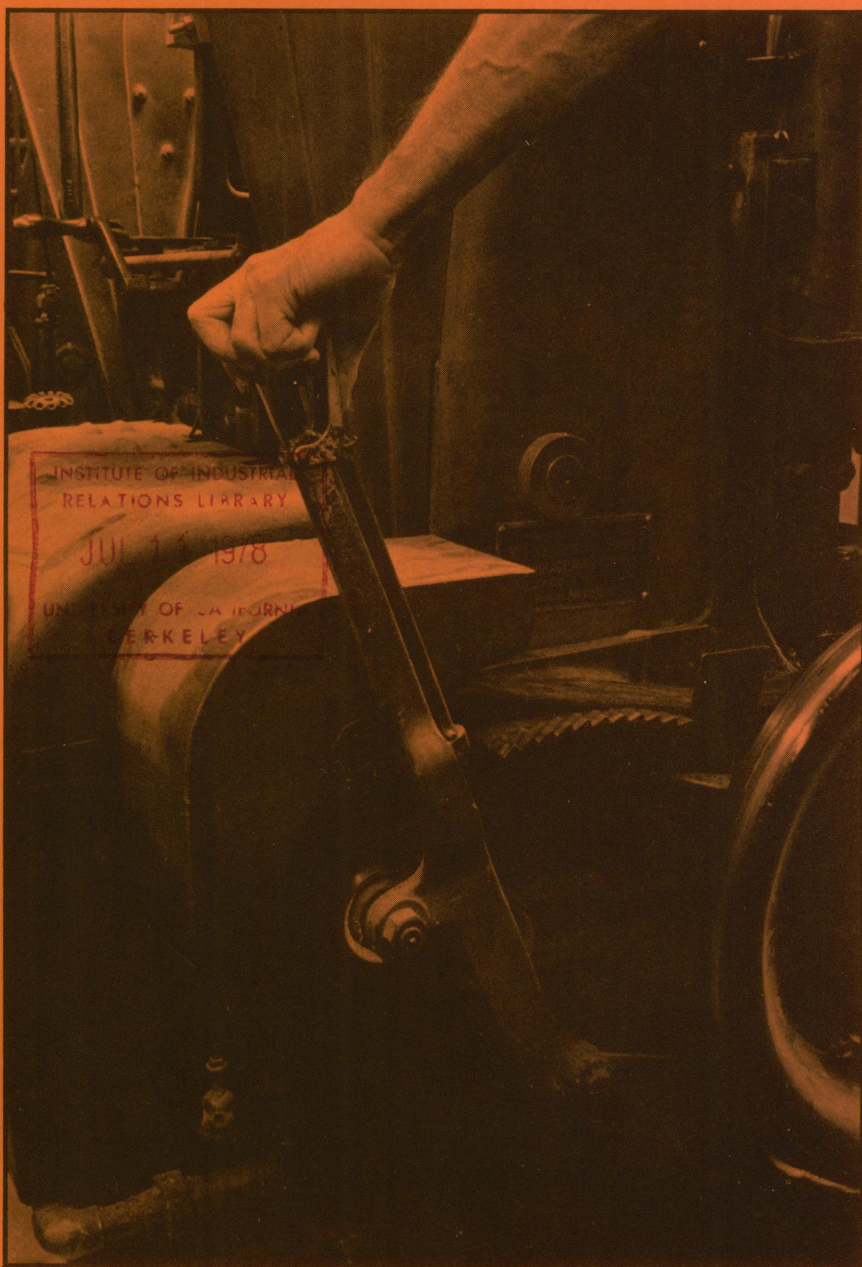
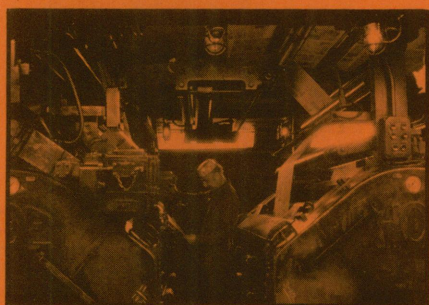


(A LABOR OCCUPATIONAL
HEALTH PROGRAM PUBLICATION,
SERIES I)

*California, University, Institute of Industrial
Relations (Berkeley), Center for Labor Research
and Education, Labor Occupational Health Program,
Properties...*

Toxic Substances Regulated by OSHA: A Guide to their Properties & Hazards



Properties, Uses, Toxicity,
and

Hazards of Substances with TLV's 1540

Donald Whorton, M.D.
Medical Director

Labor Occupational Health Program,
Center for Labor Education and Research.
Institute of Industrial Relations (Berkeley),
University of California, Berkeley

Copyright: May 1978

The following is an alphabetical listing of each toxic substance which has an OSHA regulation. Some chemicals have multiple names but each is only listed once using the OSHA-preferred name. Each substance will have the following information:

NAME OF SUBSTANCE	C*	TLV _____ppm	_____mg/M ³
(SKIN)**		***(_____ppm)	(_____mg/M ³)
Properties:	refers to whether it is a solid, liquid, or gas and if there are special characteristics such as odor, etc.		
Use:	this is a listing of <u>some</u> of the common uses but by no means a complete listing for every use for every substance.		
Toxicity:	this includes effects of the substance on the body: some of the effects occur in humans; others are known to occur in laboratory animals.		
Hazard:	this usually refers to the fire and explosive dangers associated with the substance.		

* The C means ceiling value, i.e., the exposure shall never exceed the TLV

** The designation SKIN under NAME OF SUBSTANCE means that this substance is either readily absorbed through the skin or directly affects the skin

*** Means that the ACGIH (American Conference of Governmental Industrial Hygienists, a nonprofit organization of scientists which made recommendation as to acceptable levels of toxic substances) has recommended a different level from OSHA. Often, the ACGIH levels are stricter than OSHA's; occasionally they are higher

The American Conference of Governmental Industrial Hygienists set TLVs as guidelines for exposure. When OSHA came into existence, the agency adopted the ACGIH's TLVs of 1968 as standards. OSHA refers to these exposure standards as either Permissible Exposure Limits (PELs) or Time Weighted Averages (TWAs). The TLV is the acceptable level for each substance as a single substance in either ppm (parts per million) or mg/M^3 (milligrams per cubic meter of air) or both.

In some cases the TLV will be STD 1910.10. These are special standards passed by OSHA and refer to specific handling of the substance, clean-up procedures, etc.; they do not prescribe air levels. Refer to the specific standard for the precise information as they are too long to repeat here.

A glossary of terms follows the listing. I hope that this compendium of TLVs will be useful. Not every substance will have complete information about each area. References to each statement can be supplied upon request.

ACETALDEHYDE	TLV 200ppm * (100ppm)	360mg/M ³ (180mg/M ³)
Properties:	colorless, fuming liquid with a strong fruity odor	
Use:	used as a chemical intermediate in the synthesis of alcohols, etc., a synthetic flavoring substance	
Toxicity:	strong irritant to the eyes, mucous membranes, lungs and skin; can cause delayed pulmonary edema	
Hazard:	fire and explosive hazard when exposed to flames	
ACETIC ACID	TLV 10ppm	25mg/M ³
Properties:	clear, colorless liquid with penetrating odor	
Use:	commercial vinegar, contained in food cellulose, resins, esters, solvents	
Toxicity:	direct irritant effect from the acid, can cause burns; can affect eyes, skin, mucous membranes, teeth, lungs	
Hazard:	fire and explosive danger if heated; dangerous around certain substances like chromic acid, sodium peroxide, nitric acid	
ACETIC ANHYDRIDE	TLV 5ppm	20mg/M ³
Properties:	colorless liquid with strong acetic odor	
Use:	production of cellulose acetate	
Toxicity:	similar to acetic acid but more powerful irritant as tends to cause burns more readily	
Hazard:	will react violently on contact with water or steam, fire and explosive danger when heated	
ACETONE	TLV 1,000ppm	2,400mg/M ³
Properties:	colorless liquid with mint-like odor	
Use:	solvent, a food additive, laboratory uses	
Toxicity:	irritant of skin and mucous membranes; can produce narcosis	
Hazard:	fire and explosive hazard when heated	
ACETONITRILE (Methyl cyanide)	TLV 40ppm	70mg/M ³
Properties:	colorless liquid with an aromatic odor	
Use:	used as a chemical intermediate, solvent	
Toxicity:	similar to cyanide; readily absorbed through the skin, causes the blood to not carry enough oxygen due to enzyme inhibition (cytochrome oxidase); also can injure lungs	
Hazard:	very dangerous if heated for fire hazard	
2-ACETYLAMINOFLUORENE	TLV: Std 1910.1014	
Properties:	powder	
Use:	an insecticide	
Toxicity:	a regulated carcinogen	
Hazard:	emits dangerous fumes when heated to decomposition	

ACETYLENE DICHLORIDE (1,2-Dichloroethylene) TLV 200ppm 790mg/M³

Properties: colorless liquid with pleasant odor
Use: used in production of other chemicals
Toxicity: irritant to skin and mucous membranes; produces narcosis; potential toxin to liver and kidneys
Hazards: moderate fire and explosive hazard when heated

ACETYLENE TETRABROMIDE TLV 1ppm 14mg/M³

Properties: colorless to yellow liquid
Use: used as a gauge fluid and in ore separation processes
Toxicity: irritant to mucous membranes and eyes; liver toxin; produces narcosis
Hazard: dangerous when heated to decomposition as emits dangerous gases

ACROLEIN TLV 0.1ppm 0.15mg/M³

Properties: colorless or yellowish liquid with disagreeable choking odor
Use: used in resins and as a chemical intermediate; by-product of combustion
Toxicity: strong irritant of eyes, mucous membranes, lungs and skin; a weak sensitizer, liquid can burn skin, eyes, etc., can cause pulmonary edema
Hazard: fire hazard when heated

ACRYLAMIDE (SKIN) TLV 0.3mg/M³

Properties: white crystalline solid
Use: used in organic synthesis and in soldering flux
Toxicity: can be absorbed through the skin; produces a toxic effect on the nervous system characterized by muscular weakness, incoordination, shaking, and seeing non-existent objects (hallucinating)
Hazards: reacts violently when heated

ACRYLONITRILE (SKIN) TLV 2 ppm

Properties: colorless liquid with mild odor
Use: used as a chemical intermediate
Toxicity: readily absorbed through the skin, similar to cyanide (see cyanide); animal carcinogen
Hazard: dangerous fire hazard and explosive hazard if heated

ALDRIN (SKIN) TLV 0.25 mg/M³

Properties: crystals
Use: chlorinated hydrocarbon insecticide; use banned in US by EPA
Toxicity: affects nervous system by producing irritability, convulsions, and depression, can damage liver; an animal carcinogen
Hazard: dangerous chloride fumes are produced when heated

ALLYL ALCOHOL
(SKIN) TLV 2ppm 5mg/M³

Properties: liquid with a pungent odor
Use: used in the preparation of allyl resins and plastics
Toxicity: irritation of eyes, mucous membranes and skin: potential
toxin to kidneys and liver
Hazard: moderate fire and explosive hazard when heated

ALLYL CHLORIDE TLV 1ppm 3mg/M³

Properties: colorless liquid
Use: used in chemical production
Toxicity: irritant to eyes, skin, mucous membranes and lungs,
potential liver and kidney toxin, can produce narcosis
Hazard: severe fire hazard and moderate explosive hazard if
heated

ALLYL GLYCIDYL ETHER (AGE) (C) TLV 10ppm 45mg/M³
(SKIN) *(5) (22)

Properties: liquid
Use: resin intermediate
Toxicity: irritant to eyes, mucous membranes, lungs and skin;
can act as sensitizer; can injure lungs, kidneys, and
depress central nervous system
Hazard: flammable

ALLYL PROPYL DISULFIDE TLV 2ppm 12mg/M³

Properties: a liquid with a strong odor (called onion oil)
Toxicity: marked irritant to eyes and mucous membranes
Hazard: moderate fire hazard

4-AMINODIPHENYL TLV STD 1910.1011
(SKIN) *(no exposure)

Properties: colorless crystals
Use: a rubber oxidant
Toxicity: readily absorbed through the skin; a regulated carcinogen
Hazard: produces dangerous fumes when heated

2-AMINOPYRIDINE TLV 0.5ppm 2mg/M³

Properties: white powder or crystals
Use: used in the manufacture of pharmaceuticals
Toxicity: readily absorbed through the skin; skin and eye irritant;
produces headaches, weakness, collapse, and convulsions
(CNS excitement), also elevated blood pressure; can
cause death
Hazard: emits dangerous fumes if heated to decomposition

AMMONIA

TLV 50ppm
*(35) 35mg/M³
(25)

Properties: colorless gas with extremely irritating odor
Use: refrigeration, fertilizers, explosives, dyes, chemicals, cleaning
Toxicity: irritant to eyes, mucous membranes; can cause ulcers of eyes; can irritate the moist skin; irritant of lung
Hazard: moderate fire and explosive hazard when heated; forms explosive compound with silver and mercury

AMMONIUM SULFAMATE (Ammate)

TLV 15mg/M³
*(10)

Properties: white crystalline solid
Use: herbicide
Toxicity: mild irritant of eyes, mucous membranes; causes stomach irritation if swallowed
Hazard: slight explosive hazard when heated

AMORPHOUS-SILICA (Amorphous including natural Diatomaceous Earth)

TLV $\frac{80\text{mg}/\text{M}^3}{\% \text{SiO}_2}$

Properties: colorless crystals
Use: used as a filtering agent, filler for construction, and in dyeing, bleaching and dry cleaning
Toxicity: can produce a pneumoconiosis similar to silicosis
Hazard: not flammable

n-AMYL ACETATE

TLV 100ppm 525mg/M³

Properties: colorless liquid with a pear or banana-like odor
Use: solvent for lacquers, flavors and perfumes
Toxicity: irritant to eyes, mucous membranes, can produce narcosis; can cause nausea and vomiting
Hazard: moderate fire and explosive hazard when heated

sec-AMYL ACETATE

TLV 125 ppm 650mg/M³

Properties: colorless liquid
Use: solvent
Toxicity: irritant to eyes, mucous membranes; can produce narcosis; can cause nausea and vomiting
Hazard: moderate fire and explosive hazard when heated

ANILINE
(SKIN)

TLV 5ppm 19mg/M³

Properties: oily liquid with a characteristic odor
Use: used in the dye and pharmaceutical industries
Toxicity: readily absorbed through the skin; producer of methemoglobin; can cause the breakage of red blood cells; can damage liver and kidneys; can cause headaches, dizziness; also may cause skin rashes by sensitization
Hazard: moderate fire hazard if heated

ANISIDINE (o & p isomers)
(SKIN)

TLV 0.5mg/M³

Properties: yellowish liquid
Use: dyestuff
Toxicity: irritant to skin; readily absorbed through the skin; producer of methemoglobin; causes headaches, dizziness; can damage red blood cells
Hazard: emits toxic fumes if heated to decomposition

ANTIMONY & related compounds (as Sb)

TLV 0.5mg/M³ *(0.5mg/M³ Handling)
(0.05mg/M³ Production)

Properties: solids, depends upon compound
Use: manufacture of semi-conductors; used in production of alloys of tin and lead, for type, bearings, battery plates, cable sheathing, solder, ornamental castings and ammunition
Toxicity: irritant of skin and mucous membranes; metallic taste, sore mouth, stomach upset, with vomiting, diarrhea, and complaints of nervous system like irritability, insomnia, fatigue; can damage liver, heart and white blood cells
Hazard: depends upon compound

ANTU (alpha naphthyl thiourea)

TLV 0.3mg/M³

Properties: crystals with a bitter taste
Use: rodenticide
Toxicity: no human data; can produce pulmonary edema in animal; can damage thyroid and adrenal glands; can cause skin rashes and injure white blood cells
Hazard: produces toxic fumes when heated to decomposition

ARSENIC & compounds

TLV 0.5mg/M³ *(0.25mg/M³ Handling)
(0.05mg/M³ Production)

Properties: silvery to black, brittle, crystalline and shapeless metal-like material
Use: alloys with lead and copper; medicines; glass, pigments; poisons; insecticides; textile printing; tanning, anti-fouling paints; control of sludge, food additive
Toxicity: irritant of eyes mucous membranes and skin; causes skin rashes and ulcerations; causes various GI disturbances; injures liver, blood, kidneys, and nervous system; causes peripheral neuritis; a carcinogen of skin, liver, and lung
Hazard: forms dangerous fumes when heated to decomposition

ARSINE

TLV 0.05ppm

0.2mg/M³

Properties: colorless gas with a mild garlic odor
Use: no industrial use of arsine but is an undesired side-reaction of hydrogen and arsenic compounds usually seen in chemical, smelting, and refinishing industries
Toxicity: produces breakage of red blood cells (hemolytic anemia); damages kidneys, liver, and lungs; a known carcinogen
Hazard: moderate fire and explosive hazard when heated

ASBESTOS

TLV 0.2 fibers/cc

Properties: solid, usually in fibrous form
Use: incombustible fabric; asbestos-cement products for roofing, pipes, etc; fire proofing for ships; brake and clutch linings; insulation; used in 3000 products
Toxicity: produces scarring of lungs (asbestosis); a known human carcinogen of cancer of lining of lungs and abdomen (mesothelioma), lung, stomach, and colon
Hazard: no fire or explosive hazard

AZINPHOS METHYL (Guthion)
(SKIN)

TLV 0.2mg/M³

Properties: crystal
Use: organophosphate insecticide; a food additive for animal food
Toxicity: absorbed through skin; a cholinesterase inhibitor
Hazard: see parathion

BARIUM (soluble compounds)

TLV 0.5mg/M³

Properties: a silver-white metal, but depends upon compound
Use: compounds used in glass, synthetic rubber vulcanization, lubricants, pesticides, sugar, animal and vegetable oil refining, pigments, textile dyes, and electronic industry
Toxicity: irritant of eyes, mucous membranes, lungs, and skin; can cause injury to heart, lungs, and brain
Hazards: depends upon compound

BENZENE (Benzol)

TLV 1ppm

Properties: clear, colorless liquid
Use: solvent in chemical and drug industries; starting material and intermediate in synthesis of numerous organic chemicals
Toxicity: Acute--irritant of mucous membranes, strong narcosis effect. Chronic--known leukemogen (causes leukemia), damage bone marrow and produces aplastic anemia (an irreversible inability to produce enough red blood cells). Also can cause nosebleeds, bruising, loss of appetite, energy, etc.
Hazard: Fire and explosive hazard when exposed to heat

**BENZIDINE
(SKIN)**

TLV STD 1910.1011
*(no exposure)

Properties: grey-yellow or reddish-white powder
Use: dye
Toxicity: readily absorbed through the skin; a regulated carcinogen especially of the urinary bladder and kidneys; can destroy red blood cells (hemolysis), damage bone marrow, kidneys, and liver
Hazards: produces dangerous fumes when heated to decomposition

BENZOYL PEROXIDE

TLV 5mg/M³

Properties: white granular solid
Use: catalyst to initiate free-radical polymerization; bleach for flour, oils, fats; curing agent for cosmetics and pharmaceuticals
Toxicity: irritant of skin, eyes, mucous membranes and lungs; can cause sensitization
Hazard: severe fire and explosive hazard when heated; reacts violently in contact with variety of substances

BENZYL CHLORIDE

TLV 1ppm 5mg/M³

Properties: colorless liquid with irritating, unpleasant odor
Use: manufacture of benzyl chloride, benzyl alcohol and benzaldehyde; used in plastics, resins, dyes, tanning and pharmaceutical manufacture
Toxicity: strong irritant to skin, eyes, mucous membranes, and lungs; can cause pulmonary edema; suspect carcinogen
Hazard: moderate fire and explosive hazard when heated

BERYLLIUM & compounds

TLV 0.002mg/M³

Properties: solid
Use: used in alloys with a number of metals including steel, nickel, magnesium, zinc and aluminium, copper; for high strength material; electronic and nuclear industries
Toxicity: Acute--acts as irritant of skin, eyes, mucous membranes, and lungs; can lead to increase in pneumonia. Chronic--produces a generalized disease which involves lungs, liver, skin, and other organs; produces disability and death; suspect carcinogen
Hazard: depends upon compound

BIS(CHLOROMETHYL)ETHER (Dichloromethyl ether)(BCME) TLV STD 1910.1008
*(1ppb, 5µg/M³)

Properties: a volatile liquid
Use: used as intermediates in anionic exchange strong-based resins
Toxicity: irritant of eyes, mucous membranes and lungs; a regulated carcinogen of the lungs
Hazards: unknown if fire or explosive hazard

