

# **Appendix I**

## **Particularly Hazardous Substances**

# Peroxide-Forming Chemicals

Organic peroxides are some of the most hazardous substances handled in a laboratory. They are usually sensitive to shock, sparks, or accidental ignition. These chemicals tend to be more shock-sensitive than most primary explosives that we are familiar with such as TNT. An example of a particularly dangerous situation that may be found in a lab is an ether bottle that has evaporated to dryness. In some chemicals, inhibitors are added to extend the storage lifetime of the chemical. However, because distillation of such a stabilized liquid will remove the inhibitor, the end product must be stored with care as a potential peroxide-former. Please note: peroxide may form on the surface of alkali metals and their amides. Do not perform standard peroxide tests to these materials (alkali metals & their amides) since they are water reactive. All of these chemicals should be purchased in small quantities and used up as soon as possible.

Georgia Fire Code (based on NFPA 45 (1991)) requires that all peroxide forming chemicals be dated upon opening. It is also prudent to date these chemicals upon first arrival in the facility. Unopened peroxide forming chemicals should not be used if greater than 1 year old.

## Types of Compounds Known to Auto oxidize to Form Peroxides:

- Aldehydes
- Ethers, especially cyclic ethers and those containing primary and secondary alkyl groups (never distill an ether before it has been shown to be free of peroxides).
- Compounds containing benzylic hydrogens
- Compounds containing allelic hydrogens ( $C=C-CH$ ), including most alkenes; vinyl and vinylidene compounds
- Compounds containing a tertiary C-H group (e.g., decalin and 2,5-dimethylhexane)

## Classes of Chemicals That Can Form Peroxides Upon Ageing:

**Class I:** Unsaturated materials, especially those of low molecular weight, may polymerize violently and hazardously due to peroxide initiation.

Acrylic acid	Tetrafluoroethylene
Acrylonitrile	Vinyl acetate
Butadiene	Vinyl acetylene
Chlorobutadiene (chloroprene)	Vinyl chloride
Chlorotrifluoroethylene	Vinyl pyridine
Methyl methacrylate	Vinylidene chloride
Styrene	

**Class II:** The following chemicals are a peroxide hazard upon concentration (distillation/evaporation). A test for peroxide should be performed if concentration is intended or suspected. A potassium iodide test strip can be used to check for peroxides after the chemical has expired or six months after opening with test results placed on the bottle. If the test is not performed, then these chemicals should be disposed of **6 months** after opening. A written record of test results should be maintained.

Acetal

Cumene

Cyclohexene  
Cyclooctene  
Cyclopentene  
Diacetylene  
Dicyclopentadiene  
Diethylene glycol dimethyl ether  
(diglyme)  
Diethyl ether  
Dioxane (*p*-dioxane)  
Ethylene glycol dimethyl ether (glyme)  
Furan

Methyl acetylene  
Methyl cyclopentane  
Methyl-*t*-butyl ketone  
Tetrahydrofuran  
Tetrahydronaphthalene  
Vinyl ether

**Class III:** Peroxides derived from the following compounds may explode without concentration. It is recommended that these chemicals be disposed of **3 months** after opening.

**Organic**

Divinyl ether  
Isopropyl ether  
Divinyl acetylene  
Vinylidene chloride

**Inorganic**

Potassium metal  
Potassium amide  
Sodium amide (sodamide)

*(Note: Lists are illustrative but not exhaustive)*

\*\* Prudent Practices in the Laboratory: Handling and Disposal of Chemicals. National Research Council 1995

## Specific Chemical Hazards

Because it would be impossible to list all possible chemical hazards which might be encountered in laboratories on campus, a few of the most commonly encountered hazardous materials are listed below.

### Active Metals - sodium and potassium

#### Hazards

WATER REACTIVE, CORROSIVE TO SKIN, FLAMMABLE

These metals react violently with water and may spontaneously ignite. Toxic vapors are given off upon combustion.

#### Fire Extinguishing Media

Class D fire extinguisher (Dry Chemical or Sodium Carbonate)

#### Personal Protective Equipment

Face shield, Splash goggles, lab coat, apron, nitrile gloves

#### Storage Requirements

Store in oil or kerosene in a cool, dry area away from water and oxidizers.

