHLORINATED PIGMENTS/DYES

CHLORINATED PESTICIDES