BORON OXIDE (Boric Anhydride)

TLV 15mg/M³
*(10)

Properties: solid, colorless, crystals
Use: manufacture of glass, enamels, glazes; a herbicide
Toxicity: mild irritant of eyes, skin, and mucous membranes;
excessive use or application to skin can cause
poisoning of nervous system
Hazard: not flammable

BORON TRIFLUORIDE
(C)

TLV 1ppm

3mg/M³

Properties: colorless gas with strong irritating odor
Use: flux in welding, used in polymerization as a catalyst;
alloy in metals
Toxicity: strong irritant of lungs and mucous membranes; produces
increase in lung infections (pneumonias); can produce
fluorosis
Hazards: produces dangerous fumes when heated to decomposition
and reacts with water or steam to produce toxic fumes

BROMINE

TLV 0.1ppm

0.7mg/M³

Properties: dark-red liquid
Use: gold extraction; bleaching; pharmaceuticals; dyestuff;
and fuel additive
Toxicity: highly corrosive to skin, eyes, mucous membranes, and
lungs; can cause pulmonary edema
Hazard: moderate fire hazard as can spontaneously react with
certain substances

BROMOFORM
(SKIN)

TLV 0.5ppm

5mg/M³

Properties: colorless liquid or crystals
Use: used in medicine, used in the production of other
chemicals
Toxicity: very strong irritant especially to eyes--causes profuse
wateriness; irritant to skin and mucous membranes; may
readily damage liver; may produce narcosis
Hazard: produces toxic fumes if heated to decomposition

BUTADIENE (1,3-Butadiene)

TLV 1,000ppm

2,200mg/M³

Properties: colorless gas with mild aromatic odor
Use: synthetic rubber production
Toxicity: irritant; narcotic; can burn skin if spilled on skin
Hazard: mild fire and explosive danger

2-BUTANONE (Methyl Ethyl Ketone)

TLV 200ppm

590mg/M³

Properties: colorless liquid with acetone like odor
Use: solvent for cellulose acetate and nitrate gums, resins,
lacquers, synthetic rubber, laboratory uses
Toxicity: irritant of eyes, mucous membranes and skin; can produce
narcosis
Hazard: fire and explosive hazard when heated

2-BUTOXYETHANOL (Butyl Cellosolve) (SKIN)	TLV 50ppm	240mg/M ³
Properties:	colorless liquid	
Use:	solvent	
Toxicity:	readily absorbed through skin; irritant to eyes, mucous membranes and lungs; can produce narcosis; can injure liver, kidneys and lungs; can produce breakage of red blood cells (hemolytic anemia)	
Hazard:	moderate fire hazard when heated	
BUTYL ACETATE (n-butyl acetate)	TLV 150ppm	710mg/M ³
Properties:	colorless liquid	
Use:	lacquer solvent	
Toxicity:	irritant to eyes and mucous membranes; can produce narcosis	
Hazard:	moderate fire and explosive hazard when heated	
sec-BUTYL ACETATE	TLV 200ppm	950mg/M ³
Properties:	colorless liquid with a mild odor	
Use:	lacquer solvent	
Toxicity:	irritant to eyes and mucous membranes; can produce narcosis	
Hazard:	moderate fire and explosive hazard when heated	
tert-BUTYL ACETATE	TLV 200ppm	950mg/M ³
see sec-BUTYL ACETATE		
BUTYL ALCOHOL	TLV 100ppm	300mg/M ³
Properties:	colorless liquid	
Use:	solvent, extractant, chemical intermediate, water-proof cloth manufacture	
Toxicity:	irritant of eyes, mucous membranes and skin; causes skin rashes, headaches and dizziness (narcosis effect)	
Hazard:	fire and explosive danger when heated	
sec-BUTYL ALCOHOL	TLV 150ppm *(50ppm)	450mg/M ³ (150mg/M ³)
Properties:	colorless liquid	
Use:	solvent, chemical intermediate	
Toxicity:	irritant of eyes, mucous membranes and skin; causes skin rashes, mild producer of narcosis	
Hazard:	fire and explosive danger when heated	
tert-BUTYL ALCOHOL	TLV 100ppm	300mg/M ³
Properties:	colorless liquid or solid crystals	
Use:	little used in industry; used in extraction and as an intermediate	
Toxicity:	irritant of eyes, mucous membranes and skin; causes skin rashes; mild producer of narcosis	
Hazard:	fire and explosive danger when heated	

BUTYLAMINE (SKIN) (C)	TLV 5ppm	15mg/M ³
Properties:	liquid with an ammonia-like odor	
Use:	a chemical intermediate in the chemicals and pharmaceutical industry	
Toxicity:	severe irritant to skin, eyes, mucous membranes, and lungs; can cause danger to liver and kidneys	
Hazard:	moderate fire danger	
tert-BUTYL CHROMATE (as CrO ₃) (SKIN)	TLV 0.1mg/M ³	
Properties:	solid, usually a contaminate of chromium trioxide	
Use:	see chromium	
Toxicity:	see chromium--irritant of skin, mucous membranes and lungs; produces ulcers of skin and nasal septum; a known carcinogen; can also produce narcosis	
Hazard:	see chromium	
n-BUTYL GLYCIDYL ETHER (BGE)	TLV 50ppm	270mg/M ³
Properties:	colorless liquid	
Use:	viscosity-reducing agent for epoxy resins, stabilizer of chlorinated compounds, chemical intermediate	
Toxicity:	irritant to eyes, mucous membrane and skin; may act as sensitizer	
Hazard:	moderately flammable	
BUTYL MERCAPTAN	TLV 10ppm *(0.5ppm)	35mg/M ³ (1.5mg/M ³)
Properties:	colorless liquid with a skunk-like odor	
Use:	solvent	
Toxicity:	strong offensive smell; causes headache and nausea; odor threshold ranges from 0.001 to 0.0001 ppm; mild irritant of mucous membranes and eyes	
Hazard:	dangerous fire hazard when heated	
p-tert-BUTYLTOLUENE	TLV 10ppm	60mg/M ³
Properties:	colorless liquid	
Use:	solvent for preparation of high temperature resins primary chemical intermediate	
Toxicity:	eye and mucous membrane irritant; causes narcosis; can cause liver and kidney damage; irritant of lungs; can cause serious nervous system disorders	
Hazard:	moderate fire hazard	

CADMIUM DUST

TLV 0.2mg/M³

Properties: silver-white malleable metal
Use: highly resistant to corrosion thus used in electroplating of other metals, alloys of silver, copper, nickel, and gold; used for electrodes, in the manufacture of fluorescent lamps, and in the auto and aircraft industries
Toxicity: Acute--produces irritation of mucous membranes and lungs; can produce pulmonary edema which is often delayed by hours from time of exposure; can produce pneumonia. Chronic--produces severe lung damage (emphysema), kidney damage, liver damage, and anemia; animal carcinogen of liver, lungs, and connective tissue
Hazard: depends upon compound

CADMIUM FUMES

TLV 0.1mg/M³

see CADMIUM DUST Cadmium oxide can produce metal fume fever (see ZINC OXIDE) but this is unusual

CALCIUM ARSENATE

TLV 1mg/M³

Properties: white powder
Use: insecticide, herbicide, and molluscicide
Toxicity: see ARSENIC; causes various GI disturbances; injures liver, blood, kidneys, and nervous system; a known carcinogen
Hazard: produces toxic fumes when heated to decomposition

CALCIUM OXIDE (Lime, Quicklime)

TLV 5mg/M³

Properties: colorless crystals
Use: used in making mortar and plaster
Toxicity: strong irritant of eyes, mucous membranes, lungs, and skin
Hazard: slightly dangerous as will produce heat on reaction with water or acid

CAMPHOR

TLV 2ppm 12mg/M³

Properties: white, transparent solid with strong odor and disagreeable taste
Use: production of celluloid, plastics, films, lacquers, explosives; disinfectants, and moth repellants
Toxicity: strong irritant of eyes, mucous membranes and skin; can produce loss of smell; can cause GI disturbances; can produce convulsions; can produce narcosis
Hazard: fire and explosive hazard when heated

CARBARYL (Sevin)

TLV 5mg/M³

Properties: white crystals
Use: carbamate insecticide
Toxicity: mild cholinesterase inhibitor; irritant of mucous membranes; an animal carcinogen
Hazard: not flammable

CARBON BLACK

TLV 3.5mg/M³

Properties: dark brown to black powdery material
Use: used in rubber industry, newspaper industry, for phonograph records, protective coating, carbon paper, batteries, filler, pigment, electric conductor, and chemical reducing agent
Toxicity: an irritant of skin and mucous membranes; a questionable human carcinogen of nasal sinuses and lungs
Hazard: slight fire hazard when heated

CARBON DIOXIDE

TLV 5,000

9,000mg/M³

Properties: colorless, odorless gas
Use: carbonated beverages, fire-extinguisher, refrigeration (dry ice)
Toxicity: simple asphyxiant; unconsciousness can occur at 10% concentration
Hazard: minimal fire hazard

CARBON DISULFIDE
(SKIN)

TLV 20ppm

60mg/M³

Properties: clear, colorless liquid
Use: solvent in rubber industry; insecticide; solvent for oils, resins, fats, phosphorus; used in glass industry; produced in distillation of coal, petroleum; manufacture of viscose rayon
Toxicity: Acute--can produce narcosis and anesthesia; irritant to skin, mucous membranes, and eyes. Chronic--acts as a poison on nervous system; can produce severe personality changes; can produce permanent brain damage; can produce damage to nerves; can affect movement; can affect reproduction in both sexes
Hazard: highly flammable and high explosive hazard

CARON MONOXIDE

TLV 50ppm

55mg/M³

Properties: colorless, odorless gas
Use: used as a reducing agent in metallurgy, pig iron production, and manufacture of metal carbonyls; formed by incomplete burning of carbon-containing materials
Toxicity: binds with the red blood cells (hemoglobin) and reduces the amount of oxygen in the blood, causing dizziness, headache, and unconsciousness and death at sufficient levels; results from moderate to severe poisoning include heart damage, decrease in mental capabilities, etc.
Hazard: fire hazard when exposed to flame

CARBON TETRACHLORIDE
(SKIN)

TLV 10ppm

65mg/M³

Properties: colorless liquid with ether-like odor
Use: used as a chemical intermediate, fumigant, solvent,
fire extinguisher; FDA has banned its retail sales
and household use
Toxicity: irritant to skin and mucous membranes; serious liver
and kidney toxin, readily produces narcosis; can cause
GI upset; can damage nerves; can cause death; animal
carcinogen
Hazard: when heated to decomposition, it emits phosgene gas

CHLORDANE
(SKIN)

TLV 0.5mg/M³

Properties: colorless to yellow liquid
Use: chlorinated hydrocarbon insecticide
Toxicity: readily absorbed through the skin; affects the central
nervous system and produces convulsions, shakes, and
death; can injure liver
Hazard: not flammable

CHLORINATED CAMPHENE (Toxaphene)
(SKIN)

TLV 0.5mg/M³

Properties: yellow waxy solid with piney odor
Use: chlorinated hydrocarbon insecticide
Toxicity: stimulates the nervous system and produces convulsions
and respiratory failure; readily absorbed through the
skin; can injure liver
Hazard: produces dangerous fumes when heated

CHLORINATED DIPHENYL OXIDE

TLV 0.5mg/M³

Properties: solid
Use: plasticizer, constituent of high pressure greases
Toxicity: produces skin rash (chloracne); liver toxin
Hazard: danger when heated to decomposition due to fumes

CHLORINE

TLV 1ppm

3mg/M³

Properties: greenish-yellow gas
Use: bleach in paper and textile industry; disinfectant;
multiple uses in chemical industry
Toxicity: severe irritant to eyes, mucous membranes, lungs, and
skin; can produce pulmonary edema; lethal gas
Hazard: moderate fire and slight explosive hazard

CHLORINE DIOXIDE

TLV 0.1ppm

0.3mg/M³

Properties: red-yellow gas
Use: bleaching agent; treatment of municipal water supplies
and bathing pools; variety of chemical processes
Toxicity: highly corrosive; irritant of skin, eyes, mucous mem-
branes, and lungs; can produce pulmonary edema; lethal
gas
Hazard: dangerous fire hazard, severe explosive hazard when
heated

CHLORINE TRIFLUORIDE (C)	TLV 0.1ppm	0.4mg/M ³
Properties:	colorless gas to yellow liquid with a sweet odor	
Use:	oxidizer, propellant, incendiary	
Toxicity:	irritant of eyes, mucous membranes, lungs and skin; can produce pulmonary edema or injury of lung; lethal gas	
Hazard:	spontaneously flammable	
CHLOROACETALDEHYDE (C)	TLV 1ppm	3mg/M ³
Properties:	clear colorless liquid with pungent odor	
Use:	used as a chemical intermediate	
Toxicity:	severe irritant to skin and mucous membranes; can produce permanent eye damage	
Hazard:	moderate fire hazard	
a-CHLOROACETOPHENONE (Phenacylchloride)	TLV 0.05ppm	0.3mg/M ³
Properties:	straw-colored liquid or white crystals with fragrant odor	
Use:	lachrymator type of military poison (tear gas)	
Toxicity:	strong irritant especially to eyes, mucous membranes and lungs; can burn skin; can cause death by pulmonary edema	
Hazard:	will react with water or steam to produce toxic and corrosive fumes	
CHLOROBENZENE (Monochlorobenzene)	TLV 75ppm	350mg/M ³
Properties:	clear colorless liquid	
Use:	solvent and chemical intermediate	
Toxicity:	produces narcosis, mild irritant effects; potential lung, kidney and liver toxin	
Hazard:	flammable, dangerous fire risk	
o-CHLOROBENZYLIDENE MALONONITRILE (OCBM)	TLV 0.05ppm	0.4mg/M ³
Properties:	white crystalline solid	
Use:	tear gas	
Toxicity:	intense irritation of eyes, mucous membranes, lungs, and skin; can cause headaches	
Hazard:	produces dangerous fumes when heated to decomposition	
CHLOROBROMOMETHANE	TLV 200ppm	1,050mg/M ³
Properties:	clear, colorless liquid with sweet odor	
Use:	fire-extinguishing agent, chemical intermediate	
Toxicity:	irritant of skin, eyes and mucous membranes; produces narcosis; minimal toxic effect on liver and kidneys	
Hazard:	emits dangerous fumes if heated to decomposition	

CHLORODIPHENYL (42% chlorine) (PCB) TLV 1mg/M³
(SKIN)

Properties: colorless liquid
Use: electric wire insulation, additive to special lubricants
Toxicity: irritant of the respiratory passages; toxin of the liver; causes skin rashes (acneform dermatitis); suspect carcinogen
Hazard: dangerous when heated to decomposition due to fumes

CHLORODIPHENYL (52% chlorine) (PCB) TLV 0.5mg/M³
(SKIN)

Properties: colorless liquid
Use: electric wire insulation, additive to special lubricants
Toxicity: irritant of the respiratory passages; toxin of liver; causes skin rashes (acneform dermatitis); possible carcinogen
Hazard: dangerous when heated to decomposition due to fumes

CHLOROFORM (Trichloromethane) TLV 50ppm 240mg/M³

Properties: colorless liquid with ether-like odor
Use: not widely used; formerly used as anesthetic, now mainly occurs in chemical mixtures; used in production of instant coffee; solvent
Toxicity: irritant of mucous membranes, liver, kidney and heart toxin; produces narcosis; an animal carcinogen
Hazard: only slight fire hazard when exposed to very high temperatures

1-CHLORO-1-NITROPROPANE TLV 20ppm 100mg/M³

Properties: liquid
Use: used in organic chemical synthesis
Toxicity: irritant to skin, mucous membranes, eyes, and lungs; can damage heart muscle, liver and kidneys
Hazard: moderate fire and explosive hazard

CHLOROPICRIN (Trichloronitromethane) TLV 0.1ppm 0.7mg/M³

Properties: slightly oily, colorless liquid
Use: in synthesis of organic compounds, insecticide, soil fumigant, war gas
Toxicity: very strong irritant of skin, eyes, mucous membranes, lungs; causes bronchitis and pulmonary edema; called vomiting gas as causes vomiting; 1ppm causes pain in eyes
Hazard: when heated, it decomposes to toxic gases

CHLOROPRENE (2-Chloro-1,3-butadiene) (SKIN)	TLV 25ppm	90mg/M ³
Properties:	colorless liquid	
Use:	used in the manufacture of synthetic rubber	
Toxicity:	irritant to skin, eyes, and mucous membranes; produces narcosis; liver and kidney toxin; suspect carcinogen	
Hazard:	emits dangerous fumes if heated to decomposition	
CHROMIUM (soluble chromic and chromous salts as Cr)	TLV 0.5mg/M ³	
Properties:	depends upon compound	
Use:	chromium in chromium-6 state: used in dye industry and other processes using dyes; chromic plating; explosive; alloy with steel and nickel for making stainless steel, and other metals for special alloys	
Toxicity:	produces deep, slow-healing ulcers of skin and nasal septum; skin rashes; known carcinogen of lung, nasal linings, and sinuses	
Hazard:	depends on compound	
CHROMIUM (metal and insoluble salts)	TLV 1.0mg/M ³	
Properties:	very hard, steel-gray metal	
Use:	chromium ore, chromic oxide, and chromic sulphate	
Toxicity:	essentially non-toxic	
Hazard:	depends upon compound	
COAL DUST	TLV 2.4mg/M ³ (less than 5% silica) or $\frac{10\text{mg/M}^3}{\%S_2O_2+2}$ (more than 5% silica)	
Properties:	black solid	
Use:	fuel, starting material for coke	
Toxicity:	produces lung disease over period of years which ranges from simple to severe; produces disability	
Hazard:	burns when heated; slight explosive hazard when heated	
COAL TAR PITCH VOLATILES (benzene soluble fraction)	TLV 0.2mg/M ³	
Properties:	fumes and vapors from a black to brown tarry mass	
Use:	refines for reclaiming specific and general compounds of tar, pitch, and other chemicals	
Toxicity:	a recognized carcinogen of the skin, scrotum, lip, voice box, and lungs; an experimental carcinogen of the bladder	
Hazard:	slight fire hazard	
COBALT (Metal, fume, and dust)	TLV 0.1mg/M ³	
Properties:	silver-gray metal	
Use:	alloys with chromium, nickel, copper, beryllium, and others for high strength, high temperature properties; cutting tools; pigments	
Toxicity:	produces an allergic type of skin rash and allergic type of lung disease--asthma	
Hazard:	moderate fire hazard when heated or by spontaneous chemical reaction	

COKE OVEN EMISSIONS TLV 0.150mg/M³ (Benzene-Soluble Particulate)

Properties: gases and fumes
 Use: by-product of coke production
 Toxicity: a human carcinogen; can also produce irritation to eyes, mucous membranes, lungs, and skin; can produce liver, kidney and bone marrow damage
 Hazard: usually hot gasses thus thermal danger

COPPER (dusts and mists) TLV 1mg/M³

Properties: a metal with reddish color
 Use: conductor of electricity; used for chemical apparatus and equipment, cooking utensils, roofing, coinage, alloys (especially with bronze), paints, and fungicides
 Toxicity: irritant of eyes, mucous membranes; causes ulceration of skin; can damage liver, kidneys, red blood cells, and lungs
 Hazard: depends upon the compound

COPPER (fumes) TLV 0.1mg/M³
 * (0.2mg/M³)

Properties: see above
 Use: see above
 Toxicity: see above; can produce metal fume fever (see ZINC OXIDE), nausea, metallic taste, and discoloration of skin and hair
 Hazard: see above

COTTON DUST TLV 1.0mg/M³
 * (0.2mg/M³)

Properties: dust from raw cotton
 Use: cotton products, textiles
 Toxicity: Acute--asthma-like lung disease (Monday morning fever)
 Chronic--chronic lung disease and disability; both acute and chronic are forms of byssinosis
 Hazard: moderate fire and explosive hazard when heated

C[®]RAG HERBICIDE (3,5-Dimethyltetrahydro-1,3,5,2H-thiadiazine-2-thione) TLV 15mg/M³
 * (10mg/M³)

Properties: white crystalline powder
 Use: herbicide and fungicide
 Toxicity: irritant of skin and mucous membranes; can injure liver
 Hazard: produces toxic fumes when heated to decomposition

CRESOL (all isomers) TLV 5ppm 22mg/M³
 (SKIN)

