

OCCUPATIONAL CARCINOGENS

Ref: (a) ACGIH Threshold Limit Values and Biological Exposure Indices, 2007

1. The Chemical Substances Threshold Limit Value (TLV) Committee has consolidated the available epidemiological and toxicological data and developed the following categories for occupational carcinogens:

a. A1 - *Confirmed Human Carcinogen*: The agent is carcinogenic to humans based on the weight of evidence from epidemiological studies.

b. A2 - *Suspected Human Carcinogen*: Human data are accepted as adequate in quality but are conflicting or insufficient to classify the agent as a confirmed human carcinogen. Or, the agent is carcinogenic in experimental animals at dose(s), by route(s) of exposure, at site(s), of histologic type(s), or by mechanism(s) considered relevant to worker exposure. The A2 category is used primarily when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals with relevance to humans.

c. A3 - *Confirmed Animal Carcinogen with Unknown Relevance to Humans*: The agent is carcinogenic in experimental animals at a relatively high dose, by routes(s) of administration, at site(s), of histologic types(s), or by mechanism(s) that may not be relevant to worker exposure. Available epidemiological studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agent is likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

d. A4 - *Not Classifiable as a Human Carcinogen*: Agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of a lack of data. *In vitro* or animal studies do not provide indications of carcinogenicity, which are sufficient to classify the agent into one of the other categories.

e. A5 - *Not Suspected as a Human Carcinogen*: The agent is not suspected to be a human carcinogen on the basis of properly conducted epidemiological studies in humans. These studies have sufficiently long follow-up, reliable exposure histories, sufficiently high dose, and adequate statistical power to conclude that exposure to the agent does not convey a significant risk of cancer to humans; OR, the evidence suggesting a lack of carcinogenicity in experimental animals is supported by mechanistic data.

3. Tables I, II and III below include the ACGIH list of *Confirmed Human Carcinogens*, *Suspected Human Carcinogens* and *Confirmed Animal Carcinogens with Unknown Relevance to Humans* respectively. For carcinogens in these tables, worker exposure by all routes should be carefully controlled to levels as low as reasonably achievable. The command Material Safety Data Sheets (MSDS) should be screened for these carcinogens and, if possible, all carcinogenic substances should be substituted with a less hazardous material.

Table I - Confirmed Human Carcinogens:
4-Aminodiphenyl
Arsenic and arsenic compounds
Asbestos (all forms)
Benzene
Benzidine
Beryllium and beryllium compounds
bis(Chloromethyl) ether
Chromate
Chromium (VI) compounds
Coal tar pitch volatiles, as benzene solubles
b-Naphthylamine
Nickel, insoluble compounds
Nickel subsulfide
Uranium
Vinyl chloride
Wood dust (Beech and oak hard woods)
Zinc chromates

Table II - Suspected Human Carcinogens:
Acrylonitrile
Antimony trioxide
Benz[a]anthracene
Benzo[b]fluoranthene
Benzo[a]pyrene
Benzotrichloride
1,3-Butadiene
Cadmium and cadmium compounds
Calcium chromate
Carbon tetrachloride (tetrachloromethane)
Chloromethyl methyl ether
Diazomethane
1,4-Dichloro-2-butene
Dimethyl carbamoyl chloride
Ethylene oxide
Formaldehyde
Lead chromate
4,4'-Methylene bis(2-chloroaniline), (MBOCA, (MOCA)
4-Nitrodiphenyl
Silica - Crystalline quartz
Strontium chromate
Sulfuric acid in strong inorganic acid mist
Vinyl bromide

Vinyl fluoride

Table III - Confirmed Animal Carcinogens with Unknown Relevance to Humans:

Acetaldehyde
Acrylamide
Aldrin
Allyl chloride
Amitrole
Ammonium perfluorooctanoate
Aniline
<i>o</i> -Anisidine
Benzyl chloride
Bromacil
Bromoform
Captan
Catechol
Chlordane
Chlorinated camphene (toxaphene)
Chlorobenzene
Chlorodiphenyl (54% chlorine)
Chloroform
Chrysene
Cobalt, elemental and inorganic compounds
Crotonaldehyde
DDT (dichlorodiphenyltrichloroethane)
Dichloroacetylene
<i>p</i> -Dichlorobenzene
Dichloromethane
3,3'-Dichlorobenzidine
Di(2-ethylhexyl)phthalate (DEHP)
1,1-Dimethylhydrazine
Dimethyl sulfate
Dinitrotoluene
1,4-Dioxane
Epichlorohydrin
Ethyl bromide
Ethyl chloride
Ethylene dibromide
Ethylenimine
Furfural
Gasoline
Glycidol
Heptachlor and Heptachlor epoxide
Hexachlorobenzene
Hexachlorobutadiene

Hexachloroethane
Hexamethyl phosphoramidate
Hydrazine
Hydrogen peroxide
Hydroquinone
Isophorone
Lead, elemental and inorganic compounds
Lindane
Methyl tert-butyl ether (MTBE)
4,4'-Methylene dianiline
Methyl hydrazine
Nitrobenzene
<i>p</i> -Nitrochlorobenzene
2-Nitropropane
Pentachlorophenol
Perchloroethylene (tetrachloroethylene)
<i>o</i> -Phenylenediamine
Phenyl glycidyl ether (PGE)
Phenylhydrazine
Propane sultone
<i>B</i> -Propiolactone
Propoxur
Propylene imine
Propylene oxide
Glass wool fibers
Rock wool fibers
Slag wool fibers
Special purpose glass fibers
1,1,2,2-Tetrachloroethane
Tetranitromethane
Tetrafluroethylene
<i>o</i> -Tolidine
<i>o</i> -Toluidine
<i>p</i> -Toluidine
Trichloroacetic acid
1,2,3-Trichloropropane
Vinyl acetate
Vinyl cyclohexene dioxide
VM&P Naphtha
Xylidine (mixed isomers)