### Benzene

#### Hazards

CARCINOGEN, HIGHLY FLAMMABLE, VAPORS ARE TOXIC

Vapors irritate the eyes. High concentrations inhaled can cause unconsciousness and death. Prolonged breathing of vapors may cause severe or fatal blood disease. Swallowing and absorption through the skin could result in major residual injury

#### Fire Extinguishing Media

Class B (Carbon Dioxide, Foam or Dry Chemical)

#### Personal Protective Equipment

Splash goggles, Certified fume hood, lab coat, Viton gloves

#### Storage Requirements

Store with flammables in an approved flammables storage cabinet.

### Benzoyl Peroxide

#### Hazards

EXPLOSIVE HAZARD BY SHOCK, FRICTION OR IGNITION SOURCE, CORROSIVE

Benzoyl peroxide has been reported to explode spontaneously. It is an extreme fire hazard and is also a strong oxidizer. Do not get the materials in the eyes or on the skin.

#### Fire Extinguishing Media

Large volumes of water

### **Personal Protective Equipment**

Splash goggles, certified fume hood, laboratory coat, apron, face shield, nitrile gloves

### **Storage Requirements**

Store in a cool place away from direct sunlight. It is best stored alone separated from all other chemicals and combustible materials.

## **Carbon Disulfide**

### **Hazards**

**EXTREMELY FLAMMABLE! POISON, HIGHLY VOLATILE, CORROSIVE TO SKIN**  
Carbon Disulfide is the most flammable and explosive of all common solvents. Its vapors can be ignited by contact with an ordinary lightbulb. It is toxic and major residual injury may result from overexposure in spite of prompt treatment. Mixtures of carbon disulfide in air in the presence of rust can explode.

### **Fire Extinguishing Media**

Class B (Dry chemicals, foam or Carbon Dioxide). **DO NOT USE WATER.**

### **Personal Protective Equipment**

Splash goggles, a certified fumehood, lab coat, face shield, Viton gloves

### **Storage Requirements**

Store with flammable liquids in an approved flammables storage cabinet.

## **Carbon Tetrachloride**

### **Hazards**

**POISON, CARCINOGEN**  
Avoid breathing the vapor. Small swallowed doses may result in death. Repeated low level exposures are likely to cause liver damage.

### **Fire Extinguishing Media**

Use appropriate extinguisher for surrounding fire

### **Personal Protective Equipment**

Splash goggles, face shield, lab coat, apron, certified fume hood, PVA or Viton gloves

### **Storage Requirements**

Store with other Blue labeled toxins away from alkali metals, chemically active metals, Oxidizers, bases, allyl alcohol, and dimethyl formamide.

## **Ethers**

See "PEROXIDE FORMING CHEMICALS"

## Hydrofluoric Acid

### Hazards

EXTREMELY CORROSIVE, HIGHLY TOXIC

May be fatal if swallowed. Vapors can cause severe burns. Prevent the inhalation of the vapors. Will react with water, liberating heat.

### Fire Extinguishing Media

Use extinguishing media appropriate for the surrounding fire. If water is to be used, apply in flooding quantities from as great a distance as possible. Do not use a water stream.

### Personal Protective Equipment

Splash goggles, face shield, lab coat, apron, certified fume hood, butyl rubber gloves

### Storage Requirements

Store with mineral acids in an approved acids storage cabinet or in a chemical resistant tray inside a low cabinet. Do not store in glass containers.

## Mercury

### Hazards

HIGHLY TOXIC, EMITS POISONOUS VAPORS.

The vapor pressure of mercury at room temperature is 0.002 mm Hg which is sufficient to produce concentrations of about 200 times the permissible exposure limit (0.1 mg/m<sup>3</sup>). Although this concentration is not likely to occur with small spills in a well ventilated laboratory, every effort should be made to avoid mercury spills and to promptly clean up spills that do occur. There are specific spill kits available through CRS for mercury.

### Fire Extinguishing Media

Use extinguishing media appropriate for the surrounding fire

### Personal Protective Equipment

Splash goggles, lab coat, certified fume hood, nitrile gloves

### Storage Requirements

Store in an air tight container with Blue label toxins

## Nitric Acid

### Hazards

STRONG OXIDIZER, CONTACT WITH COMBUSTIBLE MATERIALS MAY CAUSE FIRE, EXTREMELY CORROSIVE, CAUSES SEVERE BURNS

Nitric acid forms flammable and explosive compounds with many materials. Spills should be absorbed with inert materials such as absorbent clay. The use of paper towels to clean up spill could cause a fire.

### Fire Extinguishing Media

Use large amounts of water.