Properties: liquid with colors ranging from yellow to brown to pink
 Use: used in synthetic resins, explosives, petroleum products, photographic industry, antiseptics, disinfectants and insecticides
 Toxicity: severe irritant of skin, eyes, mucous membranes; can produce severe burns and rashes; can be absorbed through skin; can injure liver, lungs, kidneys and nervous system
 Hazard: moderate fire and slight explosive hazard when heated

CROTONALDEHYDE	TLV 2ppm	6mg/M ³
Properties:	water-white liquid with a strong suffocating odor	
Use:	used in resins and as a chemical intermediate	
Toxicity:	strong irritant of eyes, skin, mucous membranes, and lungs; can cause pulmonary edema	
Hazard:	fire hazard when heated	
CUMENE (Isopropyl benzene) (SKIN)	TLV 50ppm	245mg/M ³
Properties:	colorless liquid	
Use:	diluent or thinner for paints, enamels, solvents; commercial source for phenol and acetone	
Toxicity:	irritant of mucous membranes and skin; potent narcotic with prolonged effects; may have cumulative effects	
Hazard:	moderate fire hazard if exposed to heat	
CYANIDE (as CN) (SKIN)	TLV 5mg/M ³	
Properties:	varies with various compounds	
Use:	many widespread uses	
Toxicity:	varies with specific compound but can do the following: poison the body by inhibiting the blood's carrying of oxygen (cytochrome oxidase system); irritant to skin and mucous membranes; cause skin rashes. Chronic exposure associated with weakness, nausea, dizziness, headache, loss of appetite, and irritation of respiratory passages and eyes	
Hazard:	moderate fire hazard	
CYCLOHEXANE	TLV 300ppm	1,050mg/M ³
Properties:	colorless liquid with pungent odor	
Use:	solvent, starting material and intermediate for synthesis in chemical industry	
Toxicity:	skin and mucous membrane irritant; can cause narcosis; can act as asphyxiant	
Hazard:	moderate fire and explosive hazard	
CYCLOHEXANOL	TLV 50ppm	200mg/M ³
Properties:	colorless crystals or thick liquid	
Use:	dry cleaning, textile cleaning, laundry preparation, solvent and a chemical intermediate in the preparation of plasticizers and other chemicals	
Toxicity:	irritant of eyes, mucous membranes and skin; produces narcosis; can damage kidneys, liver and blood vessels in animals; an animal carcinogen	
Hazard:	moderate fire hazard when heated	

CYCLOHEXANONE TLV 50ppm 200mg/M³

Properties: colorless liquid with acetone-like odor
Use: solvent, degreaser, a chemical intermediate
Toxicity: irritant of skin, eyes, and mucous membrane; can injure liver and kidneys; can produce narcosis
Hazard: fire and explosive hazard when heated

CYCLOHEXENE TLV 300ppm 1,015mg/M³

Properties: colorless liquid
Use: manufacture of adipic, malic, and cyclohexanecarboxylic acids
Toxicity: skin and mucous membrane irritant; can produce narcosis
Hazard: moderate fire hazard

CYCLOPENTADIENE TLV 75ppm 200mg/M³

Properties: colorless liquid
Use: starting material for synthesis in chemical industry; also spontaneously will become dicyclopentadiene; insecticide and fungicide
Toxicity: skin and mucous membrane irritant; produces narcosis; known to cause liver and kidney damage in animals
Hazard: moderate fire and explosive hazard

2,4-D (2,4-Dichlorophenoxy acetic acid) TLV 10mg/M³

Properties: white powder
Use: herbicide, used in synthesis of dyes, elastomers, medicinals and plastics
Toxicity: irritant of skin and mucous membranes; produces narcosis; can be toxic to kidneys and liver
Hazard: non-flammable

DDT (SKIN) TLV 1mg/M³

Properties: colorless crystals or whitish powder
Use: chlorinated hydrocarbon insecticide, banned by EPA for use in USA; a food additive for animal and human consumption
Toxicity: affects central nervous system but not readily toxic in man as compared to other insecticides; may cause liver damage; stored in fat
Hazard: emits dangerous fumes when heated to decomposition

DECARBORANE (SKIN)		TLV 0.05ppm	0.3mg/M ³
Properties:	colorless needles		
Use:	high energy fuel; welding; pharmaceuticals; perfumes; and vulcanizing agent in the rubber industry		
Toxicity:	readily absorbed through the skin; can produce injury to the nervous system		
Hazard:	dangerous fire hazard when heated, moderate explosive hazard		
DEMETON (R) (SKIN)		TLV 0.1mg/M ³	
Properties:	a light brown liquid with a sulfur odor		
Use:	an organophosphate insecticide		
Toxicity:	readily absorbed through the skin, cholinesterase inhibitor		
Hazard:	not flammable		
DIACETONE ALCOHOL (4-Hydroxy-4-Methyl-2-Pentanone)	TLV 50ppm	240mg/M ³	
Properties:	liquid with a faintly pleasant odor		
Use:	used in lacquers, in the textile industry as a solvent, as a preservative		
Toxicity:	irritant to eyes and mucous membranes; can cause narcosis; causes liver and kidney damage and anemia in animals		
Hazard:	fire danger when heated		
DIAZOMETHANE	TLV 0.2ppm	0.4mg/M ³	
Properties:	yellow gas		
Use:	used in production of organic chemicals (methylating agent)		
Toxicity:	severe respiratory tract irritant and skin irritant; can produce pulmonary edema and death from single exposure; can cause sensitization and asthma-like condition to develop; suspect carcinogen		
Hazard:	marked explosive hazard if chocked, heated or brought into contact with metals		
DIBORANE	TLV 0.1ppm	0.1mg/M ³	
Properties:	colorless gas with a sickly sweet odor		
Use:	high energy fuel; welding; pharmaceuticals and perfumes; vulcanizing agent in the rubber industry		
Toxicity:	irritant to lungs; can produce pulmonary edema; can produce symptoms like those seen in metal fume fever; can poison the nervous system		
Hazard:	dangerous fire hazard when exposed to flame; slight explosive hazard		

1,2-DIBROMO-3-CHLOROPROPANE (DBCP)

TLV 1ppb

Properties: liquid
Use: nematocide (pesticide)
Toxicity: major effect in human is depression of testicular function, can produce infertility and sterility. Mild irritant of skin; liver and kidney toxin in animals
Hazard: produces toxic fumes when heated to decomposition

DIBUTYLPHTHALATE

TLV 5mg/M³

Properties: liquid
Use: plasticisers for variety of synthetic resins, lacquers and plastics
Toxicity: low toxicity, mild skin, eye and mucous membrane irritation at most
Hazard: low fire danger

o-DICHLOROBENZENE (C)

TLV 50ppm

300mg/M³

Properties: clear liquid
Use: solvent, fumigant, insecticide and chemical intermediate
Toxicity: irritant to skin and mucous membrane; can produce liver and kidney injury; produces narcosis
Hazard: moderate hazard when heated

p-DICHLOROBENZENE

TLV 75ppm

450mg/M³

Properties: white crystal with penetrating odor
Use: insecticide, disinfectant and chemical intermediate; used in moth proofing
Toxicity: liver toxin; produces narcosis; irritant to the skin
Hazard: fire hazard when heated

3,3'-DICHLOROBENZIDINE

TLV: Std 1910.1007

Properties: crystalline solid
Uses: a dye
Toxicity: a regulated carcinogen, readily absorbed through the skin, an irritant
Hazard: emits dangerous fumes when heated to decomposition

DICHLORODIFLUOROMETHANE

TLV 1,000ppm

4,950mg/M³

Properties: colorless, almost odorless gas
Use: refrigerant, propellant blowing agent
Toxicity: produces narcosis
Hazard: dangerous when heated to decomposition due to fumes

1,3-DICHLORO-5,5-DIMETHYLHYDANTOIN (Dactin or Halane) TLV 0.2mg/M³

Properties: crystals
Use: chlorinated agent, laundry bleach, disinfectant, intermediate in chemical reactions
Toxicity: liberates chlorine upon contact with hot water, toxicity related to chlorine thus irritation of eyes, mucous membranes, and lungs; see CHLORINE, can act as depressant on nervous system
Hazard: produces toxic fumes when exposed to hot water or steam

1,1-DICHLOROETHANE TLV 100ppm 400mg/M³
* (200ppm) (820mg/M³)

Properties: colorless gas with ether-like odor
Use: chemical intermediate
Toxicity: produces narcosis; liver and kidney toxin
Hazard: moderate fire and explosive hazard when heated

1,2-DICHLOROETHYLENE TLV 200ppm 790mg/M³

Properties: colorless liquid with pleasant odor
Use: used in production of other chemicals
Toxicity: irritant to skin and mucous membranes; produces narcosis; potential toxin to liver and kidneys
Hazard: moderate fire and explosive hazard when heated

DICHLOROETHYL ETHER (C) TLV 15ppm 90mg/M³
(SKIN) * (5ppm) (30mg/M³)

Properties: colorless stable liquid
Use: solvent, scouring of textiles, dewaxing agent for lubricating oils, chemical intermediate, insecticide, soil fumigant, dry cleaning agent
Toxicity: readily absorbed through the skin; irritant to eyes, mucous membranes and lungs; can cause a delayed pulmonary edema; mild narcosis effects
Hazard: moderate fire and explosive danger. Reacts with steam to produce dangerous fumes

DICHLOROMONOFUOROMETHANE TLV 1,000ppm 4,200mg/M³

Properties: heavy, colorless gas
Use: refrigerant
Toxicity: produces narcosis at high levels
Hazard: dangerous when heated to decomposition due to fumes

1,1-DICHLORO-1-NITROETHANE (C) TLV 10ppm 60mg/M³

Properties: liquid
Use: used in organic chemical synthesis, and as a fumigant
Toxicity: irritant to skin, mucous membranes, eyes, and lungs; can damage heart muscle, liver and kidneys
Hazard: moderate fire and explosive hazard

DICHLOROTETRAFLUOROETHANE

TLV 1,000ppm

7,000mg/M³

Properties: colorless gas
Use: refrigerant, propellant
Toxicity: can produce narcosis at high concentrations; can act as an asphyxiant
Hazard: dangerous when heated to decomposition due to fumes

DICHLOROVOS (DDVP)
(SKIN)

TLV 1mg/M³

Properties: liquid
Use: organophosphate insecticide
Toxicity: readily absorbed through the skin; a cholinesterase inhibitor
Hazard: dangerous when heated to decomposition due to toxic fumes

DIELDRIN
(SKIN)

TLV 0.25mg/M³

Properties: crystals
Use: chlorinated hydrocarbon insecticide; use banned in US by EPA
Toxicity: affects nervous system by producing irritability, convulsions, and depression; can injure liver; an animal carcinogen
Hazard: dangerous fumes produced when heated

DIETHYLAMINE

TLV 25ppm

75mg/M³

Properties: colorless liquid with ammonia-like odor
Use: intermediate in chemical and pharmaceutical industries, paint stripping and tanning operations
Toxicity: strong skin and mucous membrane irritant; can cause burns; lung irritant; can produce lung and heart damage
Hazard: fire hazard when heated

DIETHYLAMINOETHANOL
(SKIN)

TLV 10ppm

50mg/M³

Properties: colorless liquid which readily absorbs water
Use: a chemical intermediate
Toxicity: moderate skin, eye and mucous membrane irritant
Hazard: moderate fire hazard

DIFLUORODIBROMOMETHANE

TLV 100ppm

860mg/M³

Properties: colorless, heavy liquid
Use: polymer intermediate, fire extinguisher
Toxicity: irritant to the mucous membranes and lungs; produces narcosis; liver toxin
Hazard: dangerous when heated to decomposition due to fumes

DIGLYCIDYL ETHER (DGE) (C)	TLV 0.5ppm	2.8mg/M ³
Properties:	liquid	
Use:	diluent for epoxy resins, chemical intermediate, textile-treating agent	
Toxicity:	severe irritant of eyes, mucous membranes, lungs, and skin; vapor can injure lungs; can injure bone marrow	
Hazard:	flammable	
DIISOBUTYL KETONE	TLV 50ppm * (25ppm)	290mg/M ³ (150mg/M ³)
Properties:	liquid	
Use:	solvent, intermediate in the synthesis of inhibitors, dyes, pharmaceuticals and insecticides	
Toxicity:	mild narcosis effect, mild irritation of eyes and mucous membranes	
Hazard:	moderate fire hazard when heated	
DIISOPROPYLAMINE (SKIN)	TLV 5ppm	20mg/M ³
Properties:	colorless liquid	
Use:	used as an intermediate in chemical and pharmaceutical industries	
Toxicity:	strong irritant of skin, eyes, mucous membranes, lungs; can cause pulmonary edema; can damage heart muscle, liver and kidney	
Hazard:	serious fire hazard	
DIMETHYL ACETAMIDE (DMA) (SKIN)	TLV 10ppm	35mg/M ³
Properties:	liquid	
Use:	solvent	
Toxicity:	can be absorbed through the skin; produces liver injury; irritant to skin, eyes, and mucous membranes	
Hazard:	slight fire hazard	
DIMETHYLAMINE	TLV 10ppm	18mg/M ³
Properties:	colorless gas with fish-like ammonia odor	
Use:	intermediate in chemical and pharmaceutical industries; used in dehairing hides	
Toxicity:	very strong irritant to eyes, mucous membranes, lungs, and skin; can cause permanent damage to eyes; can cause pulmonary edema; a drop can burn the skin	
Hazard:	high fire hazard and moderate explosive hazard	
4-DIMETHYLAMINOAZOBENZENE	TLV: Std 1910.1015	
Properties:	yellow crystalline pellets	
Uses:	a dye	
Toxicity:	a regulated carcinogen	
Hazard:	emits dangerous fumes when heated to decomposition	

DIMETHYLANILINE (N-DIMETHYLANILINE) (SKIN)	TLV 5ppm	25mg/M ³
Properties:	liquid	
Use:	in synthesis of dyestuff; solvent; aids in methylation and as a reagent in organic compound synthesis	
Toxicity:	readily absorbed through the intact skin; produces methemoglobin and causes depression of the central nervous system	
Hazard:	moderate fire hazard when heated	
DIMETHYL-1,2-DIBROMO-2,2-DICHLOROETHYL PHOSPHATE (Dibrom)	TLV 3mg/M ³	
Properties:	solid	
Use:	organophosphate insecticide	
Toxicity:	readily absorbed through skin; a cholinesterase inhibitor	
Hazard:	dangerous when heated to decomposition due to toxic fumes	
DIMETHYLFORMAMIDE (SKIN)	TLV 10ppm	30mg/M ³
Properties:	colorless liquid	
Use:	solvent	
Toxicity:	can be absorbed through the skin; highly irritating to skin, eyes, and mucous membranes; produces liver injury	
Hazard:	moderate fire and explosive hazard when heated	
1,1-DIMETHYLHYDRAZINE (SKIN)	TLV 0.5ppm	1mg/M ³
Properties:	colorless liquid with ammonia-like odor	
Use:	rocket fuel	
Toxicity:	moderate skin and mucous membrane irritant; can damage liver; can cause red blood cell damage (hemolytic anemia); can cause convulsions; an animal carcinogen	
Hazard:	dangerous fire hazard when heated	
DIMETHYLPHthalate	TLV 5mg/M ³	
Properties:	colorless, odorless liquid	
Use:	plasticisers for variety of synthetic resins, lacquers and plastics, insect repellent	
Toxicity:	slight toxicity; mild skin, eye, and mucous membrane irritant	
Hazard:	slight fire hazard	
DIMETHYL SULFATE (SKIN)	TLV 1ppm	5mg/M ³
Properties:	colorless, odorless liquid	
Use:	methylating agent	
Toxicity:	irritant of skin, eyes, mucous membranes, and lungs with a delayed appearance of the effect (up to several hours); can cause delayed pulmonary edema; can be very toxic to kidneys and liver; can cause death; a known carcinogen	
Hazard:	moderate fire hazard when heated	

DINITROBENZENE
(SKIN)

TLV 1mg/M³

Properties: colorless or yellowish needles
Use: used in synthesis of dyestuff, explosives and in
celloid production
Toxicity: readily absorbed through skin; marked methemo-
globinemia producer; can produce damage to liver,
kidneys and central nervous system
Hazard: slight fire hazard but severe explosive hazard if
shook or heated

DINITRO-o-CRESOL
(SKIN)

TLV 0.2mg/M³

Properties: yellow, prismatic crystals
Use: used in the synthesis of dyestuff, puric acid and
picramic acid and in preservation of wood; insect-
icide and herbicide
Toxicity: readily absorbed through intact skin; mild methemo-
globin producer; can damage brain, liver, and kidneys
Hazard: fire hazard

DINITROTOLUENE
(SKIN)

TLV 1.5mg/M³

Properties: yellow needles
Use: used in synthesis of dyestuff
Toxicity: readily absorbed through skin; methemoglobin pro-
ducer; can damage liver
Hazard: moderate fire and explosive hazard

DIOXANE (Diethylene dioxide)
(SKIN)

TLV 100ppm 360mg/M³
* (50ppm) (180mg/M³)

Properties: colorless liquid with a pleasant odor
Use: solvent for plastics, resins, lacquers, paints, waxes,
greases
Toxicity: absorbed through the skin; marked irritant of eyes,
mucous membranes, and lungs; produces injury to liver,
kidneys, lungs and brain; an animal carcinogen
Hazard: dangerous fire and moderate explosive hazard when heated;
stable chemical if kept dry but rapidly degrades in
moisture

DIPHENYL

TLV 0.2ppm 1mg/M³

Properties: white scales, pleasant odor
Use: heat transfer agent, fungicide
Toxicity: strong irritant of the mucous membranes and eyes;
can produce liver damage; can damage nervous system
Hazard: slight fire hazard

DIPROPYLENE GLYCOL METHYL ETHER (SKIN)	TLV 100ppm	600mg/M ³
Properties:	colorless liquid	
Use:	coupling and dispersing agent; solvent for lacquers, paints, resins, dyes, oils and greases	
Toxicity:	absorbed through the skin; disagreeable odor; can produce narcosis and injury to lung and liver	
Hazard:	moderate fire hazard when heated	
DI-sec-OCTYL PHTHALATE (Di-2-ethylhexylphthlate)	TLV 5mg/M ³	
Properties:	light colored liquid with a slight odor	
Use:	plasticizer for polyvinyl chloride, polyvinylidene chloride, mixed polymers; a lubricant	
Toxicity:	low toxicity; causes liver changes in laboratory animals	
Hazard:	slight fire hazard when heated	
ENDRIN (SKIN)	TLV 0.1mg/M ³	
Properties:	solid	
Use:	chlorinated hydrocarbon insecticide	
Toxicity:	affects nervous system by producing irritability, convulsions, and depression; can injure liver; an animal carcinogen	
Hazard:	dangerous fumes produced when heated	
EPICHLORHYDRIN (SKIN)	TLV 5ppm	19mg/M ³
Properties:	colorless liquid with an irritating chloroform-like odor	
Use:	raw material for manufacture of glycerol and glycidol derivatives; epoxy resins; stabilizer of chlorine containing substance	
Toxicity:	irritant of eyes, mucous membranes, lungs and skin; may act as a sensitizer; can injure kidneys, lungs; can cause death by stopping breathing	
Hazard:	moderate fire hazard when heated	
EPN (Ethyl-p-nitro phenyl benzene thionophosphate) (SKIN)	TLV 0.5mg/M ³	
Properties:	a liquid or pale yellow solid	
Use:	organophosphate insecticide and acaricide	
Toxicity:	readily absorbed through skin; a cholinesterase inhibitor	
Hazard:	when heated to decomposition it produces highly toxic fumes	

ETHANOLAMINE TLV 3ppm 6mg/M³

Properties: colorless liquid with ammonia-like odor which readily absorbs water

Use: removal of carbon dioxide and hydrogen from natural gas, synthesis of surface active agents

Toxicity: skin, eye, and mucous membrane irritant; can damage liver, kidneys and lungs

Hazard: moderate fire hazard

2-ETHOXYETHANOL ("Cellosolve" solvent) TLV 200ppm 740mg/M³
(SKIN)

Properties: colorless odorless liquid

Use: solvent for lacquers, plastics, varnishes, paints, dyes, fats, resins

Toxicity: readily absorbed through the skin; irritant of eyes, mucous membranes, and lungs; can produce breakage of red blood cells; can injure kidneys

