

Appendix 10: Carcinogens

The list below is a compilation of substances classified as carcinogens by either the International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP). Some of these substances are classified as “Select Carcinogens” and require special work practices. See Appendix 1 for the definition of “Select Carcinogen”

Chemical Name	IARC ^a	NTP ^b
Acetaldehyde	2B	2
Acetamide	2B	
2-Acetylaminofluorene		2
Acrylamide	2A	2
Acrylonitrile	2B	2
Adriamycin	2A	2
AF-2 (2-(2-Furyl)-3-(5-nitro-2-furyl)acrylamide)	2B	
Aflatoxin M1	2B	
Aflatoxins, naturally occurring	1	1
A- α -C (2-amino-9H-pyrido[2,3-b]indole)	2B	
2-Aminoanthraquinone		2
p-Aminoazobenzene	2B	
o-Aminoazotoluene	2B	2
4-Aminobiphenyl	1	1
1-Amino-2-methylantraquinone		2
2-Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole	2B	
Amitrole	2B	2
Amsacrine	2B	
Analgesic mixtures containing phenacetin	1	1
Androgenic (anabolic) steroid	2A	
o-Anisidine	2B	
o-Anisidine hydrochloride		2
Antimony trioxide	2B	
Aramite	2B	
Arsenic and compounds	1	1
Asbestos	1	1
Asbestos, actinolite		
Asbestos, anthophyllite		
Asbestos, tremolite		
Auramine (technical-grade)	2B	
Azacitidine	2A	2
Azaserine	2B	
Azathioprine	1	1
Benzal chloride	2A	
Benz[a]anthracene	2A	2
Benzene	1	1
Benzidine	1	1
Benzidine-based dyes	2A	
Benzo[a]pyrene	2A	2
Benzo[b]fluoranthene	2B	2
Benzo[j]fluoranthene	2B	2
Benzo[k]fluoranthene	2B	2
Benzofuran	2B	
Benzotrichloride	2A	2

Chemical Name	IARC ^a	NTP ^b
Benzoyl chloride	2A	
Benzyl chloride	2A	
Benzyl violet	4B	2B
2,2-Bis(bromomethyl)propane-1,3-diol	2B	
Beryllium and certain compounds	1	2
Betel quid with tobacco	1	
N,N-Bis(2-chloroethyl)-2-naphthylamine (chlornaphazine)	1	
Bis(chloromethyl)ether (technical grade)	1	1
Bischloroethyl nitrosourea (BCNU)	2A	2
Bleomycins	2B	
Bracken fern	2B	
Bromodichloromethane	2B	2
1,3-Butadiene	2A	1
1,4-Butanediol dimethanesulfonate (Busulphan Myleran)	1	1
Butylated hydroxyanisole (BHA)	2B	2
β-Butyrolactone	2B	
C.I. Acid Red 114	2B	
C.I. Basic Red 9	2B	2
C.I. Direct Blue 15	2B	
C.I. Citrus Red No. 2	2B	
Cadmium and compounds	1	1
Caffeic acid	2B	
Captafol	2A	
Carbon tetrachloride	2B	2
Catechol	2B	
Ceramic Fibres (respirable size)	2B	2
Carbon-black	2B	
Carrageenan, degraded	2B	
Chlorambucil	1	1
Chloramphenicol	2A	
Chlordane	2B	
Chlordecone (Kepone)	2B	2
Chlorendic acid	2B	2
Para-Chloroaniline	2B	
Chlorinated paraffins (C12 60% Chlorine)	2B	2
α-Chlorinated toluenes	2A	
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU)	2A	2
1-(2-Chloroethyl)-3-(4-methylcyclohexyl)-1-nitrosourea (Methyl-CCNU; Semustine)	1	1
Chloroform	2B	2
Chloromethyl methyl ether (technical-grade)	1	1
1-Chloro-2-methylpropene	2B	
3-Chloro-2-methylpropene		2
Chlorophenoxy herbicides	2B	
4-Chloro-o-phenylenediamine	2B	2
Chloroprene	2B	2
Chlorothalonil	2B	
p-Chloro-o-toluidine and its strong acid salts	2A	2
Chlorozotocin	2A	2