### **Personal Protective Equipment**

Splash goggles, face shield, lab coat, apron, nitrile gloves, certified fume hood

### **Storage Requirements**

Store with oxidizers away from organics in a corrosives cabinet or in corrosive resistant trays.  
Store on lower cabinet shelves.

## **Perchloric Acid**

See “Perchloric Acid S.O.P.” in [Appendix J](#)

## **Phosphorus (White (Yellow))**

### **Hazards**

SPONTANEOUSLY FLAMMABLE IN AIR, CREATES TOXIC FUMES IN AIR  
Phosphorus is extremely toxic and exposure via any route is likely to cause residual injury despite prompt medical attention.

### **Fire Extinguishing Media**

Water

### **Personal Protective Equipment**

Splash goggles, face shield, lab coat, apron, nitrile gloves, certified fume hood

### **Storage Requirements**

Store in water in an air tight container. Store the container in a cool place separate from other laboratory chemicals.

## **Picric Acid**

### **Hazards**

RISK OF EXPLOSION BY SHOCK, FRICTION, FIRE OR OTHER SOURCES OF IGNITION  
WHEN DRY, FORMS VERY SENSITIVE EXPLOSIVE METALLIC COMPOUNDS, TOXIC,  
CORROSIVE

If the container of picric acid dries out, explosive, shock sensitive crystals will form. Dry Picric Acid must not be handled, moved or opened. Call Environmental Safety Services immediately upon discovery of dry picric acid.

### **Fire Extinguishing Media**

Water spray

### **Personal Protective Equipment**

Splash goggles, face shield, lab coat, apron, nitrile gloves, certified fume hood

### **Storage Requirements**

Store in a cool, dry place away from metals, salts, sparks and flames. Store with other RED label chemicals.

# Chemicals Suspected of or Known to Cause Cancer

## CHEMICAL

A-alpha-C(2-Amino-9H-pyrido[2,3-b]indole)  
 AcetamideAcetochlor  
 2-Acetylaminofluorene  
 Acrylamide  
 Actinomycin D  
 AF-2;[2-(2-furyl)-3-(5-nitro-2-furyl)] acrylamide  
 Alachlor  
 Aldrin  
 2-Aminoanthraquinone  
 ortho-Aminoazotoluene  
 3-Amino-9-ethylcarbazole hydrochloride  
 2-Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole  
 Analgesic mixtures containing phenacetin  
 ortho-Anisidine  
 Antimony oxide (Antimony trioxide)  
 Arsenic (inorganic arsenic compounds)  
 Auramine  
 Azathioprine  
 Azobenzene  
 Benzene  
 Benzdine-based dyes  
 Benzo[j]fluorantheneBenzo[k]fluoranthene  
 Benzo[a]pyrene  
 Benzyl chloride  
 Beryllium and beryllium compounds  
 Bis (2-chloroethyl) ether  
 (Chlornapazine)Bischloroethyl nitrosoarea (BCNU) (Carmustine)  
 Bis(chloromethyl)ether  
 Bracken fern  
 Bromo form  
 1,4-Butanediol dimethanesulfonate (Busulfan)  
 beta-Butyrolactone  
 Cadmium and cadmium compounds  
 Captafol  
 Carbon tetrachloride  
 Ceramic fibers(airborne particles of respirable size)  
 Chlorambucil  
 Chlordane  
 Chlordimeform  
 Chlorinated paraffins  
 (Average chain length,C12; approx. 60% chlorine by weight)

Chlorodibromomethane  
 1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosoarea  
 (CCNU) (Lomustine)  
 Chloroform  
 Chloromethyl methyl ether (technical grade)  
 4-Chloro-ortho-phenylenediamine  
 Chlorothalonil  
 Chromium (hexavalent compounds)  
 C.I. Acid Red 114  
 Ciclosporin (Cyclosporin A; Cyclosporine)