Hazard: moderate fire hazard when heated

2-ETHOXYETHYLACETATE (Ethylene glycol monomethyl etheracetate) TLV 100ppm 540mg/M³
(SKIN) (Cellulose acetate) * (25ppm)(120mg/M³)

Properties: white flakes or powder

Use: additive to lacquers, paint, and varnish removers

Toxicity: absorbed through skin; can injure lungs, kidneys, bone marrow, and nervous system

Hazard: fire hazard when heated

ETHYL ACETATE TLV 400ppm 1,400mg/M³

Properties: colorless liquid with a fragrant odor

Use: lacquer solvent, synthetic flavoring agent

Toxicity: irritant to eyes, mucous membranes and respiratory passages; can produce narcosis; can cause skin rashes; can be toxic to liver, kidneys and produce anemia

Hazard: moderate fire and explosive hazard when heated

ETHYL ACRYLATE TLV 25ppm 100mg/M³
(SKIN)

Properties: colorless liquid with a disagreeable, strong odor
Uses: production of thermoplastic, vinyl and acrylic resins

Toxicity: irritant of eyes, mucous membranes, and respiratory passages; can damage lungs; can produce convulsions; can irritate skin

Hazard: marked fire and explosive hazard when heated

ETHYL ALCOHOL (ethanol)	TLV	1,000ppm	1,900mg/M ³
Properties:	colorless liquid		
Use:	alcoholic beverages, solvent, processing agent for various purposes		
Toxicity:	mild irritant but main effect in narcosis (headache, dizziness, incoordination) can produce liver damage		
Hazard:	fire hazard in concentrated form		
ETHYLAMINE	TLV	10ppm	18mg/M ³
Properties:	colorless liquid with strong ammonia-like odor		
Use:	intermediate in chemical and pharmaceutical industries, paint stripping and tanning operations		
Toxicity:	strong skin, eye and mucous membrane irritation; lung irritant; can burn skin on contact; can produce liver, kidney and lung damage		
Hazard:	moderate fire hazard when heated		
ETHYL sec-AMYL KETONE (5-Methyl-3-Heptanone)	TLV	25ppm	130mg/M ³
Properties:	liquid with mild fruity odor		
Use:	solvent, used in an organic intermediate, synthetic apricot and peach essence in perfumes		
Toxicity:	moderately irritating to eyes and mucous membranes; can produce narcosis; can produce headache and nausea		
Hazard:	fire hazard when heated		
ETHYL BENZENE	TLV	100ppm	435mg/M ³
Properties:	colorless liquid, aromatic odor		
Use:	source of styrene, found in mixtures of solvents and fuels		
Toxicity:	moderate irritant of skin and mucous membranes; produces moderate narcotic effect		
Hazard:	moderate fire danger		
ETHYL BROMIDE	TLV	200ppm	890mg/M ³
Properties:	colorless, volatile liquid		
Use:	used as a chemical intermediate		
Toxicity:	irritant to the mucous membranes and lungs; produces liver, kidney, and heart injury; produces narcosis		
Hazard:	moderate explosive hazard if heated		
ETHYLBUTYL KETONE (3-Heptanone)	TLV	50ppm	230mg/M ³
Properties:	clear liquid		
Use:	solvent and intermediate for other chemical compound synthesis		
Toxicity:	irritant of eyes and mucous membranes; produces narcosis		
Hazard:	fire hazard when heated		

ETHYL CHLORIDE	TLV 1,000ppm	2,600mg/M ³
Properties:	colorless liquid or gas with ether-like odor and burning taste	
Use:	chemical intermediate, refrigerant, and anesthetic	
Toxicity:	irritant to eyes, mild irritant to lungs; is one of the least toxic of all of the chlorinated hydrocarbons; has caused kidney, liver and heart damage in animals; produces narcosis	
Hazard:	high fire and explosive hazard if heated	
ETHYL ETHER	TLV 400ppm	1,200mg/M ³
Properties:	a clear, volatile liquid with a sweet strong odor	
Use:	solvent or extractant in manufacture of dyes, cellulose acetate, rayon, plastics; formerly used as an anesthetic gas	
Toxicity:	capable of producing anesthesia, thus can produce intoxication, drowsiness, stupor and loss of consciousness	
Hazard:	highly flammable and high explosive hazard	
ETHYL FORMATE	TLV 100ppm	300mg/M ³
Properties:	white, watery, liquid with pleasant aromatic odor	
Use:	solvent, a food additive	
Toxicity:	irritant to eyes, mucous membranes and skin; produces narcosis in high concentration	
Hazard:	fire and explosive hazard when heated	
ETHYL MERCAPTAN (C)	TLV 10ppm * (0.5ppm)	25mg/M ³ (1mg/M ³)
Properties:	colorless liquid with a penetrating garlic-like odor	
Use:	stenching gas for liquified petroleum gases and adhesive stabilizers	
Toxicity:	intense odor; can cause headache, nausea and irritation	
Hazard:	dangerous fire and explosive hazard when heated	
ETHYL SILICATE	TLV 100ppm	850mg/M ³
Properties:	colorless liquid with a faint odor	
Use:	preservative for stone, brick, concrete, and plaster; fire proofing	
Toxicity:	irritant of eye and mucous membranes; can produce narcosis, liver, kidney, and lung damage in animals	
Hazard:	moderate fire hazard when heated	

ETHYLENE CHLOROHYDRIN (SKIN)	(b-Chloroethyl alcohol)	TLV 5ppm	16mg/M ³
Properties:	colorless liquid with faintly ether-like odor		
Use:	used in the production of ethylene glycol and ethylene oxide; solvent; used in extraction and seed inhibition		
Toxicity:	can be absorbed through the skin; irritant of mucous membranes, but powerful toxin of lungs, liver, and nervous system; can cause delayed pulmonary edema and burns of the lungs; also kidney toxin		
Hazard:	fire hazard when heated		
ETHYLENEDIAMINE		TLV 10ppm	25mg/M ³
Properties:	volatile, colorless liquid with ammonia-like odor		
Use:	chemical intermediate in preparation of dyes, resins, inhibitors, and pharmaceuticals		
Toxicity:	irritant of eyes, skin, mucous membrane and lungs; can cause sensitization to occur with resultant skin rashes and asthma; can produce liver, kidney and lung damage		
Hazard:	moderate fire hazard when heated		
ETHYLENE DIBROMIDE (SKIN)	(1,2-Dibromoethane)	TLV 20ppm	145mg/M ³
Properties:	colorless heavy liquid with a sweet odor		
Use:	used in antiknock gasoline, fumigant, chemical intermediate and solvent		
Toxicity:	irritant to skin, mucous membranes, eyes, and lungs; liver, lung, and kidney toxin; produces narcosis and can cause death; an animal carcinogen; causes reproduction problems in laboratory animals		
Hazard:	dangerous when heated to decomposition due to fumes		
ETHYLENE DICHLORIDE	(1,2-Dichloroethane)	TLV 50ppm	200mg/M ³
Properties:	colorless liquid with pleasant odor and sweet taste		
Use:	an industrial solvent in cleaning and extraction processes; a fumigant; a gasoline additive; a food additive		
Toxicity:	strong irritant of eyes, mucous membranes; produces narcosis; liver, kidney, and adrenal toxin; irritant to skin		
Hazard:	moderate fire and explosive hazard if heated		
ETHYLENE GLYCOL DINITRATE (SKIN)	(C)	TLV 0.2ppm	1.2mg/M ³
Properties:	colorless to yellowish liquid with sweet odor		
Use:	explosive		
Toxicity:	absorbed through skin, lungs, and GI tract; causes lowering of blood pressure due to dilation of arteries; headache most common complaint; sudden death syndrome associated with withdrawal of several to more days from the constant work exposure; also can cause methemoglobinemia		
Hazard:	severe fire and very severe explosive hazard		

ETHYLENE IMINE (SKIN)	TLV STD 1910.1012 *(0.5ppm 1mg/M ³)	
Properties:	water-white oily liquid with ammonia-like odor	
Use:	used in production of organic chemicals and the manufacture of triethylenemelamine	
Toxicity:	readily absorbed through the skin; potent irritant of the skin, eyes, and mucous membranes as well as lungs; can cause sensitization; a regulated carcinogen	
Hazard:	dangerous fire hazard if heated	
ETHYLENE OXIDE	TLV 50ppm	90mg/M ³
Properties:	colorless gas	
Use:	used in chemical production especially for ethylene glycol and derivatives; sterilizer	
Toxicity:	irritant of eyes, mucous membranes and lungs; can produce injury of lung--pulmonary edema; an animal carcinogen	
Hazard:	highly flammable, dangerous fire and explosive risk	
N-ETHYLMORPHOLINE (SKIN)	TLV 20ppm	94mg/M ³
Properties:	colorless liquid	
Use:	corrosive inhibitor; a neutralizing and scrubbing agent; used in conjunction with other chemical products	
Toxicity:	readily absorbed through the skin; irritant to the skin, eyes, and mucous membranes	
Hazard:	moderate fire hazard if heated	
FERBAM	TLV 15mg/M ³ * (10mg/M ³)	
Properties:	black solid	
Use:	carbamate fungicide	
Toxicity:	irritant to eyes, mucous membranes and skin; an animal carcinogen	
Hazard:	produces toxic fumes when heated to decomposition	
FERROVANADIUM DUST	TLV 1.0mg/M ³ * (0.5mg/M ³)	
Properties:	gray to black dust	
Use:	a metal alloy	
Toxicity:	produces chronic inflammation of lungs, i.e. chronic bronchitis and scarring	
Hazard:	moderate fire and slight explosive hazard when heated	

FLUORIDE

TLV 2.5mg/M³

Properties: various compounds but often form hydrogen fluoride which is a gas
 Use: used in many industries and processes including steel production, flux in smelting, glass etching, rodenticides, insecticides, welding rods, catalyst for reaction, etc.; additive to water supplies
 Toxicity: inorganic fluorides are usually markedly irritating and toxic partly due to the ready formation of hydrogen fluoride which can irritate eyes, mucous membranes, lungs, skin; chronic exposure can produce "fluorosis" which causes a brittleness of bones, calcification of ligaments and joints, brittle teeth; can affect GI system, lungs, and cause skin rashes; can produce a variety of complaints of nervous system
 Hazard: dangerous when heated to decomposition or on contact with acid as will produce toxic fumes

FLUORINE

TLV 0.1ppm 0.2mg/M³
 * (1.0ppm) (2.0mg/M³)

Properties: pale yellow gas
 Use: used in uranium manufacture; oxidizer for rocket fuel systems
 Toxicity: highly toxic as powerful irritant of eyes, mucous membranes, lungs, skin; will cause burns or severe damage of whatever it contacts
 Hazard: dangerous fire hazard

FLUOROTRICHLOROMETHANE

TLV 1,000ppm 8,600mg/M³

Properties: colorless liquid
 Use: refrigerant, propellant, solvent, blowing agent
 Toxicity: mild irritant to mucous membranes; produces narcosis
 Hazard: dangerous when heated to decomposition due to fumes

FORMALDEHYDE

TLV 3ppm 3mg/M³

Properties: clear gas or liquid with strong, unpleasant odor
 Use: preservative in medicine, in resins, other chemical reactions, fungicide
 Toxicity: severe irritant of eyes, mucous membranes, lungs, and skin; can produce sensitization of skin; can damage lungs; a suspect lung carcinogen
 Hazard: fire and explosive hazards present when heated

FORMIC ACID

TLV 5ppm 9mg/M³

Properties: colorless, fuming liquid with disagreeable odor
 Use: used in production of formic esters; an acidifying and reducing agent in wool, leather, rubber, and electroplating industries; a fumigant
 Toxicity: a strong acid that irritates the skin, eyes, mucous membranes, and lungs, by direct effect; may produce nausea
 Hazard: moderate fire hazard when heated

FURFURAL (SKIN)	TLV 5ppm	20mg/M ³
Properties:	colorless-yellow liquid with an almond-like odor	
Use:	solvent in refining of lubricating oils, resins, and other organic materials	
Toxicity:	strong irritant of eyes, mucous membranes, and skin; liver toxin; central nervous system poison	
Hazard:	moderate fire and explosive hazard when heated	
FURFURYL ALCOHOL	TLV 50ppm	200mg/M ³
Properties:	clear colorless liquid	
Use:	solvent used for cellulose, resins, manufacture of abrasive wheels, textile dyes	
Toxicity:	irritant to skin, mucous membranes, and lungs; produces toxic effects to nervous system (shakes)	
Hazard:	moderate fire and explosion hazard when heated	
GLYCIDOL (2,3-Epoxy-1-Propanol)	TLV 50ppm	150mg/M ³
Properties:	colorless liquid	
Use:	used as synthesis material for glycerol and related compounds; pharmaceutical industry; sanitary chemicals	
Toxicity:	readily absorbed through skin; irritant to skin and mucous membranes; causes stimulation of nervous system	
Hazard:	moderate fire hazard when heated	
GRAPHITE (Natural)	TLV 15 MPPCF	
Properties:	a crystalline form of carbon which is soft, with a greasy feel, black to steel gray in color; usually contains up to 10% silica	
Use:	foundry facing, steel production, lubricants and refractories, electrodes, bricks, blocks, pencil lead, chemical applications	
Toxicity:	a graphite pneumoconiosis which has varied appearance of lungs; can mimic silicosis	
Hazard:	slight fire hazard when heated	
HAFNIUM	TLV 0.5mg/M ³	
Properties:	a silvery, ductile, lustrous metal	
Use:	found associated with zirconium used in rocket engine parts which must operate under high-temperature corrosive conditions; also in nuclear reactors	
Toxicity:	can damage liver	
Hazard:	fire and explosive hazard of fine powdered dust	
HEPTACHLOR (SKIN)	TLV 0.5mg/M ³	
Properties:	crystals	
Use:	chlorinated hydrocarbon insecticide	
Toxicity:	readily absorbed through the skin; produces disturbances of the nervous system like convulsions, shakes; can damage liver and kidneys; a suspect carcinogen	
Hazard:	produces toxic fumes when heated to decomposition	

HEPTANE	TLV 500ppm * (400ppm)	2,000mg/M ³ (1,600mg/M ³)
Properties:	colorless liquid	
Use:	liquid paraffin hydrocarbon used in mixtures as fuels, solvents, plastics, degreasing and lubricants	
Toxicity:	mild irritant to mucous membranes; can produce narcosis and polyneuritis	
Hazard:	moderate fire and explosive dangers	
HEXACHLOROETHANE (SKIN)	TLV 1ppm	10mg/M ³
Properties:	colorless crystals with camphor-like odor	
Use:	used in chemical industry; used as insecticide and parasiticide	
Toxicity:	can be absorbed through the skin; toxin for liver and kidneys; produces narcosis and depression of the nervous system	
Hazard:	slight danger to spontaneous explosion	
HEXACHLORONAPHTHALENE (SKIN)	TLV 0.2mg/M ³	
Properties:	solid	
Use:	electric wire insulation; additive to special lubricant	
Toxicity:	skin rash (chloracne), severe liver toxin	
Hazard:	dangerous when heated to decomposition due to fumes	
HEXANE	TLV 500ppm * (100ppm)	1,800mg/M ³ (360mg/M ³)
Properties:	colorless liquid, faint odor	
Use:	liquid paraffin hydrocarbon used in mixtures as fuels, solvents, plastics, degreasers and lubricants	
Toxicity:	mild irritant to mucous membranes; can produce narcosis or polyneuritis	
Hazard:	moderate fire and explosive danger especially if heated or exposed to open flame	
2-HEXANONE (Methyl-2-Butyl Ketone) (SKIN)	TLV 100ppm * (25ppm)	410mg/M ³ (100mg/M ³)
Properties:	clear liquid	
Use:	solvent, degreaser, chemical intermediate	
Toxicity:	irritant to skin and mucous membranes; toxic to nervous system; can produce weakness in hands and feet (peripheral neuropathy), can produce narcosis	
Hazard:	moderate fire and explosive hazard	
HEXONE (Methyl Isobutyl Ketone) (SKIN)	TLV 100ppm	410mg/M ³
Properties:	clear liquid	
Use:	solvent in lacquer industry and for oils, fats, resins, gums, etc.	
Toxicity:	irritant to eyes, mucous membranes; can produce narcosis	
Hazard:	fire and explosive hazard when heated	

sec-HEXYL ACETATE	TLV 50ppm	300mg/M ³
Properties:	clear liquid with pleasant odor	
Use:	lacquer solvent	
Toxicity:	irritant to eyes and mucous membranes	
Hazard:	moderate fire hazard when heated	
HYDRAZINE (SKIN)	TLV 1ppm	1.3mg/M ³
Properties:	colorless, fuming liquid, white crystals	
Use:	photography, metal processing, preservatives, preparation of anti-corrosives, insecticides, and pharmaceuticals	
Toxicity:	strong irritant of skin, eyes, and mucous membranes; can damage liver, destroy red blood cells (hemolytic anemia), cause convulsions, cause sensitization; TLV set at level that continuous exposure may not be protected; a suspect carcinogen	
Hazard:	moderate fire hazard and extreme explosive hazard if heated	
HYDROGEN BROMIDE (hydrobromic acid)	TLV 3ppm	10mg/M ³
Properties:	colorless gas or pale yellow liquid	
Use:	used in the manufacture of organic and inorganic bromides; as reducing agents and catalysts	
Toxicity:	highly corrosive acid which irritates and burns on contact with skin, eyes, mucous membranes, lungs; chronic poisoning can produce GI upset and sinus-like problems	
Hazard:	highly reactive compound; must be handled with care	
HYDROGEN CHLORIDE (Hydrochloric acid) (C)	TLV 5ppm	7mg/M ³
Properties:	colorless gas or colorless fuming liquid	
Use:	used in manufacture of fertilizers, dyes, artificial silk, pigments for paints, and in these industries: photographic, soap refining, textile, rubber, petroleum, pickling, electroplating, leather tanning, and others	
Toxicity:	highly corrosive acid which irritates and burns on contact	
Hazard:	will react with water to produce toxic and corrosive fumes	

HYDROGEN CYANIDE (Hydrocyanic acid) (SKIN)	TLV 10ppm	11mg/M ³
Properties:	colorless liquid with faint odor of bitter almonds	
Use:	widely used substance--fumigant, electroplating, resin production, chemical intermediate; may be generated from blast furnace, gas works, coke ovens; an insecticide	
Toxicity:	readily absorbed through the skin; highly dangerous compound which inhibits the body's use of oxygen by blocking transfer of oxygen from blood to other parts of body (see CYANIDE); can cause dizziness, headache, feeling of suffocation; can cause death	
Hazard:	dangerous fire hazard and severe explosive hazard if heated	
HYDROGEN FLUORIDE (Hydrofluoric acid)	TLV 3ppm	2mg/M ³
Properties:	clear colorless, fuming liquid or gas	
Use:	used in the production of fluorocarbons and inorganic fluorides; used in refining certain metals; a catalyst in organic chemical reactions; etching glass	
Toxicity:	marked irritant and corrosive effects on skin, eyes, mucous membranes, and lungs; can produce severe burns	
Hazard:	dangerous when heated due to corrosive fumes; reacts with water or steam to produce corrosive fumes	
HYDROGEN PEROXIDE (90%)	TLV 1ppm	1.4mg/M ³
Properties:	colorless liquid	
Use:	bleaching agent, antiseptic, used in the metal industry for surface treatment and plastic manufacturing, food additive	
Toxicity:	high concentrations are highly irritating to skin, eyes, mucous membranes, lungs	
Hazard:	severe fire and explosive hazard	
HYDROGEN SELENIDE	TLV 0.05ppm	0.2mg/M ³
Properties:	colorless gas with odor of decaying horseradish	
Use:	no commercial use; this gas is formed by water or acid reactions with various metal selenides	
Toxicity:	strong irritation of eyes, mucous membranes and lungs; can produce damage to lungs, liver, and spleen	
Hazards:	high fire and explosive hazard	
HYDROGEN SULFIDE	TLV 20ppm * (10ppm)	
Properties:	colorless gas with an offensive odor of rotten eggs	
Use:	occurs as a by-product in processes wherever sulfides are found, burned, or refined like petroleum refining, certain garbage dumps, etc.	
Toxicity:	marked irritant of eyes, mucous membranes, lungs; can produce pulmonary edema; can damage nervous system; can cause rapid death by causing paralysis of breathing; chronic exposure can produce GI disturbances, weight loss and general disability	
Hazard:	dangerous fire and explosive hazard when heated	

HYDROQUINONE (p-Dihydroxybenzene)