Chromium (VI) compounds	1	1
Ciclosporin	1	
Cisplatin	2A	2
Coal-tar pitches	1	

Chemical Name	IARC ^a	NTP ^b
Coal-tars	1	1
Cobalt and cobalt compounds	2B	
Coffee (urinary bladder)	2B	
Conjugated estrogens		1
Creosotes	2A	1
p-Cresidine	2B	2
Cupferron		2
Cycasin	2B	
Cyclophosphamide	1	1
Cyclosporin A		1
DDT		2
Dacarbazine	2B	2
Dantron (Chrysazin; 1, 8-Dihydroxyanthraquinone)	2B	2
Daunomycin	2B	
N,N'-Diacetylbenzidine	2B	
2,4-Diaminoanisole	2B	
1,4-Diaminoanisole sulfate		2
4,4'-Diaminodiphenyl ether	2B	2
2,4-Diaminotoluene	2B	2
Dibenz[a, h]acridine	2B	2
Dibenz[a, h]anthracene	2A	2
Dibenz[a, j]acridine	2B	2
7H-Dibenzo[c,g]carbazole	2B	2
Dibenzo[a, e]pyrene	2B	2
Dibenzo[a, h]pyrene	2B	2
Dibenzo[a, i]pyrene	2B	2
Dibenzo[a, l]pyrene	2B	2
1,2-Dibromo-3-chloropropane (DBCP)	2B	2
2,3-Dibromopropan-1-ol	2B	
p-Dichlorobenzene	2B	2
3,3'-Dichlorobenzidine dihydrochloride		2
3,3'-Dichlorobenzidine	2B	2
3,3'-Dichloro-4-4'-diaminodiphenyl ether	2B	
1,2-Dichloroethane	2B	2
Dichloromethane	2B	2
2-(2,4-Dichlorophenoxy)propionic acid	2B	
1,3-Dichloropropene (technical-grade)	2B	2
Dichlorvos	2B	
Diepoxybutane		2
Diesel engine exhaust particulates	2A	2
Diesel fuel, marine	2B	
Di(2-ethylhexyl) phthalate		2
1,2-Diethylhydrazine	2B	
Diethyl Sulfate	2A	2
Diethylstilbestrol (DES)	1	1

Diglycidyl resorcinol ether	2B	2
Dihydrosafrole	2B	
Diisopropyl sulfate	2B	
3,3'-Dimethoxybenzidine (o-Dianisidine)	2B	2
3,3'-Dimethoxybenzidine dihydrochloride		2
2,6-Dimethylaniline	2B	
3,3'-Dimethylbenzidine (o-Tolidine)	2B	2

Chemical Name	IARC ^a	NTP ^b
1,2-Dimethylhydrazine	2A	
Dimethyl sulfate	2A	2
p-Dimethylaminoazobenzene	2B	2
Trans-2-[(Dimethylamino)methylimino]-5-[2-(5-nitro-2-furyl)vinyl]-1,3,4-oxadiazole	2B	
Dimethylcarbamoyl Chloride	2A	2
1,1-Dimethylhydrazine	2B	2
Dimethyl vinyl chloride		2
3,7-Dinitrofluoranthene	2B	
3,9-Dinitrofluoranthene	2B	
1,6-Dinitropyrene	2B	2
1,8-Dinitropyrene	2B	2
2,4-Dinitrotoluene	2B	
2,6-Dinitrotoluene	2B	
1,4-Dioxane	2B	2
Direct Black 38		1
Direct Blue 6		1
Disperse blue 1	2B	2
Engine exhaust, gasoline	2B	
Environmental Tobacco Smoke		1
1,2-Epoxybutane	2B	
Epichlorohydrin	2A	2
Erionite	1	1
Estrogens (not conjugated) estradiol-17 β		2
Estrogens (not conjugated) estrone		2
Estrogens (not conjugated) ethinylestradiol		2
Estrogens (not conjugated) mestranol		2
Ethyl acrylate	2B	
Ethylbenzene	2B	
Ethylene thiourea	2B	2
Ethylene dibromide	2A	2
Ethylene oxide	1	1
Ethyl methanesulfonate	2B	2
N-Ethyl-N-nitrosourea	2A	2
Etoposide	2A	
Etoposide in combination with cisplatin and bleomycin	1	
Formaldehyde (gas)	2A	2
2-(2-Formylhydrazino)-4-(5-(5-nitro-2-furyl)thiazole	2B	
Fowler's solution	1	
Fuel oil, residual	2B	
Furan	2B	2

Gasoline	2B	
Gasoline engine exhaust fumes	2B	
Gasoline, unleaded	2B	
Glass wool (respirable size)	2B	2
Glu-P-1 (2-amino-6-methyldipyrido[1, 2-a:3', 2'-d]imidazole)	2B	
Glu-P-2 (2-aminodipyrido[1, 2-a:3', 2'-d]imidazole)	2B	
Glycidaldehyde	2B	
Glycidol	2A	2
Griseofulvin	2B	
HC blue 1	2B	
Heptachlor	2B	
Hexachlorobenzene	2B	2