## CHEMICAL

Acetaldehyde  
 Acifluorfen  
 Acrylonitrile  
 Adriamycin (Doxorubicin hydrochloride)  
 Aflatoxins  
 Alcoholic beverages, when assoc. w/alcohol abuse  
 Allyl chloride  
 p-Aminoazobenzene  
 4-Aminobiphenyl (4-aminodiphenyl)  
 1-Amino-2-methylanthraquinone  
 Amitrole  
 Aniline  
 ortho-Anisidine hydrochloride  
 Aramite  
 Asbestos  
 Azaserine  
 Azacitidine  
 Benz[a]anthracene  
 Benzdine [and its salts]  
 Benzo[b]fluoranthene  
 Benzofuran  
 Benzotrichloride  
 Benzyl violet 4B  
 Betel quid with tobacco  
 N,N-Bis(2-chloroethyl)-2-naphthylamine  
 Bitumens, extracts of steam-refined & air refined  
 Bromodichloromethane  
 1,3-Butadiene  
 Butylated hydroxyanisole  
 Caffeic acid  
 Captan  
 Carbon-black extracts  
 Certain combined chemotherapy for lymphomas  
 Chloramphenicol  
 Chlordecone (Kepone)  
 Chlorendic acid  
 p-Chloroaniline  
 Chloroethane (Ethyl chloride)  
 1-(2-Chloroethyl)-3-(4-methylcyclohexyl)-  
 1-nitrosoarea (Methyl-CCNU)  
 3-Chloro-2-methylpropene  
 p-Chloro-o-toluidine  
 Chlorozotocin  
 Chrysene  
 C.I. Basic Red 9 monohydrochloride  
 Cinnamyl anthranilate

Cisplatin		
Cobalt metal powder		
Coke oven emissions		
Creosotes		
Cupferron		
Cyclophosphamide (anhydrous)		
D&C Orange No. 17		
D&C Red No. 9		
Dacarbazine		
Dantron (Chrysazin; 1,8-Dihydroxyanthraquinone)		
DDD (Dichlorodiphenyldichloroethane)		
DDT (Dichlorodiphenyltrichloroethane)		
N,N'-Diacetylbenzidine		
2,4-Diaminoanisole sulfate		
2,4-Diaminotoluene		
Dibenz[a,h]acridine		
Dibenz[a,j]acridine		
Dibenz[a,h]anthracene		
7H-Dibenzo[c,g]carbazole		
Dibenzo[a,e]pyrene		
Dibenzo[a,h]pyrene		
Dibenzo[a,i]pyrene		
Dibenzo[a,l]pyrene		
1,2-Dibromo-3-chloropropane (DBCP)	96128	July 1, 1987
2,3-Dibromo-1-propanol	96139	October 1, 1994
p-Dichlorobenzene	106467	January 1, 1989
3,3'-Dichlorobenzidine	91941	
1-4,-Dichloro-2-butene	764410	
3,3'-Dichloro-4-4'-diaminodiphenyl ether	28434868	
1,1-Dichloroethane	75343	January 1, 1990
Dichloromethane (Methylene chloride)	75092	
1-2-Dichloropropane	78875	
1,3-Dichloropropene	542756	January 1, 1989
Dieldrin 60571		
Dienestrol	84173	
Diepoxybutane	1464535	
Diesel engine exhaust	--	
Di(2-ethylhexyl)phthalate	117817	
1,2-Diethylhydrazine	1615801	
Diethyl sulfate	64675	
Diethylstilbestrol	56531	
Diglycidyl resorcinol ether (DGRE)	101906	
Dihydrosafrole	94586	
Diisopropyl sulfate	2973106	April 1, 1993
3,3'-Dimethoxybenzidine (ortho-Dianisidine)	119904	
3-3'Dimethoxybenzidine dihydrochloride (ortho-Dianisidine dihydrochloride)	20325400	
Dimethyl sulfate	77781	
4-Dimethylaminoazobenzene	60117	
trans-2-[(Dimethylamino)methylimino]- 5-[2-(5-nitro-2-furyl)vinyl]-1,3, 4-oxadiazole	55738540	
7,12-Dimethylbenz(a)anthracene	57976	
3,3'-Dimethylbenzidine (ortho-Tolidine)	119937	
3,3'-Dimethylbenzidine dihydrochloride	612828	April 1, 1992
Dimethylcarbamoyl chloride	79447	
1,1-Dimethylhydrazine (UMDH)	57147	
1,2-Dimethylhydrazine	540738	
Citrus Red No. 2		
Cobalt [II] oxide		
Conjugated estrogens		
para-Cresidine		
Cycasin		
Cyclophosphamide (hydrated)		
D&C Red No. 8		
D&C Red No. 19		
Daminozide		
Daunomycin		
DDE (Dichlorodiphenyldichloroethylene)		
DDVP (Dichlorvos)		
2-4-Diaminoanisole		
4-4'-Diaminodiphenyl ether (4,4'-Oxydianiline)		
Diaminotoluene (mixed)		
226368		
224420		
53703		
194592		
192654		
189640		
189559		
191300		