TLV 2mg/M³

Properties: colorless crystals
Use: reducing agent used in photographic development;
as stabilizers for compounds which polymerize in
the presence of oxidants; used in pharmaceutical
industry
Toxicity: irritant of eyes, skin, and mucous membranes; can
cause eye injury and lung irritation; can produce
skin rashes; can produce poisoning of the nervous
system
Hazard: slight fire and explosive hazard when heated

INERT or NUISANCE DUST

TLV 5mg/M³ (respiratory fraction)
15mg/M³ (total dust)

Properties: any dust that does not currently have a TLV
Use: depends upon the substance
Toxicity: supposedly no effect but this is not always accurate,
each compound should be examined before being de-
clared "inert"
Hazard: depends upon the compound

IODINE (C)

TLV 0.1ppm 1mg/M³

Properties: violet-black crystals with a metallic luster
Use: analytical chemistry, medicine, photography, dyestuff,
and numerous organic compounds; a food additive
Toxicity: fumes are very irritating to eyes, mucous membranes,
lungs, and skin
Hazard: dangerous when heated due to emission of toxic fumes

IRON OXIDE FUME

TLV 10mg/M³

Properties: metal fume
Use: generated during steel production
Toxicity: occasionally causes metal fume fever; produces a
pneumoconiosis (siderosis) which is thought to be
harmless, but is of some concern about being a car-
cinogen (seen in haematite mines)
Hazard: not flammable

ISOAMYL ACETATE

TLV 100ppm 525mg/M³

Properties: liquid with banana-like odor
Use: lacquer solvent, food additive
Toxicity: irritant of eyes, mucous membranes, and respiratory
passages; can produce narcosis
Hazard: marked fire and moderate explosive hazard when heated

ISOAMYL ALCOHOL

TLV 100ppm 360mg/M³

Properties: clear liquid with a disagreeable odor
Use: intermediate in the preparation of pharmaceuticals
and isoamyl derivatives
Toxicity: irritation of eyes, mucous membranes; produces narcosis
Hazard: moderate fire hazard when heated

ISOBUTYL ACETATE	TLV 150ppm	700mg/M ³
Properties:	colorless, neutral liquid with a fruit-like odor	
Use:	lacquer solvent	
Toxicity:	irritant to eyes, mucous membranes and respiratory passages	
Hazard:	marked fire and explosive hazard when heated	
ISOBUTYL ALCOHOL	TLV 100ppm * (50ppm)	300mg/M ³ (150mg/M ³)
Properties:	clear liquid with sweet odor	
Use:	used in lacquers, paint removers, cleaners and hydraulic fluids, and manufacture of chemicals	
Toxicity:	irritant of eyes and mucous membranes; produces narcosis	
Hazard:	moderate fire hazard when heated	
ISOPHORONE (Tremethyl cyclohexenone)	TLV 25ppm * (5ppm)	140mg/M ³ (25mg/M ³)
Properties:	water-white liquid	
Use:	solvent for oils, fats, gum, resins, lacquers, nitro-cellulose, and vinyl-resin, co-polymers; chemical intermediate	
Toxicity:	irritant of eyes, mucous membranes and lungs; can produce narcosis and produce injury to kidney; one of more toxic ketones	
Hazard:	moderate fire hazard when heated	
ISOPROPYL ACETATE	TLV 250ppm	950mg/M ³
Properties:	colorless aromatic liquid	
Use:	lacquer solvent	
Toxicity:	irritant of eyes, mucous membranes and respiratory passages; chronic exposure may cause liver injury	
Hazard:	moderate fire and explosive hazard when heated	
ISOPROPYL ALCOHOL (SKIN)	TLV 400ppm	980mg/M ³
Properties:	clear liquid with slight odor	
Use:	solvent; used in linament, skin lotions, cosmetics, pharmaceuticals, chemical manufacture; ingredient of antifreezes, liquid soaps, and window cleaners	
Toxicity:	irritant of eyes and mucous membranes; produces narcosis	
Hazard:	fire and explosive hazard when heated	
ISOPROPYLAMINE	TLV 5ppm	12mg/M ³
Properties:	colorless liquid with ammonia odor	
Use:	intermediate in chemical and pharmaceutical industry	
Toxicity:	strong irritant to eyes, skin, mucous membranes, and lungs; can produce narcosis at high concentration; can produce pulmonary edema; can produce sensitization and thus asthma and skin problems	
Hazards:	fire hazard when heated	

ISOPROPYL ETHER	TLV 500ppm * (250ppm)	2,100mg/M ³ (1,050mg/M ³)
Properties:	colorless liquid with ether odor	
Use:	solvent, extraction agent, chemical intermediate	
Toxicity:	irritant to skin and mucous membranes; can produce narcosis	
Hazard:	highly flammable and high explosive hazard if heated	
ISOPROPYL GLYCIDYL ETHER (IGE)	TLV 50ppm	240mg/M ³
Properties:	liquid	
Use:	reactive diluent for epoxy resins; stabilizer for organic compounds; used in synthesis of ethers and esters	
Toxicity:	moderate irritant to eyes, mucous membranes and skin; can produce sensitization; depresses nervous system	
Hazard:	flammable, upon standing in air forms explosive peroxides	
KETENE	TLV 0.5ppm	0.9mg/M ³
Properties:	colorless gas with disagreeable taste	
Use:	in resins; a chemical intermediate	
Toxicity:	strong irritant of eyes, mucous membranes, lungs and skin; can produce pulmonary edema	
Hazard:	fire and explosive hazard	
LEAD and its inorganic compounds	TLV 0.20mg/M ³ (Cal TLV 0.15mg/M ³)	
Properties:	bluish-gray, soft metal; also depends upon compound	
Use:	pipes, alloys, cables, solder, filler, shielding material, storage batteries, paints, plastics, printing, and others	
Toxicity:	produces GI disturbances which range from constipation to stomach pain (colic); produces an anemia and affects bone marrow; affects reproduction in both males and females; can produce damage to nerves (peripheral neuritis); can cause memory loss and reduction, convulsion, and death (seen more commonly in children than adults); can damage kidneys, liver, and other tissue	
Hazard:	depends upon compound	
LEAD ARSENATE	TLV 0.15mg/M ³	
Properties:	white crystals	
Use:	insecticide	
Toxicity:	Acute--are more like arsenate (skin rashes, GI disturbances with vomiting, diarrhea, or constipation, muscle cramps, and mental changes); Chronic--are more like lead (liver, kidney, nerve damage); a carcinogen	
Hazard:	produces dangerous fumes when heated	

LINDANE (Hexachlorocyclohexane) (SKIN)	TLV 0.5mg/M ³
Properties:	white crystalline powder
Use:	chlorinated hydrocarbon insecticide
Toxicity:	readily absorbed through the skin; irritant of skin and mucous membranes; produces hyperexcitability and convulsions; can damage liver, kidneys, and lung; a suspect carcinogen
Hazard:	produces toxic fumes when heated to decomposition
LITHIUM HYDRIDE	TLV 0.025mg/M ³
Properties:	white, clear, crystalline solid
Use:	used in the atomic energy and chemical industries
Toxicity:	very caustic irritant of eyes, mucous membranes, lungs, and skin
Hazard:	can ignite spontaneously in moist air
L.P.G. (Liquified Petroleum Gas)	TLV 1,000ppm 1,800mg/M ³
Properties:	colorless gas, composed primarily of propane gas with impurities
Use:	heating fuel
Toxicity:	mild irritant to mucous membranes; can cause mild narcosis; can act as simple asphyxiant
Hazard:	moderate fire and explosive danger
MAGNESIUM OXIDE FUME	TLV 15mg/M ³ * (10mg/M ³)
Properties:	fume from white powder
Use:	magnesium used in alloys, linings of refractories, floor material
Toxicity:	can produce metal fume fever
Hazard:	not flammable
MALATHION (SKIN)	TLV 15mg/M ³
Properties:	brown to yellow liquid
Use:	organophosphate insecticide; used in food for animals
Toxicity:	readily absorbed through skin; mild cholinesterase inhibitor
Hazard:	produces toxic fumes when heated to decomposition
MALEIC ANHYDRIDE	TLV 0.25ppm 1mg/M ³
Properties:	white crystals or solid
Use:	in alkyl resin ester and polyester resins; in drying oils and agricultural chemicals
Toxicity:	produces severe skin, eye and mucous membrane burns; can produce pulmonary edema
Hazard:	will react violently on contact with water or steam

MANGANESE (C)

TLV 5mg/M³

Properties: reddish-grey to silvery, brittle, metallic element
Use: reagent in steel production; manufacture of dry cell batteries; used in the chemical industry as an oxidizing agent
Toxicity: some compounds are caustic and thus irritating or produce burns; dusts and fumes cause lung damage with increase in infections; dusts and fumes cause injury to the nervous system which only appears long after first exposure (up to a year); produces a disease state which resembles Parkinson's disease; also can injure liver in conjunction with nervous system injury; nervous system injury can mimic multiple sclerosis
Hazard: moderate fire and explosive hazard from the dust

MERCURY (Quicksilver or inorganic)

TLV 0.1mg/M³
* (0.05mg/M³)

Properties: silvery metallic liquid, different forms with different compounds
Use: catalyst for production of chlorine, alkalines, acetic acid; used in laboratory research, textile, manufacture, tanning, paints, and pigments; photography; electronics; treatment of gold and silver ores
Toxicity: produces sores and inflammation of gums, mouth, throat, and stomach; can produce skin rashes; can injury kidneys; more common toxic effect is on nervous system which cause personality changes, mental disorders, shakes, and memory loss
Hazard: produces dangerous fumes when heated

MESITYL OXIDE

TLV 25ppm

100mg/M³

Properties: oily colorless liquid with a strong odor
Use: solvent
Toxicity: readily absorbed through skin, irritant to eyes, mucous membranes and lungs; can cause severe eye damage; can cause narcosis; prolonged exposure can injure liver, kidneys and lungs
Hazard: moderate fire hazard when heated

METHOXYCHLOR

TLV 15mg/M³
* (10mg/M³)

Properties: crystals
Use: chlorinated hydrocarbon insecticide
Toxicity: can produce irritability and convulsions; can produce kidney injury
Hazard: produces toxic fumes when heated to decomposition

METHYL ACETATE

TLV 200ppm

610mg/M³

Properties: colorless volatile liquid
Use: lacquer solvent
Toxicity: irritant of eyes, mucous membranes and respiratory passages; can produce narcosis
Hazard: moderate fire and explosive hazard when heated

METHYL ACETYLENE (Propyne) (Allylene)	TLV 1,000ppm	1,650mg/M ³
Properties:	gas	
Use:	in synthesis of organic compounds	
Toxicity:	simple anesthetic (narcosis) and asphyxiant at high concentrations	
Hazard:	severe fire hazard and moderate explosive hazard	
METHYL ACETYLENE-PROPADIENE MIXTURE (MAPP)	TLV 1,000ppm	1,800mg/M ³
Properties:	clear, colorless, liquified gas	
Use:	in synthesis of organic compounds	
Toxicity:	simple anesthetic (narcosis) and asphyxiant at high concentrations	
Hazard:	moderate fire hazard	
METHYL ACRYLANE (SKIN)	TLV 10ppm	35mg/M ³
Properties:	colorless liquid	
Use:	production of thermoplastic, vinyl and acrylic resins	
Toxicity:	irritant of eyes, mucous membranes, respiratory passages, skin; can injure lungs, liver and kidneys in animals	
Hazard:	dangerous fire and explosive hazard when heated	
METHYLAL (Dimethoxymethane)	TLV 1,000ppm	3,100mg/M ³
Properties:	colorless liquid with unpleasant odor	
Use:	used in adhesives	
Toxicity:	mild narcosis effect; mild irritant effect; can cause liver, kidney and heart damage	
Hazard:	fire and explosive hazard when heated	
METHYL ALCOHOL (methanol) (SKIN)	TLV 200ppm	260mg/M ³
Properties:	clear colorless liquid	
Use:	solvent, wood alcohol, starting material for many chemicals	
Toxicity:	irritant to skin and mucous membranes; can cause blindness; considered a cumulative poison because of slowness of body in removing it from body	
Hazard:	fire and explosive hazard when heated	
METHYLAMINE	TLV 10ppm	12mg/M ³
Properties:	colorless gas or liquid with strong ammonia-like odor	
Use:	intermediate in chemical and pharmaceutical industries	
Toxicity:	strong irritant of eyes, mucous membranes, lung, and skin; can produce lung damage	
Hazard:	fire and explosive hazard	

METHYL (n-AMYL) KETONE (2-heptanone)	TLV 100ppm	463mg/M ³
Properties:	water-white liquid	
Use:	solvent	
Toxicity:	irritant to eyes and mucous membranes; can produce narcosis	
Hazard:	fire hazard when heated	
METHYL BROMIDE (C) (SKIN)	TLV 20ppm * (15ppm)	80mg/M ³ (60mg/M ³)
Properties:	colorless, volatile liquid or gas with a burning taste	
Use:	fumigant, insecticide, solvent, refrigerant, and a chemical intermediate	
Toxicity:	strong irritant to skin, eyes, mucous membranes and lungs; skin burns result from splashing of the skin; toxic to the liver, kidneys, lungs and nervous system; chronic exposure can produce permanent nervous system changes; causes pulmonary edema	
Hazard:	moderate fire and explosive hazard when heated	
METHYL CELLOSOLVE (2-Methoxyethanol) (SKIN)	TLV 25ppm	80mg/M ³
Properties:	colorless liquid with a mild agreeable odor	
Use:	solvent used in oil-water compositions; component of hydraulic fluids; used as a chemical intermediate	
Toxicity:	readily absorbed through the skin; injures the bone marrow and produces anemia (aplastic); injures nervous system and produces shakes, fatigue, drowsiness	
Hazard:	fire hazard when heated	
METHYL CELLOSOLVE ACETATE (Ethylene glycol monoethyl ether acetate) (SKIN)	TLV 25ppm	120mg/M ³
Properties:	white flakes or powder	
Use:	additive to lacquer, paint and varnish remover	
Toxicity:	absorbed through skin; can injure lungs, kidneys, and nervous system	
Hazard:	fire hazard when heated	
METHYL CHLORIDE	TLV 100ppm	210mg/M ³
Properties:	colorless gas	
Use:	refrigerant, propellant, solvent, and chemical intermediate; used as a food additive; local anesthetic	
Toxicity:	can produce narcosis, chronic exposure can produce toxic effect on nervous system, kidneys, liver, lungs and heart	
Hazard:	moderate fire and explosive hazard when heated	
METHYL CHLOROFORM (1,1,1-Trichloroethane)	TLV 350ppm	1,900mg/M ³
Properties:	colorless liquid	
Use:	solvent, chemical intermediate	
Toxicity:	irritant to mucous membranes and unpleasant odor; produces narcosis, low toxicity to kidney and liver	
Hazard:	danger if heated to decomposition due to fumes	

METHYL CHLOROMETHYL ETHER

TLV STD 1910.1006

*(no exposure)

Properties: clear, colorless liquid
Use: resin production
Toxicity: a regulated carcinogen of the lungs
Hazard: a moderate explosive hazard

METHYLCYCLOHEXANE

TLV 500ppm
* (400ppm)

2,000mg/M³
(1,600mg/M³)

Properties: colorless liquid
Use: solvent and chemical manufacture
Toxicity: causes narcosis and depression of nervous system;
does not cause irritation and has no odor warning level
Hazard: moderate fire and explosive hazard

METHYLCYCLOHEXANOL

TLV 100ppm
* (50ppm)

470mg/M³
(235mg/M³)

Properties: colorless thick liquid with menthol-like odor
Use: solvent in lacquers, blending agent in textile soaps,
and antioxidant in lubricants
Toxicity: irritant of eyes and mucous membranes and lungs; may be
toxin of liver and kidneys
Hazard: fire and explosive danger if heated

METHYLCYCLOHEXANONE
(SKIN)

TLV 100ppm
* (50ppm)

460mg/M³
(230mg/M³)

Properties: water-white to pale yellow liquid with acetone-like odor
Use: solvent in manufacture of lacquers, varnishes, plastics
and in leather industry; rust remover
Toxicity: irritant to eyes, mucous membranes and skin; can produce
narcosis; can damage liver and kidneys
Hazard: fire hazard when heated

METHYLENE BIPHENYL ISOYANATE (MDI) (C)

TLV 0.02ppm

0.2mg/M³

Properties: yellow crystals or solid
Use: used in paints, varnishes, lacquers, adhesives, foam-
ing operations, synthetic rubber, plastic industry
Toxicity: irritant to mucous membranes and respiratory passages;
can act as sensitizer of lungs and produce asthma-like
condition
Hazard: fire hazard if exposed to heat

METHYLENE CHLORIDE

TLV 500ppm
* (200ppm)

Properties: colorless, volatile liquid
Use: solvent especially in paint-stripping operations; used
as food additive and to decaffeinate coffee
Toxicity: irritant to eyes; produces narcosis; can irritate skin
with prolonged exposure or contact; recent data shows
increase in carbon monoxide in blood of workers who
are exposed to this substance
Hazard: no fire or explosive hazard

METHYL FORMATE	TLV 100ppm	250mg/M ³
Properties:	colorless liquid with agreeable odor	
Use:	insecticide, fumigant, solvent, food additive	
Toxicity:	irritant of eyes, mucous membranes and respiratory passages; can damage lungs, eyes, nerves	
Hazard:	dangerous fire and moderate explosive hazards when heated	
METHYL IODIDE (SKIN)	TLV 5ppm	28mg/M ³
Properties:	colorless liquid that turns brown upon exposure to light	
Use:	chemical intermediate	
Toxicity:	irritant to skin and lungs; produces narcosis and is toxic to nervous system	
Hazard:	danger if heated to decomposition due to fumes	
METHYL ISOBUTYL CARBINOL (Methyl amyl alcohol) (SKIN)	TLV 25ppm	100mg/M ³
Properties:	clear liquid	
Use:	brake fluids, frothing agent in ore floatation, in manufacture of lubricant additives, solvents, plasticizers, lacquers, and other organic compounds	
Toxicity:	can be absorbed through the skin, irritant of eyes, mucous membranes, and skin; can produce narcosis	
Hazard:	moderate fire hazard when heated	
METHYL ISOCYANATE (SKIN)	TLV 0.02ppm	0.05mg/M ³
Properties:	liquid	
Use:	used as a chemical intermediate	
Toxicity:	similar to TDI but also can cause pulmonary edema and lung injury, strong irritant	
Hazard:	dangerous fire hazard if heated	
METHYL MERCAPTAN (C)	TLV 10ppm * (0.5ppm)	20mg/M ³ (1mg/M ³)
Properties:	liquid or gas with the odor of rotten cabbage	
Use:	used in synthesis of methionine; intermediate in manufacture of fungicides; catalyst; constituent of jet fuel additives	
Toxicity:	foul odor, irritant of eyes, mucous membranes; can cause headache	
Hazard:	dangerous fire hazard when heated	
METHYL METHACRYLATE	TLV 100ppm	410mg/M ³
Properties:	colorless liquid	
Use:	solvent, lubricant, plasticizer	
Toxicity:	irritant to eyes, mucous membranes and respiratory passages	
Hazard:	moderate fire and explosive danger when heated	

a-METHYL STYRENE (C)	TLV 100ppm	480mg/M ³
Properties:	colorless liquid, insoluble in water	
Use:	synthetic rubber, plastics, and other chemical synthesis	
Toxicity:	moderate irritant of skin and mucous membranes; causes moderate narcosis; can be associated with the development of pneumonia	
Hazard:	moderate fire hazard	
MICA	TLV 20MPPCF	
Properties:	solid	
Use:	electric insulation	
Toxicity:	a pneumoconiosis-producer	
Hazard:	not flammable	
MOLYBDENUM (Insoluble compounds)	TLV 15mg/M ³ * (10mg/M ³)	
Properties:	depends upon the compound	
Use:	alloy especially in steel and casting; lubricant, catalyst, dye; fertilizers	
Toxicity:	low toxicity, mild irritant to mucous membranes	
Hazard:	depends upon the compound	
MOLYBDENUM (Soluble compounds)	TLV 5mg/M ³	
Properties:	depends upon the compound	
Use:	see above	
Toxicity:	mild irritant of mucous membranes	
Hazard:	depends upon the compound	
MONOMETHYL ANILINE (SKIN)	TLV 2ppm	9mg/M ³
Properties:	reddish-brown, oily liquid	
Use:	used in synthesis of pharmaceuticals, dyes, resins, pigments, and rubber	
Toxicity:	readily absorbed through skin; methemoglobin producer	
Hazard:	dangerous when heated due to decomposition fumes	
MONOMETHYL HYDRAZINE (C) (SKIN)	TLV 0.2ppm	0.35mg/M ³
Properties:	colorless liquid with ammonia-like odor	
Use:	rocket fuel	
Toxicity:	powerful irritant of skin, eyes, mucous membranes, and lungs; toxic to liver; causes convulsions; causes breakage of red blood cells; suspect carcinogen	
Hazard:	moderate fire and extreme explosive hazard if heated	