Chemical Name	IARC ^a	NTP ^b
Hexachlorocyclohexane (all isomers)	2B	2
Hexachloroethane	2B	2
Hexamethylphosphoramide	2B	2
Hydrazine (anhydrous)	2B	2
Hydrazine sulfate		2
Hydrazobenzene		2
Indeno[1, 2, 3-cd]pyrene	2B	2
Inorganic-acid mists, containing sulfuric acid	1	
IQ (2-Amino-3-methylimidazo[4,5-f]quinoline)	2A	
Iron-dextran complex	2B	2
Isoprene	2B	2
Lasiocarpine	2B	
Lead and lead compounds, inorganic	2B	
Lead acetate		2
Lead phosphate		2
Lindane		2
Magenta (containing CI basic red 9)	2B	
MeA-a-C (2-Amino-3-methyl-9H-pyrido[2, 3]indole)	2B	
Medroxyprogesterone acetate	2B	
MelQ (2-Amino-3, 4-dimethylimidazo[4, 5-f]quinoline)	2B	
MelQx (2-AMino-3, 8-dimethylimidazo[4, 5-f]quinoxaline)	2B	
Melphalan	1	1
Merphalan	2B	
5-Methoxypsoralen	2A	
8-Methoxypsoralen (methoxsalen) plus ultraviolet A radiation	1	1
2-Methylaziridine (propyleneimine)	2B	2
Methylazoxymethanol acetate	2B	
5-Methylchrysene	2B	2
4,4'-Methylene bis(2-chloroaniline) (MBOCA)	2A	2
4,4'-Methylene bis(2-methylaniline)	2B	
4,4'-Methylene bis(N,N-dimethylbenzenamine)		2
4,4'-Methylenedianiline	2B	2
4,4'-Methylenedianiline dihydrochloride	2B	2
Methyl Mercury Compounds	2B	
Methyl methanesulfonate	2A	2
2-Methyl-1-nitroanthraquinone (uncertain purity)	2B	
N-Methyl-N'-nitro-N-nitrosoguanidine (MNNG)	2A	2
N-Methyl-N-nitrosourea	2A	2

N-Methyl-N-nitrosourethane	2B	
Methylthiouracil	2B	
Metronidazole	2B	2
Michler's ketone [4,4'-(Dimethylamino)benzophenone]		2
Mineral oils, untreated and mildly-treated	1	1
Mirex	2B	2
Mitomycin C	2B	
Mitoxantrone	2B	
Monocrotaline	2B	
MOPP and other combined chemotherapy including alkylating agents	1	
5-(Morpholinomethyl)-3-[(5-nitrofurfurylidene)amino]-2-oxazolidinone	2B	
Mustard gas	1	1
Nafenopi	2B	

Chemical Name	IARC ^a	NTP ^b
2-Naphthylamine	1	1
Nickel compounds	1	
Nickel and certain nickel compounds		2
Nickel metallic, and alloys	2B	
Niridazole	2B	
Nitrilotriacetic acid	2B	2
Nitrilotriacetic acid and its salts	2B	
5-Nitroacenaphthene	2B	
2-Nitroanisole	2B	2
Nitrobenzene	2B	
6-Nitrochrysene	2B	2
Nitrofen, technical-grade	2B	2
2-Nitrofluorene	2B	
1-[(5-Nitrofurfurylidene)amino]-2-imidazolidinone	2B	
N-[4-(5-Nitro-2-furyl)-2-thioxolyl]acetamide	2B	
Nitrogen mustard	2A	
Nitrogen mustard N-oxide	2B	
Nitrogen mustard hydrochloride		2
Nitromethane	2B	
2-Nitropropane	2B	2
1-Nitropyrene	2B	2
4-Nitropyrene	2B	2
N-Nitrosodi-n-butylamine	2B	2
N-Nitrosodi-n-propylamine	2B	2
N-Nitrosodiethanolamine	2B	2
N-Nitrosodiethylamine	2A	2
N-Nitrosodimethylamine	2A	2
N-Nitroso-N-ethylurea	2A	2
3-(N-Nitrosomethylamino)propionitrile	2B	
4-(N-Nitrosomethylamino)-1-(3-pyridyl)-butanone (NNK)	2B	2
N-Nitrosomethylethylamine	2B	
N-Nitroso-N-methylurea	2A	2
N-Nitrosomethylvinylamine	2B	2
N-Nitrosomorpholine	2B	2