Dimethylvinylchloride	513371	
1,6-Dinitropyrene	42397648	
1,8-Dinitropyrene	42397659	
2-4,Dinitrotoluene	121142	
1,4-Dioxane	123911	
Diphenylhydantoin (Phenytoin)	57410	
Diphenylhydantoin (Phenytoin), sodium salt	630933	
Direct Black 38 (technical grade)	1937377	
Direct Blue 6 (technical grade)	2602462	
Direct Brown 95 (technical grade)	16071866	
Disperse Blue 1	2475458	
Epichlorohydrin	106898	
Erionite 12510428		
Estradiol 17	50282	
Estrone 53167		
Ethinylestradiol	57636	
Ethyl acrylate	140885	
Ethyl methanesulfonate	62500	
Ethyl-4,4'-dichlorobenzilate	510156	
Ethylene dibromide	106934	July 1, 1987
Ethylene dichloride (1,2-Dichloroethane)	107062	
Ethylene oxide	75218	July 1, 1987
Ethylene thiourea	96457	
Ethyleneimine	151564	
Folpet	133073	January 1, 1989
Formaldehyde (gas)	50000	
2-(2-Formylhydrazino)-4-(5-nitro-2-furyl) thiazole	3570750	
Furan	110009	October 1, 1993
Furazolidone	67458	
Furmecyclox	60568050	
Gasoline engine exhaust (condensates/extracts)	--	
Glasswool fibers(airborne particles of respirable size)--		
Glu-P-1	67730114	
(2-Amino-6-methyldipyrido[1,2-a:3',2'-d] imidazole)		
Glu-P-2 67730103		
(2-Aminodipyrido [1,2-a:3',2'-d] imidazole)		
Glycidaldehyde	765344	
Glycidol	556525	
Griseofulvin	126078	
Gyromitrin (Acetaldehyde methylformylhydrazone)	16568028	
HC Blue 1	2784943	
Heptachlor	76448	
Heptachlor epoxide	1024573	
Hexachlorobenzene	118741	
Hexachlorocyclohexane (technical grade)	--	
Hexachlorodibenzodioxin	34465468	
Hexachloroethane	67721	
Hexamethylphosphoramide	680319	
Hydrazine	302012	
Hydrazine sulfate	10034932	
Hydrazobenzene (1,2-Diphenylhydrazine)	122667	
Indeno [1,2,3-cd]pyrene	193395	

IQ (2-Amino-3-methylimidazo[4,5-f]quinoline)	76180966	
Iron dextran complex	9004664	
Isosafrole	120581	
Lactofen	77501634	January 1, 1989
Lasiocarpine	303344	
Lead acetate	301042	
Lead and lead compounds	--	October 1, 1992
Lead phosphate	7446277	
Lead subacetate	1335326	
Lindane and other hexachlorocyclohexane isomers	--	
Mancozeb	8018017	
Maneb	12427382	
Me-A-alpha-C (2-Amino-3-methyl-9H-pyrido[2,3-b] indole)	68006837	
Medroxyprogesterone acetate	71589	
MeIQ (2-Amino-3,4-dimethylimidazo[4,5-f]quinoline)	7094112	October 1, 1994
MeIQx 7500040 (2-Amino-3,8-dimethylimidazo[4,5-f]quinoxaline)	October 1, 1994	
Melphalan	148823	
Merphalan	531760	
Mestranol	72333	
8-Methoxy psoralen with ultraviolet A therapy	298817	
5-Methoxy psoralen with ultraviolet A therapy	484208	
2-Methylaziridine (Propyleneimine)	75558	
Methylzoxymethanol	590965	
Methylzoxymethanol acetate	592621	
3-Methylcholanthrene	56495	
5-Methylchrysene	3697243	
4,4'-Methylene bis(2-chloroaniline)	101144	July 1, 1987
4,4'-Methylene bis (N,N-dimethyl) benzenamine	101611	
4,4'-Methylene bis(2-methylaniline)	838880	
4,4'-Methylenedianiline	101779	
4,4'-Methylenedianiline dihydrochloride	13552448	
Methylhydrazine and its salts	--	July 1, 1992
Methyl iodide	74884	
Methyl methanesulfonate	66273	
2-Methyl-1-nitroanthraquinone (of uncertain purity)	129157	
N-Methyl-N' -nitro-N-nitrosoguanidine	70257	
N-Methylolacrylamide	924425	
Methylthiouracil	56042	
Metiram	9006422	
Metronidazole	443481	
Michler's ketone	90948	
Mirex	2385855	
Mitomycin C	50077	
Monocrotaline	315220	
5-(Morpholinomethyl)-3- [(5-nitro-furfurylidene)-amino]-2-oxalolide none	139913	
Mustard Gas	505602	
Nafenopin	3771195	
1-Naphthylamine	134327	
2-Naphthylamine	91598	
Nickel and certain nickel compounds	--	