MORPHOLINE (SKIN)	TLV 20ppm	70mg/M ³
Properties:	oily, colorless liquid with an ammonia-like odor	
Use:	corrosive inhibitor, neutralizing and scrubbing agent; used in plastics, lubricants, emulsifiers, anti-oxidants and pharmaceuticals; used as a food additive	
Toxicity:	skin, eye, and mucous membrane irritant; can damage kidneys and liver	
Hazard:	moderate fire hazard when heated	
NAPHTHA (Coaltar)	TLV 100ppm	400mg/M ³
Properties:	dark, straw-colored to colorless liquid	
Use:	a residue from coke process	
Toxicity:	irritant of mucous membranes; narcosis; skin and lung cancer	
Hazard:	moderate fire hazard, slight explosive hazard	
NAPHTHALENE	TLV 10ppm	50mg/M ³
Properties:	white crystalline, volatile flakes with aromatic odor	
Use:	a by-product of coke production used as moth repellent, and in the chemical and dye industry; wood preservation	
Toxicity:	irritant to eyes; can cause serious eye damage, headaches, confusion, nausea, liver damage, blood damage, and CNS disturbances	
Hazard:	moderate fire hazard, moderate explosive hazard in fine dust form	
alpha-NAPHTHYLAMINE	TLV STD 1910.1004 * (no exposure)	
Properties:	white crystals which redden on exposure to air	
Use:	dye for textile fibers	
Toxicity:	a regulated carcinogen, especially of urinary bladder	
Hazard:	slight fire hazard, produces dangerous fumes when heated	
beta-NAPHTHYLAMINE	TLV STD 1910.1009 * (no exposure)	
Properties:	white to pink solid, leaf-like	
Use:	dye	
Toxicity:	readily absorbed through the skin; a regulated carcinogen of the urinary bladder	
Hazard:	vapors are moderately flammable	
NICKEL CARBONYL	TLV 0.001ppm * (.005ppm)	0.007mg/M ³ (0.035mg/M ³)
Properties:	colorless volatile liquid	
Use:	used in the manufacture of pure nickel	
Toxicity:	highly toxic; causes headache, dizziness, nausea, vomiting, fever, and difficulty breathing; can lead to death; a human carcinogen; also can produce an allergy type skin rash	
Hazard:	dangerous fire hazard and moderate explosive hazard when heated	

NICKEL (metal and soluble compounds as Ni)	TLV 1.0mg/M ³ * (0.1mg/M ³)	
Properties:	depends upon compound	
Use:	used in alloy like stainless steel; catalyst in chemical processes coinage, electroplating; magnetic tapes; plastic manufacture	
Toxicity:	causes nickel skin rashes and allergy type skin rashes; can produce an asthma-like condition; human carcinogen of nasal cavity sinuses and lungs	
Hazard:	depends upon compound	
NICOTINE (SKIN)	TLV 0.5mg/M ³	
Properties:	colorless and odorless oil with a sharp burning taste	
Use:	insecticide	
Toxicity:	readily absorbed through the skin; causes nausea, vomiting, diarrhea, mental disturbances and convulsions	
Hazard:	produces toxic fumes when heated to decomposition	
NITRIC ACID	TLV 2ppm	5mg/M ³
Properties:	colorless or yellowish, fuming liquid	
Use:	used in many industries for acid properties; also in dye industry, photography, explosive production and manufacture of other acids	
Toxicity:	highly corrosive to eyes, mucous membranes, lungs, skin, and teeth	
Hazard:	moderate fire hazard and dangerous reaction with certain substances	
NITRIC OXIDE	TLV 25ppm	30mg/M ³
Properties:	colorless gas, blue liquid	
Use:	produced as a by-product of many manufacturing operations that use nitric acid produced by internal combustion; rapidly oxidized from nitric oxide to nitrogen dioxide	
Toxicity:	irritant of eyes, mucous membranes, and lungs (but less so of eyes and mucous membranes than lungs); can produce pulmonary edema; can produce methemoglobin	
Hazard:	will react with steam to produce strong acid	
p-NITROANILINE (SKIN)	TLV 1ppm	6mg/M ³
Properties:	yellow crystals	
Use:	used in the synthesis of dyestuff and other chemical intermediates	
Toxicity:	readily absorbed through the skin; a strong methemoglobin producer and also causes breakage of red blood cells (hemolytic anemia); can injure the liver; acute symptoms include headaches, nausea, vomiting, weakness, and stupor	
Hazard:	dangerous when heated due to decomposition fumes	

NITROBENZENE (SKIN)	TLV 1ppm	5mg/M ³
Properties:	bright yellow crystals or yellow oily liquid	
Use:	used in the chemical industry as one of the most important and basic intermediates for the preparation of other organic chemicals	
Toxicity:	readily absorbed through the skin; powerful methemoglobin producer; can cause headaches, nausea, vomiting	
Hazard:	moderate fire and explosive hazard if heated	
4-NITROBIPHENYL (4-Nitrodiphenyl) (PNB)	TLV STD 1910.1003 * (no exposure)	
Properties:	crystals	
Use:	dye	
Toxicity:	a regulated carcinogen of urinary bladder	
Hazard:	produces dangerous fumes when heated to decomposition	
p-NITROCHLOROBENZENE (SKIN)	TLV 1mg/M ³	
Properties:	liquid	
Use:	used in the manufacture of explosives and as a solvent	
Toxicity:	readily absorbed through the skin; producer of methemoglobin; causes destruction of red blood cells (hemolytic anemia), skin irritant; causes headaches	
Hazard:	slight fire hazard if heated	
NITROETHANE	TLV 100ppm	310mg/M ³
Properties:	colorless liquid with disagreeable odor	
Use:	solvent for cellulose esters, resins, oils, fats, dyes; used in synthesis of organic compounds	
Toxicity:	moderate irritant of the respiratory tract, liver and kidney damage can occur; narcosis	
Hazard:	moderate fire and explosive hazard	
NITROGEN DIOXIDE	TLV 5ppm	9mg/M ³
Properties:	colorless solid to yellowish liquid, boils at 21° C	
Use:	produced as a by-product of many manufacturing operations, by-product of internal combustion	
Toxicity:	nitrogen dioxide can form nitric acid when combined with water, thus is an irritant of eyes, mucous membranes and lungs; can produce pulmonary edema; chronic exposure can produce lung diseases like chronic bronchitis or emphysema	
Hazard:	dangerous when heated due to toxic fumes	
NITROGEN TRIFLUORIDE	TLV 10ppm	29mg/M ³
Properties:	colorless gas with an odor of mold	
Use:	oxidizer for high-energy fuels	
Toxicity:	irritant of eyes, mucous membranes, lungs, skin, and teeth; chronic exposure can cause "fluorosis" (see FLUORIDE)	
Hazard:	dangerous fire hazard and react violently with hydrogen, grease, and oils	

NITROGLYCERIN (SKIN)		TLV 0.2ppm	2mg/M ³
Properties:	colorless to yellow liquid with sweet taste		
Use:	explosive; medicine for individuals with coronary artery disease		
Toxicity:	readily absorbed through the skin; causes headaches, fainting, dizziness; reduces blood pressure; sudden death associated with sudden withdrawal from substance once a worker has become dependent upon it		
Hazard:	fire and explosive hazards great		
NITROMETHANE		TLV 100ppm	250mg/M ³
Properties:	an oily liquid		
Use:	fuel additive		
Toxicity:	irritant of the mucous membranes and lungs; can cause loss of appetite, nausea, vomiting, and diarrhea; may be harmful to liver and kidneys		
Hazard:	moderate fire and explosive hazard when heated		
1-NITROPROPANE		TLV 25ppm	90mg/M ³
Properties:	colorless liquid		
Use:	solvent for cellulose esters, resins, fats, oils, dyes; used in synthesis of organic compounds		
Toxicity:	irritant of the mucous membranes and lungs; can cause nausea, vomiting, loss of appetite, diarrhea; can cause injury to liver and kidneys; large doses produce methemoglobinemia		
Hazard:	moderate fire hazard if heated or exposed to open flame		
2-NITROPROPANE		TLV 25ppm	90mg/M ³
Properties:	colorless liquid		
Use:	same as 1-Nitropropane		
Toxicity:	same as 1-Nitropropane		
Hazard:	same as 1-Nitropropane		
n-NITROSODIMETHYLAMINE		TLV STD 1910.1016 * (no exposure)	
Properties:	yellow liquid		
Use:	used in manufacture of organic compounds, in vulcanizing in printing fabrics		
Toxicity:	a regulated carcinogen, causes liver damage		
Hazard:	produces dangerous fumes when heated to decomposition		
NITROTOLUENE (SKIN)		TLV 5ppm	30mg/M ³
Properties:	yellowish crystals		
Use:	as an explosive; used in the synthesis of dyestuff and other chemicals		
Toxicity:	readily absorbed through the skin; methemoglobin producer; irritant to skin and mucous membranes; can cause headaches		
Hazard:	moderate fire hazard if heated		

OCTACHLORONAPHTHALENE
(SKIN)

TLV 0.1mg/M³

Properties: solid
Use: electric wire insulation; additives to special lubricants
Toxicity: skin rash (chloracne); liver toxin
Hazard: danger if heated to decomposition due to fumes

OCTANE

TLV 500ppm
* (300ppm) 2,350mg/M³
(1,450mg/M³)

Properties: clear liquid, strong odor
Use: liquid paraffin hydrocarbon used in mixtures, as in fuels, solvents, plastic industry, degreasing operations and lubricants
Toxicity: irritant of mucous membranes; causes narcosis at high concentrations; can act as asphyxiant
Hazards: moderate-severe fire and explosive danger when heated

OIL MIST (Mineral)

TLV 5mg/M³

Properties: colorless, oily liquid
Use: cool and lubricate machines; medicines
Toxicity: inhalation of vapors can produce lipid pneumonia; mineral oils are a carcinogen of skin and scrotum and animal carcinogen of lungs and GI tract
Hazard: slightly flammable when heated

ORGANO (Alkyl) MERCURY

TLV 0.01mg/M³

Properties: depends upon compound
Use: medicines, pesticides, preservatives, catalyst for chemical reaction, fungicide
Toxicity: readily absorbed through the skin; irritates and burns the skin and produces chronic skin rashes; major toxic effect is on the central nervous system with the resulting severe brain damage, blindness, death
Hazard: dangerous when heated as produces toxic fumes

OSMIUM TETROXIDE

TLV 0.002mg/M³

Properties: either colorless crystals or a yellow solid with a chlorine-like odor
Use: osmium metal easily forms osmium tetroxide, a catalyst in ammonia synthesis and hydrogenation for organic compounds; used in alloys
Toxicity: extremely irritating to eyes, mucous membranes, and lungs; often causes bronchitis; injures liver and kidneys; turns skin green or black on contact and causes skin rashes or ulcers
Hazards: dangerous when heated to decomposition due to fumes

OXALIC ACID

TLV 1mg/M³

Properties: transparent, colorless crystals
Use: bleach, metal polish, rust remover, organic synthesis
Toxicity: severe burns of the eye, skin, mucous membranes, and lungs can occur from the dust; will burn whatever comes in contact with; can produce severe kidney damage; can turn skin bluish and make fingernails brittle and yellow
Hazard: not flammable

OXYGEN DIFLUORIDE (Fluorine monoxide)

TLV 0.05ppm

0.1mg/M³

Properties: colorless gas, yellowish-brown liquid
Use: oxidizer for rocket propellants
Toxicity: irritant of eyes, mucous membranes, lungs, and teeth; headache; can produce pulmonary edema and damage to lungs; can produce fluorosis (see FLUORIDE)
Hazard: reacts violently with certain compounds

OZONE

TLV 0.1ppm

0.2mg/M³

Properties: colorless gas or dark blue liquid
Use: sterilization of water; bleaching agent; produced in welding process
Toxicity: irritant to eyes, mucous membranes, and lungs; can produce pulmonary edema, severely injure lungs and produce scarring (fibrosis); can produce increase in aging process in laboratory animals (radiomimetic effects); lab tests suggest it is mutagenic
Hazard: fire hazard due to reaction with other chemicals

PARAQUAT (1,1-Dimethyl-4,4-Hipyridinium salt) TLV 0.5mg/M³
(SKIN)

Properties: yellow solid
Use: herbicide
Toxicity: ingestion in humans can cause fatal injury to lungs which is characterized by progressive scarring of lungs; also irritant; can damage kidneys
Hazard: produces toxic fumes when heated to decomposition

PARATHION
(SKIN)

TLV 0.1mg/M³

Properties: yellowish liquid
Use: organophosphate insecticide
Toxicity: readily absorbed through skin; very powerful cholinesterase inhibitor
Hazard: produces toxic fumes when heated to decomposition

PENTABORANE	TLV 0.005ppm	0.01mg/M ³
Properties:	colorless gas or liquid with a bad odor	
Use:	high energy fuel additive; used in rubber, pharmaceutical and perfume industries	
Toxicity:	can produce severe injury to the nervous system	
Hazard:	spontaneously ignites in air, fire cannot be extinguished with water or halogenated extinguishing agents	
PENTACHLORONAPHTHALENE (SKIN)	TLV 0.5mg/M ³	
Properties:	solid	
Use:	wire insulation; additives to special lubricants	
Toxicity:	causes skin rash (chloracne); liver toxin	
Hazard:	danger if heated to decomposition due to fumes	
PENTACHLOROPHENOL (SKIN)	TLV 0.5mg/M ³	
Properties:	dark-colored flakes and needle crystals with characteristic odor	
Use:	antimicrobial agent, insecticide, herbicide, fungicide	
Toxicity:	irritant of skin, mucous membranes; can produce convulsions, liver and kidney injury, and death	
Hazard:	dangerous when heated to decomposition due to fumes	
PENTANE	TLV 1,000ppm * (600ppm)	2,950mg/M ³ (1,800mg/M ³)
Properties:	colorless liquid	
Use:	in fuels; used as a solvent, degreaser, lubricant	
Toxicity:	narcosis at high concentrations; irritant to mucous membranes	
Hazard:	severe fire and explosive hazard when heated	
2-PENTANONE (Methyl-n-Propyl Ketone)	TLV 200ppm	700mg/M ³
Properties:	water-white liquid	
Use:	solvent; used in synthesis or organic compounds	
Toxicity:	irritant of eyes, mucous membranes and lungs; can produce narcosis	
Hazard:	fire hazard when heated	
PERCHLOROMETHYL MERCAPTAN	TLV 0.1ppm	0.8mg/M ³
Properties:	yellow oily liquid, foul odor	
Use:	insecticide, solvent	
Toxicity:	highly irritating to eyes, mucous membranes, skin and lungs	
Hazard:	produces toxic fumes when heated to decomposition	

PERCHLORYL FLUORIDE	TLV 3ppm	13.5mg/M ³
Properties:	colorless gas with a characteristic sweet smell	
Use:	oxidant in rocket fuels, oxidizing and fluorinating agent in chemical reactions	
Toxicity:	can be absorbed through the skin; produces methemoglobin; destroys red blood cells; acts as irritant of eyes, and mucous membranes; can produce fluorosis if chronic exposure (see FLUORIDE)	
Hazard:	moderate fire hazard and moderate explosive hazard upon contact with certain compounds	
PETROLEUM DISTILLATES (Naphtha)	PETROLEUM SPIRITS TLV 500ppm	2,000mg/M ³
Properties:	volatile, clear, colorless liquid	
Use:	in petroleum products, paraffin	
Toxicity:	narcosis; can resemble alcohol intoxication; irritant; known to cause pulmonary edema and bleeding into internal organs in severe intoxications	
Hazard:	severe fire hazard and explosive hazard if heated	
PHENOL (SKIN)	TLV 5ppm	19mg/M ³
Properties:	white, crystalline solid	
Use:	used in the manufacture of a large variety of aromatic compounds; disinfectant; medicine	
Toxicity:	irritant of skin, mucous membranes; readily absorbed by skin; can cause death from overexposure with damage to central nervous system; can injure kidneys and liver; can cause skin rashes	
Hazard:	moderate fire hazard when heated	
p-PHENYLENEDIAMINE (Diaminobenzene) (SKIN)	TLV 0.1mg/M ³	
Properties:	colorless crystals	
Use:	dye in the fur industry	
Toxicity:	irritant of skin, eyes, mucous membranes; can produce sensitization and thus allergic skin reactions plus asthma	
Hazard:	slight fire hazard if heated	
PHENYL ETHER	TLV 1ppm	7mg/M ³
Properties:	liquid, foul odor	
Use:	heat-transfer agent, chemical intermediate, used in perfume industry	
Toxicity:	relatively low toxicity at this level; causes mild skin irritation; in animals, chronic damage to liver, kidney, thyroid, and GI tract noted	
Hazard:	moderate fire and explosive when heated	

PHENYL ETHER-DIPHENYL MIXTURE	TLV 1ppm	7mg/M ³
Properties:	liquid	
Use:	heat-transfer agent at temperature below 750° F	
Toxicity:	(see phenyl ether); odor very foul, mild skin irritation	
Hazard:	moderate fire and explosive hazard when heated	
PHENYL GLYCIDYL ETHER (PGE)	TLV 10ppm	60mg/M ³
Properties:	colorless liquid	
Use:	used as an intermediate in various chemical processes	
Toxicity:	irritant to skin, mucous membranes; can produce sensitization; depresses the nervous system	
Hazard:	poorly flammable	
PHENYLHYDRAZINE (SKIN)	TLV 5ppm	22mg/M ³
Properties:	yellow crystals or oil	
Use:	used in manufacture of sugars, ketones, aldehydes, dyes and other organic compounds	
Toxicity:	skin irritant and can cause skin sensitization; can damage liver, kidneys, and destroy red blood cells; produce methemoglobin; cause GI upset and generalized weakness	
Hazard:	moderate fire hazard when exposed to heat	
PHOSDRIN (Mevinphos) (SKIN)	TLV 0.1mg/M ³	
Properties:	yellow to orange liquid	
Use:	organophosphate insecticide	
Toxicity:	readily absorbed through the skin; cholinesterase inhibitor	
Hazard:	produces toxic fumes when heated to decomposition	
PHOSGENE (Carbonyl Chloride)	TLV 0.1ppm * (0.05ppm)	0.4mg/M ³ (0.2mg/M ³)
Properties:	colorless gas with odor of newly mowed hay or green corn	
Use:	former war gas (WWI); occurs whenever a volatile chlorine compound comes in contact with flames or hot metal--like degreasers and welding	
Toxicity:	concentrations of 3-5ppm cause irritation of eyes and throat; lower concentrations give no warning but cause damage to lungs which may appear 2-24 hours after exposure and be pulmonary edema or pneumonia	
Hazard:	highly dangerous when heated to decomposition as will produce dangerous gases	

PHOSPHINE

TLV 0.3ppm

0.4mg/M³

Properties: colorless gas
Use: it is formed whenever phosphorus is dissolved in hot alkalies or phosphorus compounds come in contact with water
Toxicity: high concentration can cause rapid death by affecting the nervous system and lungs; chronic exposure can cause disturbances of the nervous system like visual, speech, and coordination problems, bronchitis, anemia, and GI problems
Hazard: fire hazard by spontaneous chemical reaction

PHOSPHORIC ACID

TLV 1ppm

Properties: colorless liquid
Use: fertilizer industry, metal cleaning, food additive
Toxicity: irritant of skin, mucous membranes, eyes, and lungs
Hazard: dangerous when heated to decomposition due to toxic fumes

PHOSPHORUS (Yellow)

TLV 0.1mg/M³

Properties: colorless to yellow solid
Use: used in manufacture of phosphor-bronze, tracer bullets, incendiaries, rat poison
Toxicity: irritant of eyes, mucous membranes, lungs, and skin; causes destruction of bones, especially the jaw and teeth; causes liver damage and ulcer of mouth
Hazard: spontaneously ignites in air, must be stored under water