N-Nitrosornicotine	2B	2
N-Nitrosopiperidine	2B	2
N-Nitrosopyrrolidine	2B	2
N-Nitrososarcosine	2B	2
Norethisterone	2B	2
Ochratoxin A	2B	2
Oestrogen-progestogen therapy, post menopausal	2B	
Oestrogen replacement therapy	1	
Oestrogen, nonsteroidal	1	
Oestrogen, steroidal	1	
Oil orange ss	2B	
Oral contraceptives, combined	1	
Oral contraceptives, sequential	1	
Oxazepan	2B	
4,4'-Oxydianiline	2B	2
Oxymetholone		2
Palygorskite (long fibers, > 5 micrometers)	2B	
Panfuran S (containing dihydorxymethylfuratrizine)	2B	

Chemical Name	IARC ^a	NTP ^b
Phenacetin	2A	2
Phenazopyridine hydrochloride	2B	2
Phenobarbital	2B	
Phenolphthalein	2B	2
Phenoxybenzamine hydrochloride	2B	2
Phenyl glycidyl ether	2B	
Phenytoin	2B	2
Phlp (2-Amino-1-methyl-6-phenyl-imidazo[4,5-b]pyridine)	2B	
Piperazine estrone sulfate		1
Polybrominated biphenyls	2B	2
Polychlorinated biphenyls (PCB's)	2A	2
Ponceau 3R	2B	
Ponceau MX	2B	
Potassium bromate	2B	
Procarbazine hydroxhloride	2A	2
Progesterone		2
Progestins	2B	
Progestogen-only contraceptives	2B	
1,3-Propane sultone	2B	2
β-Propiolactone	2B	2
Propyleneimine	2B	2
Propylene oxide	2B	2
Propylthiouracil	2B	2
Radon 222 and its decay products	1	1
Reserpine		2
Rockwool	2B	
Safrole	2B	2
Selenium sulfide		2
Shale-oils	1	
Silica, crystalline cristobalite (respirable size)	1	1

Silica, crystalline tridymite (respirable size)		1
Silica, crystalline quartz (respirable size)	1	1
Slagwool	2B	
Sodium equilin sulfate		1
Sodium estrone sulfate		1
Sodium ortho-phenylphenate	2B	
Soots	1	1
Sterigmatocystin	2B	
Streptozotocin	2B	2
Strong inorganic acid mists containing sulfuric acid		1
Styrene	2B	
Styrene-7,8-oxide	2A	
Sulfallate	2B	2
Talc (containing asbestos fibers)	1	
Tamoxifen	1	1
Tars		1
Teniposide	2A	
2,3,7,8-Tetrachlorodibenzo-para-dioxin (TCDD)	1	1
Tetrachloroethylene	2A	2
Tetrafluoroethylene	2B	2
Tetranitromethane	2B	2
Thioacetamide	2B	2

Chemical Name	IARC ^a	NTP ^b
4,4'-Thiodianiline	2B	
Thiotepa	1	1
Thiourea	2B	2
Thorium dioxide		1
Tobacco products, smokeless	1	1
Tobacco smoke	1	1
o-Tolidine	2B	2
Toluene diisocyanates	2B	2
o-Toluidine	2A	2
o-Toluidine hydrochloride		2
Toxaphene (Polychlorinated camphenes)	2B	2
Treosulfan	1	
Trichlormethine (trimustine hydrochloride)	2B	
Trichloroethylene	2A	2
2,4,6-Trichlorophenol		2
1,2,3-Trichloropropane	2A	2
Tris (2,3-dibromopropyl)phosphate	2A	2
Trp-P-1 (3-Amino-1,4-dimethyl-5H-pyrido[4,3-b] indole)	2B	
Trp-P-2 (3-Amino-1-methyl-5H-pyrido[4,3-b]indole)	2B	
Trypan blue	2B	
Uracil mustard	2B	
Urethane	2B	2
Vinyl acetate	2B	
Vinyl bromide	2A	
Vinyl chloride CSA	1	1
4-Vinyl cyclohexene	2B	
4-Vinyl-1-cyclohexene diepoxide		2

4-Vinylcyclohexene diepoxide	2B	
Vinyl fluoride	2A	
Welding Fumes	2B	
2,6-Xylidine (2,6-Dimethylaniline)	2B	
Zalcitabine	2B	
Zidovudine	2B	

(a) International Agency for Research on Cancer (IARC):

- 1. Carcinogenic to humans with sufficient epidemiological evidence
- 2A. Probably carcinogenic to humans with (usually) at least limited human evidence
- 2B. Probably carcinogenic to humans, but having (usually) no human evidence

For a complete listing of IARC carcinogens, mixtures and exposure circumstances, see <http://www.iarc.fr>

(b) National Toxicology Program (NTP):

- a. Known to be carcinogenic with evidence from human studies
- b. Reasonably anticipated to be a carcinogen, with limited evidence in humans or sufficient evidence in experimental animals

More information on NTP carcinogens can be found at: <http://ntp-server.niehs.nih.gov>