Nickel carbonyl	13463393	
Nickel refinery dust from pyrometallurgical process	--	
Nickel subsulfide	12035722	
Niridazole	61574	
Nitrilotriacetic acid	139139	
Nitrilotriacetic acid, trisodium salt monohydrate	18662538	April 1, 1989
5-Nitroacenaphthene	602879	
5-Nitro-o-anisidine	99592	
o-Nitroanisole	91236	October 1, 1992
4-Nitrobiphenyl	92933	
6-Nitrochrysene	7496028	
Nitrofen (technical grade)	1836755	
2-Nitrofluorene	607578	
Nitrofurazone	59870	
1-[(5-Nitrofurfurylidene)-amino]-2-imidazolidinone	555840	
N-[4-(5-Nitro-2-furyl)-2-thiazoly]acetamide	531828	
Nitrogen mustard (Mechlorethamine)	51752	
Nitrogen mustard hydrochloride (Mechlorethamine hydrochloride)	55867	
Nitrogen mustard N-oxide	126852	
Nitrogen mustard N-oxide hydrochloride	302705	
2-Nitropropane	79469	
1-Nitropyrene	5522430	
4-Nitropyrene	57835924	
N-Nitrosodi-n-butylamine	924163	
N-Nitrosodiethanolamine	1116547	
N-Nitrosodiethylamine	55185	
N-Nitrosodimethylamine	62759	
p-Nitrosodiphenylamine	156105	
N-Nitrosodiphenylamine	86306	
N-Nitrosodi-n-propylamine	621647	
N-Nitroso-N-ethylurea	759739	
3-(N-Nitrosomethylamino) propionitrile	60153493	
4-(N-Nitrosomethylamino)-1-(3-pyridyl)1-butanone	64091914	
N-Nitrosomethylethylamine	10595956	
N-Nitroso-N-methylurea	684935	
N-Nitroso-N-methylurethane	615532	
N-Nitrosomethylvinylamine	4549400	
N-Nitrosomorpholine	59892	
N-Nitrosornicotine	16543558	
N-Nitrosopiperidine	100754	
N-Nitrosopyrrolidine	930552	
N-Nitrososarcosine	13256229	
Norethisterone (Norethindrone)	68224	
Ochratoxin A	303479	
Oil Orange SS	2646175	
Oral contraceptives, combined	--	
Oral contraceptives, sequential	--	
Oxadiazon	19666309	
Oxymetholone	434071	
Oxazepam	604751	October 1, 1994
Panfuran S	--	
Pentachlorophenol	87865	
Phenacetin	62442	
Phenazopyridine	94780	

Phenazopyridine hydrochloride	136403	
Phenesterin	3546109	
Phenobarbital	50066	
Phenoxybenzamine	59961	
Phenoxybenzamine hydrochloride	63923	
Phenyl glycidyl ether	122601	
Phenylhydrazine and its salts	--	July 1, 1992
o-Phenylphenate, sodium	132274	
PhiP (2-Amino-1-methyl-6-phenylimidazol[4,5-b]pyridine)	105650235	October 1, 1994
Polybrominated biphenyls	--	
Polychlorinated biphenyls	--	
Polychlorinated biphenyls (containing $\geq$ 60% chlorine by molecular weight)	--	
Polychlorinated dibenzo-p-dioxins	--	October 1, 1992
Polychlorinated dibenzofurans	--	October 1, 1992
Polygeenan	53973981	
Ponceau MX	3761533	
Ponceau 3R	3564098	
Potassium bromate	7758012	
Procarbazine	671169	
Procarbazine hydrochloride	366701	
Procymidone	32809168	October 1, 1994
Progesterone	57830	
1,3-Propane sultone	1120714	
Propargite	2312358	October 1, 1994
beta-Propiolactone	57578	
Propylene oxide	75569	
Propylthiouracil	51525	
Radionuclides	--	
Reserpine	50555	
Residual (heavy) fuel oils	--	
Saccharin	81072	
Saccharin, sodium	128449	
Safrole	94597	
Selenium sulfide	7446346	
Shale-oils	68308349	
Silica, crystalline (airborne particles of respirable size)	--	
Soots, tars, and mineral oils (untreated and mildly treated oils and used engine oils)	--	
Sterigmatocystin	10048132	
Streptozotocin	18883664	
Styrene oxide	96093	
Sulfallate	95067	
Talc containing asbestiform fibers	--	
Terrazole	2593159	October 1, 1994
Testosterone and its esters	58220	
2,3,7,8-Tetrachlorodibenzo-para-dioxin (TCDD)	1746016	
1,1,2,2-Tetrachloroethane	79345	
Tetrachloroethylene (Perchloroethylene)	127184	
p- , -Tetrachlorotoluene	5216251	
Tetranitromethane	509148	