PHOSPHORUS PENTACHLORIDE

TLV 1mg/M³

Properties: yellowish-white fuming crystalline mass with strong, unpleasant odor
Use: used in chemical manufacturing
Toxicity: highly caustic compound to skin, eyes, mucous membranes and lung
Hazard: moderate fire hazard by chemical reaction, reacts violently to water

PHOSPHORUS PENTASULFIDE

TLV 1mg/M³

Properties: gray to yellow-green solid
Use: used in chemical manufacturing
Toxicity: irritant of eyes, mucous membranes and skin; forms hydrogen sulfide and phosphorus pentoxide on contact with moisture; (see HYDROGEN SULFIDE for toxicity)
Hazard: dangerous fire hazard in dust form when heated, moderate explosive hazard by spontaneous chemical reaction

PHOSPHORUS TRICHLORIDE

TLV 0.5ppm

3mg/M³

Properties: clear, colorless fuming liquid
Use: used in chemical manufacture
Toxicity: highly caustic to skin, eyes, mucous membranes, and lungs
Hazard: moderate fire hazard by chemical reaction

PHTHALIC ANHYDRIDE

TLV 2ppm
* (1ppm)

12mg/M³
(6mg/M³)

Properties: white crystalline needles with characteristic choking odor
Use: production of plasticizers, resins, and dyes
Toxicity: potent irritant of the skin, eyes, mucous membranes, and lungs; can cause skin and possibly lung sensitization (asthma)
Hazard: dust is explosive but low fire hazard

PICRIC ACID (2,4,6-Trinitrophenol)
(SKIN)

TLV 0.1mg/M³

Properties: yellow crystals or liquid, very bitter
Use: used in explosives, etching, matches, rocket fuses, leather processing
Toxicity: causes skin irritation plus skin sensitization; can cause headache, dizziness, nausea, vomiting and diarrhea; can damage kidneys, liver and destroy red blood cells (hemolysis)
Hazard: severe explosive hazard especially if the acid comes in contact with metals

PIVAL^(R) (2-Pivalyl-1,3-Indandione)

TLV 0.1mg/M³

Properties: yellow crystals
Use: rodenticide, insecticide, and pharmaceutical intermediate
Toxicity: reduces blood clotting and leads to bleeding (anticoagulant)
Hazard: not flammable

PLATINUM (Soluble salts)

TLV 0.002mg/M³

Properties: depends upon compound, usually crystals
Use: used in alloys, in chemical production, in dental and medical devices
Toxicity: highly toxic to skin and lungs as an allergen, i.e., causes allergic skin rashes and asthma
Hazard: depends upon the compound

PORTLAND CEMENT

TLV 50MPPCF

Properties: solid or powder
Use: cement or building material
Toxicity: considered an "inert dust", wet cement irritant to skin
Hazard: not flammable

PROPARGYL ALCOHOL (SKIN)	TLV 1ppm	
Properties:	moderately volatile liquid with a geranium-like odor	
Use:	chemical intermediate	
Toxicity:	severe irritant of eyes, mucous membranes, lungs and skin; similar to acrolein and allyl alcohol	
Hazard:	fire hazard when heated	
PROPANE	TLV 1,000ppm	1,800mg/M ³
Properties:	colorless gas	
Use:	fuel	
Toxicity:	asphyxiant at high concentration	
Hazard:	severe fire and explosive danger	
beta-PROPIOLACTONE	TLV STD 1910.1013 * (no exposure)	
Properties:	a liquid	
Use:	used in production of organic compounds; a sterilant and disinfectant especially against viruses in plasma and tissue grafts	
Toxicity:	extreme irritant of skin, eyes, mucous membranes; a regulated carcinogen of the skin	
Hazard:	moderate fire hazard when heated	
n-PROPYL ACETATE	TLV 200ppm	840mg/M ³
Properties:	clear, colorless liquid with a pleasant odor	
Use:	lacquer solvent, flavors, perfumes	
Toxicity:	irritant to eyes, mucous membranes; can produce narcosis	
Hazard:	moderate fire and explosive hazard when heated	
PROPYL ALCOHOL	TLV 200ppm	500mg/M ³
Properties:	clear, odorless liquid	
Use:	a solvent used in a wide variety of products	
Toxicity:	mild irritant; produces narcosis	
Hazard:	fire and explosive hazard when heated	
n-PROPYL NITRATE	TLV 25ppm	110mg/M ³
Properties:	pale yellow liquid with sickly odor	
Use:	fuel ignition promoter; used as an intermediate in synthesis of organic compounds	
Toxicity:	skin irritant; causes methemoglobinemia, fall in blood pressure, mild anemia (hemolytic), disturbances of the nervous system	
Hazard:	highly dangerous fire and explosive hazard when heated	

PROPYLENE DICHLORIDE	TLV 75ppm	350mg/M ³
Properties:	colorless liquid	
Use:	solvent, fumigant, chemical intermediate	
Toxicity:	mild irritant to skin, eye, and mucous membranes; produces narcosis; toxin to liver and kidneys	
Hazard:	fire hazard when heated	
PROPYLENE IMINE (SKIN)	TLV 2ppm	5mg/M ³
Properties:	liquid	
Use:	used in synthesis of other organic compounds	
Toxicity:	a strong irritant of skin, eyes, and mucous membranes; can cause serious eye injury; can damage lungs and kidneys; an animal carcinogen	
Hazard:	moderate fire hazard when heated	
PROPYLENE OXIDE	TLV 100ppm	240mg/M ³
Properties:	colorless liquid	
Use:	intermediate in chemical processes, a fumigant, herbicide, preservative and solvent, a food additive	
Toxicity:	strong irritant to skin and mucous membranes; can cause burns; chronic exposure can damage lungs; mild depressant of nervous system; an animal carcinogen; can injure kidneys and liver	
Hazard:	extreme fire and explosive danger when heated	
PYRETHRUM (dalmatian insect powder)	TLV 5mg/M ³	
Properties:	fine powder	
Use:	insecticide	
Toxicity:	can cause both allergic and irritative skin rashes, and lung reaction; large doses can cause incoordination, shakes, and paralysis	
Hazard:	not flammable	
PYRIDINE	TLV 5ppm	15mg/M ³
Properties:	colorless liquid with sharp, penetrating odor and burning taste	
Use:	used as a solvent and denaturant for alcohol	
Toxicity:	irritant to skin, eyes and mucous membranes; can be absorbed through skin; can damage kidneys and liver; can produce narcosis; can cause GI upset, can damage bone marrow	
Hazard:	severe fire and explosive hazard when exposed to heat	
QUINONE	TLV 0.1ppm	0.4mg/M ³
Properties:	yellow crystals with a characteristic irritating odor	
Use:	wide application in dye, textile, chemical, tanning and cosmetic industries	
Toxicity:	severe irritant to eyes, mucous membranes and skin; causes injuries to eyes, discoloration of skin, burns of skin	
Hazard:	fire or explosive hazards	

RDX (Cyclotrimethylene Trinitramine) (SKIN)	TLV 1.5mg/M ³
Properties:	white, crystalline powder
Use:	explosive
Toxicity:	irritant of skin; can also sensitize skin and cause allergic skin rashes; chronic exposure to fumes can lead to nervous system disorders including epileptic-type seizures (convulsions)
Hazard:	highly explosive
RHODIUM (Metal and dust as Rh)	TLV 0.1mg/M ³
Properties:	silvery white metal, rare earth metal closely related to platinum
Use:	specialized use because of resistance to corrosion and oxidation; rhodium-platinum alloys; catalyst; electric contacts; and an electroplate coating for scientific instrument parts; electronic equipment and jewelry
Toxicity:	little data on human but assumed to be similar to platinum
Hazard:	moderate fire hazard
RHODIUM (Soluble salts)	TLV 0.001mg/M ³
Properties:	depends upon the compound
Use:	see above
Toxicity:	see above
Hazard:	depends upon the compound
RONNEL	TLV 10mg/M ³
Properties:	white powder
Use:	organophosphate insecticide, additive to animal food
Toxicity:	cholinesterase inhibitor
Hazard:	produces toxic fumes when heated to decomposition
ROTENONE (Tubatoxin, Derris)	TLV 5mg/M ³
Properties:	white, odorless crystals
Use:	insecticide (toxic to fish and animals but leaves no residue on vegetable crops)
Toxicity:	a skin irritant; acute poisoning causes numbness, nausea, vomiting, and shakes; chronic exposure injures liver and kidneys; a suspect carcinogen
Hazard:	not flammable

SELENIUM COMPOUNDS (as Se)

TLV 0.2mg/M³

Properties: solids with odor
Use: used in the manufacture of pigments, glass, insecticides; copper and steel alloys, textiles and chemicals obtained as a by-product of sulfide ores of copper, gold, nickel and silver
Toxicity: can produce irritation of skin, eyes, mucous membranes; can produce damage to liver, kidneys, bone marrow and thyroid; chronic exposure can produce GI upset, paleness, skin rashes, dizziness, and a metallic taste in mouth; can produce a garlic like breath; a suspect carcinogen
Hazard: depends upon compound

SELENIUM HEXAFLUORIDE

TLV 0.05ppm

0.4mg/M³

Properties: colorless gas
Use: gaseous electric insulator
Toxicity: irritant of eyes, mucous membranes, lungs, and skin; can produce pulmonary edema; (see SENENIUM AND FLUORIDE)
Hazard: produces hazardous fumes when heated to decomposition

SILICA (Quartz and fused)

TLV = $\frac{10\text{mg}/\text{M}^3}{\% \text{SiO}_2 + 2}$

Properties: colorless crystals (sand)
Use: used in foundries, glass production, ceramic industry, refractory bricks, building, flints, sandblasting, and others; found in most rocks, sandstone, sedimentary rock and sand; food additive
Toxicity: produces a dust disease of lung--silicosis; workers with silicosis at risk of developing tuberculosis
Hazard: no fire or explosive hazard

SILVER (Metal and soluble compounds)

TLV 0.01mg/M³

Properties: soft, shiny white metal
Use: used in alloys, electrical industry, catalyst in aldehyde production, photography, coinage
Toxicity: silver can stain the skin and mucous membranes (called argyria--a bluish discoloration); some compounds are very irritating to the skin and mucous membranes like silver nitrate, oxide, and picrate
Hazard: depends upon compound

SOAPSTONE

TLV 20MPPCF

Properties: white powder or solid
Use: used in the production of ovens, pots, and pans
Toxicity: produces a pneumoconiosis
Hazard: not flammable

SODIUM FLUOROACETATE
(SKIN)

TLV 0.05mg/M³

Properties: fine, white, odorless powder
Use: rodenticide
Toxicity: toxic to the heart, central nervous system, and muscles; causes the heart to develop abnormal beats, lose blood pressure; causes convulsions; first indication of poisoning is nausea and apprehension followed by seizures
Hazard: not flammable

SODIUM HYDROXIDE (caustic soda)

TLV 2mg/M³

Properties: white solid
Use: used in the manufacture of variety of materials; used in metal plating, cleaning, extraction processes, bleaching processes, lye
Toxicity: caustic irritation of eyes, mucous membranes, lungs and skin; can cause severe burns
Hazard: reacts with water or steam to produce heat, can produce burns

STIBINE (Antimony hydride)

TLV 0.1ppm

0.4mg/M³

Properties: colorless gas
Use: occurs whenever an acid reacts with a compound containing antimony as an impurity--seen in metallurgy, welding, cutting, soldering, etching of zinc, and chemical laboratories
Toxicity: destroys red blood cells (hemolytic anemia); also injures liver and kidneys; a marked irritant to lungs; can be lethal
Hazard: moderate fire hazard when heated

STODDARD SOLVENT (mineral spirits)

TLV 500ppm
* (100ppm)

2950mg/M³
(575mg/M³)

Properties: clear colorless liquid
Use: dry cleaning, degreasing, thinners
Toxicity: irritant to mucous membranes; produces narcosis
Hazard: moderate fire and explosive hazard

STRYCHNINE

TLV 0.15mg/M³

Properties: hard, white, solid with bitter taste
Use: rat poison (rodenticide), and medicine
Toxicity: toxic effect on the nervous system; effects range from irritability muscle twitching, to convulsions with the body arching backwards, death usually follows a few seizures
Hazard: produces toxic fumes when heated to decomposition

STYRENE (Vinyl benzene)	TLV 100ppm	420mg/M ³
Properties:	colorless liquid	
Use:	used as monomer for polystyrene, synthetic rubbers, plastics, and starting material or intermediate for synthesis of other chemicals	
Toxicity:	can be dangerous irritant to eyes and produce severe damage; can be irritant to mucous membranes; can produce narcosis	
Hazard:	moderate fire and explosive hazard	
SULFUR DIOXIDE	TLV 5ppm	13mg/M ³
Properties:	colorless gas or liquid with strong odor	
Use:	used in the production of sulfides, sulfates, sulfuric acid; bleaching agent; chemical synthesis; preservative in wine; fumigant, insecticide and fungicide	
Toxicity:	acts as irritant of eyes, mucous membranes, and lungs; concentrations of 0.3-1ppm can be detected by taste, 3ppm has a noticeable odor; can produce pulmonary edema; can produce scarring of lungs	
Hazard:	reacts with water to form toxic and corrosive fumes	
SULFUR HEXAFLUORIDE	TLV 1,000ppm	6,000mg/M ³
Properties:	colorless gas	
Use:	gaseous insulator in high-voltage electric insulations	
Toxicity:	considered chemically inert in pure state; however, usually contaminated with other fluoride compounds which can act as irritants; also can act as asphyxiant	
Hazard:	dangerous when heated to decomposition due to fumes	
SULFURIC ACID	TLV 1mg/M ³	
Properties:	colorless, oily liquid	
Use:	used as a raw material in the chemical industry; dehydrating agent; electrolyte in lead-acid batteries; refining oils; leather and soap industries; laboratories; cleansing metals; food additive	
Toxicity:	severe caustic which irritates and burns eyes, mucous membranes, lungs, skin or any other part of body which comes in contact with it	
Hazard:	can ignite upon contact with combustibles; will react with water in violent manner	
SULFUR MONOCHLORIDE	TLV 1ppm	6mg/M ³
Properties:	yellow to yellow-red fuming liquid with a penetrating odor	
Use:	used in the vulcanization of rubber, manufacture of other chemicals	
Toxicity:	strong irritant of eyes, mucous membranes, lungs, and skin	
Hazard:	slight fire hazard when heated	

SULFUR PENTAFLUORIDE

TLV 0.025ppm

0.25mg/M³

Properties: colorless liquid
Use: gaseous insulator in high voltage electrical installations
Toxicity: highly corrosive liquid which irritates and burns eyes, mucous membranes, lungs, and skin; produces pulmonary edema
Hazard: dangerous when heated due to fumes

SULFURYL FLUORIDE

TLV 5ppm

20mg/M³

Properties: colorless gas
Use: fumigant
Toxicity: can produce nausea, vomiting, stomach cramps, and itching; can damage kidneys, liver, and nervous system; can produce convulsions; can cause fluorosis
Hazard: produces hazardous fumes when heated to decomposition

2,4,5-T (2,4,5-Trichlorophenoxyacetic acid) TLV 10mg/M³

Properties: light tan solid or crystals
Use: herbicide
Toxicity: irritant of mucous membranes, skin, produces narcosis; can be toxic to kidneys and liver; can cause damage to offspring of pregnant workers, often contaminated with dioxin, another dangerous chemical
Hazard: not flammable

TALC (fibrous) (Tremolite)

see ASBESTOS

TALC (non-asbestos form)

TLV 20MPPCF

Properties: white powder or solid
Use: used in cosmetics and as a filler
Toxicity: can produce a pneumoconiosis--talcosis
Hazard: not flammable

TANTALUM

TLV 5mg/M³

Properties: gray heavy and hard metal
Use: used in corrosive-resistant tools in the chemical equipment and electronics industry
Toxicity: little data but thought to be low toxicity, may be mild irritant
Hazard: moderate fire hazard in dust form

TEDP (Tetraethyldithiopyrophosphate) (SKIN)		TLV	0.2mg/M ³
Properties:	a liquid almost insoluble in water		
Use:	organophosphate insecticide		
Toxicity:	readily absorbed through the skin; cholinesterase inhibitor		
Hazard:	produces toxic fumes when heated to decomposition		
TELLURIUM		TLV	0.1mg/M ³
Properties:	brittle, silver-white, shiny metal		
Use:	used in alloys with steel, copper, tin, lead; in vulcanizing of rubber; pottery glazing		
Toxicity:	can produce a garlic-like breath and sweat; also can produce increase in sweating, loss of appetite, nausea, metallic taste, and sleepiness		
Hazard:	dangerous when heated due to toxic gases		
TELLURIUM HEXAFLUORIDE		TLV	0.02ppm 0.2mg/M ³
Properties:	colorless gas with an unpleasant odor		
Use:	see TELLURIUM		
Toxicity:	powerful irritant of the lungs and mucous membranes; can produce pulmonary edema (see TELLURIUM)		
Hazard:	forms dangerous fumes when heated to decomposition		
TEPP (Tetraethyl pyrophosphate) (SKIN)		TLV	0.05mg/M ³
Properties:	water-white to yellow liquid		
Use:	organophosphate insecticide		
Toxicity:	readily absorbed through the skin; cholinesterase inhibitor		
Hazard:	produces toxic fumes when heated to decomposition		
TERPHENYLS (Triphenols) (C)		TLV	1ppm 9mg/M ³
Properties:	liquid (some are colorless needles)		
Use:	heat storage and heat transfer agents		
Toxicity:	potentially toxic to liver and kidneys; irritant to eyes, mucous membranes and lungs		
Hazard:	low fire danger		
1,1,1,2-TETRACHLORO-2, 2-DIFLUOROETHANE		TLV	500ppm 4,170mg/M ³
Properties:	liquid		
Use:	refrigerant, chemical intermediate		
Toxicity:	mild irritant; mild producer of narcosis; can injure liver		
Hazard:	produces dangerous fumes if heated to decomposition		

1,1,1,2-TETRACHLORO-1, 2-DIFLUOROETHANE	TLV 500ppm	4,170mg/M ³
Properties:	liquid	
Use:	refrigerant, chemical intermediate	
Toxicity:	mild irritant; mild producer of narcosis; can injure liver	
Hazard:	produces dangerous fumes if heated to decomposition	
1,1,2,2-TETRACHLOROETHANE (SKIN)	TLV 5ppm	35mg/M ³
Properties:	heavy, colorless liquid with chloroform-like odor	
Use:	solvent for cleaning and extraction processes; chemical intermediate	
Toxicity:	irritant of skin; strong irritant of mucous membranes, eyes, and lungs, marked toxin of liver and kidneys; produces narcosis and toxic to nervous system, it is considered as one of the most hazardous of all of chlorinated hydrocarbons and has been banned in some countries	
Hazard:	explosive under certain conditions	
TETRACHLOROETHYLENE (Perchloroethylene) (SKIN)	TLV 100ppm	670mg/M ³
Properties:	colorless liquid with chloroform-like odor	
Use:	solvent in dry cleaning industry and degreaser	
Toxicity:	irritant of eyes, mucous membranes, and skin; produces narcosis; potential toxin of liver and kidneys; suspected carcinogen	
Hazard:	danger if heated to decomposition because of fumes	
TETRACHLORONAPHTHALENE (SKIN)	TLV 2mg/M ³	
Properties:	solid	
Use:	electric wire insulation; additive to lubricants	
Toxicity:	skin rash (chloracne); liver toxin	
Hazard:	danger when heated to decomposition due to fumes	
TETRAETHYL LEAD (SKIN)	TLV 0.075mg/M ³ * (0.10mg/M ³)	
Properties:	colorless, oily liquid with a pleasant characteristic odor	
Use:	antiknock compound of gasoline	
Toxicity:	readily absorbed through the skin, as well as the lungs; produces changes of the central nervous system more than other changes seen with lead poisoning (see INORGANIC LEAD); highly toxic; a suspect carcinogen	
Hazard:	moderate fire hazard when heated	

TETRAHYDROFURAN

TLV 200ppm

590mg/M³

Properties: colorless liquid with ether-like odor
Use: solvent for many types of dyes, resins and lacquers
Toxicity: causes irritation of mucous membranes and skin;
strong narcotic; can injure liver and kidneys
Hazard: moderate fire and serious explosive hazard especially
when exposed to air as forms peroxides

TETRAMETHYL LEAD
(SKIN)

TLV 0.07mg/M³
* (0.15mg/M³)

Properties: colorless liquid
Use: antiknock compound of gasoline
Toxicity: readily absorbed through the skin, toxicity similar
to tetraethyl lead
Hazard: moderate fire and explosive hazard when heated

TETRAMETHYL SUCCINONITRILE
(SKIN)

TLV 0.5ppm

3mg/M³

Properties: crystallizes in plates, has no odor
Use: formed as a breakdown product in the production of
foam rubber or vinyl foam
Toxicity: can be absorbed through the skin; a powerful producer
of convulsions and death; causes headaches and nausea;
highly toxic
Hazard: dangerous when heated to decomposition as emit cyanide
fumes

TETRANITROMETHANE

TLV 1ppm

8mg/M³

Properties: colorless or yellow liquid
Use: explosive
Toxicity: strong irritant of eyes and respiratory passages;
produces damage to liver; can cause pulmonary edema;
can damage kidneys, and methemoglobinemia
Hazard: highly explosive if jarred, heated, etc.