Thioacetamide	62555	
4,4'-Thiodianiline	139651	
Thiourea	62566	
Thorium dioxide	1314201	
Tobacco, oral use of smokeless products	--	
Tobacco, smoke	--	
Toluene diisocyanate	26471625	
ortho-Toluidine	95534	
ortho-Toluidine hydrochloride	636215	
para-Toluidine	106490	
Toxaphene (Polychlorinated camphenes)	8001352	
Treosulfan	299752	
Trichlormethine (Trimustine hydrochloride)	817094	January 1, 1992
2,4,6-Trichlorophenol	88062	
Triphenyltin hydroxide	76879	July 1, 1992
Trichloroethylene	79016	
Tris (aziridinyl)-para-benzoquinone (Triaziquone)	68768	
Tris(1-aziridinyl)phosphine sulfide (Thiotepa)	52244	
Tris(2-chloroethyl)phosphate	115968	April 1, 1992
Tris(2,3-dibromopropyl)phosphate	126727	
Trp-P-1 (Tryptophan-P-1)	62450060	
Trp-P-2 (Tryptophan-P-2)	62450071	
Trypan blue (commercial grade)	72571	
Unleaded gasoline (wholly vaporized)	--	
Uracil mustard	66751	
Urethane (Ethyl carbamate)	51796	
Vinyl bromide	593602	
Vinyl chloride	75014	
4-Vinyl-1-cyclohexene diepoxide (Vinyl cyclohexene dioxide)	106876	
Vinyl trichloride (1,1,2-Trichloroethane)	79005	
2,6-Xylidine (2,6-Dimethylaniline)	87627	
Zineb	12122677	

# Chemicals Known to Cause Reproductive Toxicity

## Developmental Toxicity

### Chemical

Acetohydroxamic acid  
Actinomycin D  
All-trans retinoic acid  
Alprazolam  
Amikacin sulfate  
Aminoglutethimide  
Aminoglycosides  
Aminopterin  
Angiotensin converting (ACE) inhibitors  
Anisindione  
Aspirin

(NOTE: It is especially important not to use aspirin during the last three months of pregnancy, unless specifically directed to do so by a physician because it may cause problems in the unborn child or complications during delivery.)

Barbiturates  
Benomyl  
Benzphetamine hydrochloride  
Benzodiazepines  
Ethylene thiourea  
Bischlorethyl nitrosourea (BCNU) (Carmustine)  
Bromoxynil  
Butabarbital sodium  
1,4-Butanediol dimethylsulfonate (Busulfan)  
Carbon disulfide  
Carbon monoxide  
Carboplatin  
Chenodiol  
Chlorcyclizine hydrochloride  
Chlorambucil  
Chlordecone (Kepone)  
Chlordiazepoxide  
Chlordiazepoxide hydrochloride  
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU) (Lomustine)  
Clomiphene citrate  
Clorazepate dipotassium  
Cocaine 50362  
Colchicine  
Conjugated estrogens  
Cyanazine  
Cycloheximide  
Cyclophosphamide (anhydrous)  
Cyclophosphamide (hydrated)  
Cyhexatin  
Cytarabine  
Danazol 17230885  
Daunorubicin hydrochloride  
Demeclocycline hydrochloride (internal use)  
Diazepam  
  
Minocycline hydrochloride (internal use)

### Chemical

Dicumarol  
Diethylstilbestrol (DES)  
Dinocap  
Dinoseb  
Diphenylhydantoin (Phenytoin)  
Doxycycline (internal use)  
Doxycycline hyclate (internal use)  
Doxycycline monohydrate (internal use)  
Ergotamine tartrate  
Ethyl alcohol in alcoholic beverages

Ethylene glycol monoethyl ether  
Ethylene glycol monomethyl ether  
Ethylene glycol monoethyl ether acetate  
Ethylene glycol monomethyl ether acetate  
Etoposide  
Etretnate  
Fluorouracil  
Fluoxymesterone  
Flurazepam hydrochloride  
Flutamide  
Halazepam  
Hexachlorobenzene  
Ifosfamide  
Iodine-131  
Isotretinoin  
Lead  
Lithium carbonate  
Lithium citrate  
Lorazepam  
Lovastatin  
Medroxyprogesterone acetate  
Megestrol acetate  
Melfhalan  
Menotropins  
Meprobamate  
Mercaptopurine  
Mercury and mercury compounds  
Methacycline hydrochloride  
Methimazole  
Methotrexate  
Methotrexate sodium  
Methyl bromide as a structural fumigant  
Methyl mercury  
Methyltestosterone  
Midazolam hydrochloride  
  
Ribavirin

Misoprostol	Secobarbital sodium
Mitoxantrone hydrochloride	Streptomycin sulfate
Nafarelin acetate	Tamoxifen citrate
Niomycin sulfate (internal use)	Temazepam
Netilmicin sulfate	Testosterone cypionate
Nicotine	Testosterone enanthate
Nitrogen mustard (Mechlorethamine)	2,3,7,8-Tetrachlorodibenzo-para-dioxin (TCDD)
Nitrogen mustard hydrochloride (Mechlorethamine hydrochloride)	Tetracyclines (internal use)
Norethisterone (Norethindrone)	Tetracycline (internal use)
Norethisterone acetate (Norethindrone acetate)	Tetracycline hydrochloride (internal use)
Norethisterone (Norethindrone)/Ethinyl estradiol	Thalidomide
Norethisterone (Norethindrone)/Mestranol	Thioguanine
Norgestrel	Tobacco smoke (primary)
Oxaxepam	Tobramycin sulfate
Oxytetracycline (internal use)	Toluene
Oxytetracycline hydrochloride (internal use)	Triazolam
Paramethadione	Trilostane
Penicillamine	Trimethadione
Pentobarbital sodium	Uracil mustard
Phenacemide	Urethane
Phenprocoumon	Urofollitropin
Pipobroman	Valproate (Valproic acid)
Plicamycin	Vinblastine sulfate
Polybrominated biphenyls	Vincristine sulfate
Polychlorinated biphenyls	Warfarin
Procarbazine hydrochloride	
Propylthiouracil	
Retinol/retinyl esters,	
when in daily dosages in excess of 10,000 IU, or 3,000 retinol equivalents. (NOTE: Retinol/retinyl esters are required and essential for maintenance of normal reproductive function. The recommended daily level during pregnancy is 8,000 IU.)	

## Female Reproductive Toxicity

Chemical	CAS #	Date
Aminopterin		
Anabolic steroids		
Aspirin 50782		
(NOTE: It is especially important not to use aspirin during the last three months of pregnancy, unless specifically directed to do so by a physician because it may cause problems in the unborn child or complications during delivery.)		
Carbon disulfide		
Cocaine 50362		
Cyclophosphamide (anhydrous)		
Cyclophosphamide (hydrated)		
Ethylene oxide		
Lead		
Tobacco smoke (primary)		

## Male Reproductive Toxicity

Chemical	CAS #	Date
Anabolic steroids		
Benomyl		
Carbon disulfide		
Colchicine		
Cyclophosphamide (anhydrous)		
Cyclophosphamide (hydrated)		
1,2-Dibromo-3-chloropropane (DBCP)		
m-Dinitrobenzene		
o-Dinitrobenzene		
p-Dinitrobenzene		
Dinoseb 88857		
Ethylene glycol monoethyl ether	110805	
Ethylene glycol monomethyl ether	109864	
Ethylene glycol monoethyl ether acetate	111159	January 1, 1993
Ethylene glycol monomethyl ether acetate	110496	January 1, 1993
Hexamethylphosphoramide	680319	October 1, 1994
Lead	--	
Nitro furantoin	67209	April 1, 1991
Tobacco smoke (primary)	--	
Uracil mustard	66751	January 1, 1992

Date: October 1, 1994