TETRYL (2,4,6-Trinitrophenylmethylnitramine)
(SKIN)

TLV 1.5mg/M³

Properties: yellow crystals
Use: explosives
Toxicity: causes irritation and sensitization of skin as major
problem; may cause upset of the GI tract and breakage
of red blood cells (hemolysis)
Hazard: severe explosive hazard

THALLIUM (Soluble Compounds)
(SKIN)

TLV 0.1mg/M³

Properties: bluish-white soft metal; also depends upon compounds
Use: rodent poison; fungicide; manufacture of special glasses and photoelectric cells; medicines
Toxicity: Acute--affects GI tract and nervous system and can cause death; Chronic--discoloration of hair; causes it to fall out; also causes disturbances of stomach and nervous system; can damage nerves of eyes
Hazard: dust is a fire hazard and compounds produce dangerous fumes when heated

THIRAM (Tetramethylthiram Disulphide) (TMTD) TLV 5mg/M³

Properties: crystals
Use: used in rubber industry; a preservative; a fungicide; disinfectant
Toxicity: can damage liver, kidneys, and brain; in presence of alcohol can produce violent vomiting and nausea and collapse (similar to antabuse)
Hazard: can produce toxic fumes when heated to decomposition

TIN (inorganic compounds except SnH₄ and SnO₂) TLV 2mg/M³

Properties: usually solids
Use: used as a protective coating of other metals, in printing, dyeing, in alloys
Toxicity: some compounds are irritants to skin and mucous membranes; dust can produce a pneumocomiosis which is considered non-harmful
Hazard: depends upon compound

TIN (organic compounds)

TLV 0.1mg/M³

Properties: depends upon compound
Use: fungicides, other uses
Toxicity: readily absorbed through skin, can cause skin rashes, some compounds can destroy red blood cells
Hazard: depends upon compound

TITANIUM DIOXIDE

TLV 15mg/M³
* (10mg/M³)

Properties: blue crystals
Use: used as a white pigment in rubber, plastics, pottery, paint and varnish industries
Toxicity: considered a material with no known toxic effects
Hazard: fine powdered dust may be an explosive hazard

TOLUENE (Toluol) (SKIN)	<div> <div>Properties:</div> <div>Use:</div> <div>Toxicity:</div> <div>Hazard:</div> </div> <div> <div>colorless liquid; odor like benzene</div> <div>solvent in the chemical and dye industry, thinner for paints and similar products, starting material and intermediate in synthesis of numerous chemicals</div> <div>powerful narcotic agent; produces dizziness, headache, loss of coordination; mild irritant of mucous membranes</div> <div>moderate fire hazard; commercial toluene may be contaminated with benzene</div> </div>	TLV 200ppm * (100ppm)	
TOLUENE-2, 4-DIISOCYANATE (TDI)	<div> <div>Properties:</div> <div>Use:</div> <div>Toxicity:</div> <div>Hazard:</div> </div> <div> <div>clear, faintly yellow liquid</div> <div>in the manufacture of polyurethane foams, foam-type of insulation, foundry molds, and others</div> <div>irritant to skin and mucous membranes; can act as sensitizer of lungs and produce asthma-like condition; serious question if TLV adequate to protect against sensitization process</div> <div>fire hazard if exposed to heat</div> </div>	TLV 0.02ppm	0.14mg/M ³
o-TOLUIDINE (o-Methylaniline) (SKIN)	<div> <div>Properties:</div> <div>Use:</div> <div>Toxicity:</div> <div>Hazard:</div> </div> <div> <div>colorless liquid</div> <div>used in synthesis of dyestuff and other chemicals and in the preparation of ion exchange resins</div> <div>methemoglobin producer; causes breakage of red blood cells; causes damage to kidneys and liver; a suspected carcinogen</div> <div>fire hazard if heated</div> </div>	TLV 5ppm	24mg/M ³
TRIBUTYL PHOSPHATE	<div> <div>Properties:</div> <div>Use:</div> <div>Toxicity:</div> <div>Hazard:</div> </div> <div> <div>colorless, odorless liquid</div> <div>antifoaming agent, plasticizer and complexing agent in extraction of heavy metals</div> <div>little data, complaints of nausea and headache; may cause stimulation of the nervous system; weak inhibitor of cholinesterase</div> <div>slight fire hazard</div> </div>	TLV 5mg/M ³	
1,1,2-TRICHLOROETHANE (SKIN)	<div> <div>Properties:</div> <div>Use:</div> <div>Toxicity:</div> <div>Hazard:</div> </div> <div> <div>liquid, pleasant odor</div> <div>solvent, chemical intermediate in plastic industry; fumigant</div> <div>irritant to eyes, mucous membranes, and lungs, liver and kidney toxin; produces narcosis</div> <div>dangerous fumes produced with thermal decomposition</div> </div>	TLV 10ppm	45mg/M ³

TRICHLOROETHYLENE	TLV 100ppm	535mg/M ³
Properties:	colorless, heavy liquid with chloroform-like odor	
Use:	solvent, degreaser, anesthetic, chemical intermediate; used in extraction processes	
Toxicity:	irritant to mucous membranes; produces narcosis; mild liver and kidney toxin; an animal carcinogen	
Hazard:	low fire and explosive danger	
TRICHLORONAPHTHALENE (SKIN)	TLV 5mg/M ³	
Properties:	solid	
Use:	electric wire insulation; additive to lubricants	
Toxicity:	skin rash (chloracne); liver toxin	
Hazard:	danger when heated to decomposition due to fumes	
1,2,3-TRICHLOROPROPANE	TLV 50ppm	300mg/M ³
Properties:	colorless liquid	
Use:	solvent	
Toxicity:	irritant to mucous membranes; produces narcosis; liver and kidney toxin	
Hazard:	danger when heated to decomposition due to fumes	
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	TLV 1,000ppm	7,600mg/M ³
Properties:	colorless liquid	
Use:	refrigerant, solvent, chemical intermediate	
Toxicity:	irritant to mucous membranes; produces narcosis; potential heart irritant (causes irregular heart beats)	
Hazard:	very slight fire hazard	
TRIETHYLAMINE	TLV 25ppm	100mg/M ³
Properties:	colorless liquid with ammonia-like odor	
Use:	used as a chemical intermediate in synthesis of organic chemicals	
Toxicity:	irritant to eyes, mucous membranes, lungs, and skin	
Hazard:	dangerous fire hazard when heated	
TRIFLUOROMONOBROMOMETHANE	TLV 1,000ppm	6,100mg/M ³
Properties:	gas	
Use:	fire extinguisher, refrigerant	
Toxicity:	irritant to mucous membranes and lungs; produces narcosis	
Hazard:	not flammable	

TRINITROTOLUENE (TNT)
(SKIN)

TLV 1.5mg/M³

Properties: colorless crystals
Use: explosive (TNT)
Toxicity: readily absorbed through skin; mild producer of methemoglobin; can damage liver and bone marrow (aplastic anemia); can be irritant to skin; can cause GI upset
Hazard: extreme explosive hazard

TRIORTHOCRESYL PHOSPHATE

TLV 0.1mg/M³

Properties: colorless liquid
Use: plasticizer, mixed with lubricating oils
Toxicity: mild skin and mucous membrane irritant; causes injury to the nervous system which usually occurs some time after exposure; may be permanent injury or may be transient
Hazard: minimal fire hazard

TRIPHENYL PHOSPHATE

TLV 3mg/M³

Properties: colorless, odorless, crystalline solid
Use: plasticizer
Toxicity: affects the central nervous system; causes paralysis; weak inhibitor of cholinesterase
Hazard: poorly flammable

TURPENTINE

TLV 100ppm

560mg/M³

Properties: colorless liquid with characteristic odor
Use: solvent; chemical products
Toxicity: irritant of mucous membranes; nausea, headaches, dizziness; can cause kidney injury; can cause lipid pneumonia
Hazard: moderate fire and explosive hazard

URANIUM (Insoluble compounds)

TLV 0.25mg/M³

Properties: crystals
Use: atomic energy, nuclear weapons, source for radium
Toxicity: can damage bone marrow and kidneys; radioactive-- can lead to increase in cancer of thyroid, lung, and leukemia
Hazard: moderate fire and explosive hazard in form of dust

URANIUM (soluble compounds)

TLV 0.05mg/M³

Properties: crystals
Use: used for staining glass, glazing ceramics, enamelling, in photographic processes and others
Toxicity: can damage bone marrow and kidneys; radioactivity can lead to increase in cancer of lung, thyroid, and leukemia
Hazard: depends upon compound

VANADIUM (V_2O_5 dust, V_2O_5 fume)		Dust TLV $0.5\text{mg}/\text{M}^3$ *($0.05\text{mg}/\text{M}^3$)	Fume TLV $0.1\text{mg}/\text{M}^3$ ($0.05\text{mg}/\text{M}^3$)
Properties:	yellow to red crystalline powder		
Use:	alloy for special steel, glass and ceramic glazes		
Toxicity:	irritant of mucous membranes; eyes, and lungs; can produce increase in lung infections; can produce greenish-black tongue, cough, paleness, and shortness of breath		
Hazard:	slight explosive hazard due to fine dust		
VINYL CHLORIDE		TLV STD 1910.1017 * (no exposure)	
Properties:	colorless liquid or gas, faintly sweet odor		
Use:	essential starting material for polyvinyl plastics, was used as propellant but now banned in US		
Toxicity:	causes cancer of liver (hemangiosarcoma) and possibly other organs; also produces narcosis and bone destruction of hands; possible reproductive effects, regulated carcinogen		
Hazard:	fire hazard if exposed to heat,		
VINYL TOLUENE		TLV 100ppm	$480\text{mg}/\text{M}^3$
Properties:	colorless liquid		
Use:	solvent, chemical intermediate		
Toxicity:	irritant to eyes and mucous membranes, chronic exposure can cause liver and kidney damage		
Hazard:	moderate fire hazard		
WARFARIN		TLV $0.1\text{mg}/\text{M}^3$	
Properties:	colorless, odorless, tasteless crystals		
Use:	rodenticide; anticoagulant medicine		
Toxicity:	reduces blood clotting and leads to bleeding (anti-coagulant)		
Hazard:	not flammable		
XYLENE (Xylol) (SKIN)		TLV 100ppm	$435\text{mg}/\text{M}^3$
Properties:	colorless liquid		
Use:	solvent, fuel, thinner; used in chemical synthesis		
Toxicity:	moderate irritant to skin and mucous membranes, moderate producer of narcosis; can affect bone marrow but slight as compared to benzene		
Hazard:	moderate fire hazard, commercial xylene may be contaminated with benzene		

XYLIDINE (SKIN) TLV 5ppm 25mg/M³

Properties: liquid
Use: used in the dye and rubber industries
Toxicity: readily absorbed through skin; potent methemoglobin producer; can cause damage to liver and breakage of red blood cells (hemolysis); considered a more insidious poison than aniline
Hazard: fire hazard if heated

YTTRIUM TLV 1mg/M³

Properties: gray-black metal
Use: used in smelting, refining, electronics, and glass industries
Toxicity: can produce scarring of lungs (pulmonary fibrosis); may act as an anticoagulant (decrease ability to clot blood)
Hazard: moderate fire hazard in form of dust when heated

ZINC CHLORIDE FUME TLV 1mg/M³

Properties: fumes from white crystals
Use: galvanizing; wood preservative, dry-cell batteries, oil refining
Toxicity: caustic irritant of mucous membranes, eyes, lungs and skin; can cause burns; can produce scarring of lungs
Hazard: compound produces fumes when heated

ZINC OXIDE FUMES TLV 5mg/M³

Properties: white or yellowish powder
Use: a seed disinfectant; fungicide; food additive to human and animal food; fumes occur when zinc is welded
Toxicity: causes metal fume fever which is characterized by fever, chills, nausea, vomiting and muscle aches which last from 24-48 hours; it is similar to viral infection of short duration; also there is a type of tolerance to it as once one has had the fever, it will not reoccur unless one is away from zinc oxide fumes for several weeks (also called zinc chills, brass founder's ague, etc.)
Hazard: see above

ZIRCONIUM COMPOUNDS (as Zr) TLV 5mg/M³

Properties: a gray-white shiny metal; also depends upon compound
Use: foundry sand, abrasive, ceramics, bricks, metal alloys
Toxicity: a low toxicity substance which can cause skin and lung infections (granulomata)
Hazard: depends upon compound

TERMSDEFINITIONS

Acute	Occurring immediately or over a short term (usually less than 24 hours)
Allergy	Hypersensitivity of body cells to a specific irritant (antigen) that results in specific reactions by the body, e.g., poison ivy, hay fever from pollen, etc.
Anemia	A condition in which the number or quality of red blood cells in the body is markedly reduced or altered
Anesthesia	Total loss of sensation, usually including loss of consciousness
Asphyxia	Unconsciousness from suffocation or lack of oxygen
Asthma	A disease of lungs in which the small air passages in the lungs are in spasm, making breathing difficult
Bronchitis	Infection of the air tubes (bronchi) causing increased mucous (phlegm) production and reducing breathing capacity
Byssinosis	Lung disease associated with raw cotton dust exposure
Cancer	Usually fatal disease which starts in one part and spreads to other parts of the body
Carcinogen	Any cancer-producing substance
Centimeter	One hundredth of a meter; equals 0.39 inches
Cholinesterase	A substance that regulates normal nerve and muscle actions
Cirrhosis	A liver disease in which there is scarring
Cholinesterase - inhibitor	An agent which interferes with the action of cholinesterase. Poisoning by chemicals that inhibit cholinesterase can produce effects that mimic the flu. Can also produce paralysis or death.
Chronic	Taking a long time to cause a disease; long-term

<u>TERM</u>	<u>DEFINITION</u>
CNS	Central nervous system, including the brain and spinal cord
Connective Tissue	Part of the body that holds the structures together, like ligaments, tendons, etc.
Contact Dermatitis	Dermatitis of the skin due to direct contact with an irritating substance
Convulsions	Violent, uncoordinated spasms of muscles (e.g., epilepsy)
Cumulative	Additive effects of a substance with long-term exposure
Dermatitis	Redness, cracking, itching, swelling of the skin
Dust	Fine, dry particles of a solid substance suspended in air, generated by grinding or crushing
Emphysema	A destructive lung disease
Fibrosis	The formation of scar tissue
Fume	Solid particles, condensed from gas formed by volatile molten metals
Gas	That state of matter which has no shape nor volume but will expand indefinitely to fill an enclosure. It can be changed to liquid or solid by increasing pressure and decreasing temperature
GI Tract	Gastro-intestinal tract, including mouth, esophagus, stomach, small intestine, and large intestine (colon)
Gram	One thousandth of a kilogram or 1/454 a pound
Hemoglobin	An oxygen-carrying part of the blood
Hepatitis	Liver disease
Inflammation	A condition of the body or a portion of the body characterized by swelling, redness, pain, and heat.
Irritant	Having an effect on outer layer of skin, mouth, lungs, throat, etc., which may cause burning, chapping, drying, or swelling
Jaundice	A yellow color of the skin and eyes; usually referred to as problem of liver

<u>TERM</u>	<u>DEFINITION</u>
Leukemia	A cancer of the white blood cells
Local	A chemical's effect which takes place at the point of contact
Metal Fume Fever	An acute disease with flu-like symptoms, caused by exposure to fumes from metals such as zinc and magnesium; symptoms can last 24 to 72 hours without apparent long-term effect (usually only workers new to a process or who have been away from it for awhile develop symptoms)
Methemoglobin	An altered state of the oxygen-carrying portion of the blood in which oxygen can no longer be carried effectively
mg/M ³	Milligrams per cubic meter of air
Micron	1/25,400 of an inch or 1/1,000,000 of a meter
Milligram	1/1,000 of a gram
Millimeter	1/10 of a centimeter, or 1/1,000 of a meter
Mist	Suspended liquid droplets generated by condensation from gaseous state or from liquid state by atomizing or splashing
MPPCF	Million particles per cubic foot of air
Mucous Membrane	The moist, soft covering of the nose, mouth, lining of eyes
Narcotic	Having an effect on the central nervous system, especially the brain, with such symptoms as giddiness, dizziness, headache, confusion, and in some cases, possibly coma or death
Nasal Septum	The cartilage just inside the opening of each nostril that keeps the nostrils separate
Parkinson's Disease	A disease of the nervous system characterized by shakes and stiffness in movement, leading to inability to coordinate movements; frequently fatal
Peripheral Nerve	The nerves of the body that are outside of the brain and spinal cord, like the nerves to the hand, foot, etc.

<u>TERM</u>	<u>DEFINITION</u>
Peripheral Neuritis	A diseased condition of the peripheral nerves with many causes
Pneumoconiosis	Disease of the lungs caused by inhalation of dusts; can be associated with scarring of the lungs
PPM	Parts per million
Pulmonary Edema	The lungs become so irritated that they fill with fluid (similar to a burn blister)
Respirable	Particles of dusts, fumes, etc., small enough to get into the lungs
Sensitization	An allergic condition (sensitivity reaction) that usually affects either the skin (dermatitis) or the lungs (asthma). Once exposure to a substance has caused a reaction, the individual is sensitized, and any further exposure will cause a reaction
Silicosis	A severe pneumoconiosis produced by silica dust
Solvent	A substance (liquid) capable of dissolving another
Systemic	A chemical's effect on the body which takes place somewhere other than the point of contact
TLV	Threshold Limit Value: An estimated concentration of exposure at which most healthy people suffer no illness
Toxic	Poisonous
Toxin	Poisonous substance
Toxicity	The degree to which a substance is poisonous
Toxicology	The study of poisons, or the poisonous effects of substances
Ulcer	Sore on the surface or the skin, mouth, nose, intestines or any other part of the body that has a surface
Vapor	Gaseous form of a substance which normally is in the liquid or solid phase
Volatile	A substance (liquid) that vaporizes quickly

REFERENCES

References for this compilation of TLV's are listed below.

Only major sources are listed:

Condensed Chemical Dictionary, Ed Hawley, 8th Ed, Van Nostrin, Randholt Co.

Dangerous Properties of Industrial Materials, N. Irving Sax, 4th Ed.,
1975, Litton Educational Publishing, Inc., New York

Documentation of the Threshold Limit Values for Substances in Workroom Air,
American Conference of Governmental Industrial Hygienists, Third Edition,
1971, and Supplements for Those Substances Added or Changed since 1971

Encyclopedia of Occupational Safety and Health, International Labor
Organization, Vols. I & II, 1974, McGraw-Hill, New York

Farm Chemical Handbook, from Farm Chemical Magazine, Willoughby, Ohio

Fire Protection Guide on Hazardous Materials, National Fire protection Agency,
6th Edition, Boston, Ma.

Industrial Hygiene and Toxicology, Edited by Frank Patty, 2nd Ed.,
Vol. II, 1963, Interscience Publishers, New York

Industrial Toxicology, Hamilton and Hardy, 3rd Ed., 1974, Publishing
Sciences Group, Inc., Acton, Mass.

The Pharmacological Basis of Therapeutics, Edited by Louis Goodman and
Alfred Gilman, 5th Ed., 1975, MacMillan Publishing Co., Inc.,
New York

Toxic & Hazardous Industrial Chemical Safety Manual, International Technical
Institute, Japan, 1975

Various articles in the medical literature

Various NIOSH Criteria Documents and Health Hazard Alerts

KEY TO PHOTOGRAPHS:

1. Foundry Workers
2. Welder: High Steel
3. Nurse
4. Printing Pressman
5. Farm Workers
6. Laundry Workers
7. Webb Press Operator

All Photographs
Copyright ©1976, 1977
KEN LIGHT

