Selected Chemicals Which Pose A Skin Absorption Hazard

The following listing contains common substances, which are listed in the 2019 TLV (Threshold Limit Values) Booklet by the American Conference of Governmental Industrial Hygienists (ACGIH) as having a "potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, either by contact with vapors, or, of probable greater significance, by direct skin contact with the substance."

The recommended airborne exposure limits (TLVs) for these materials is also listed. Please take special note of avoiding skin contact and using the proper glove and eye protection for each of the materials listed below, particularly those which also have a low TLV. Note that this listing is not all inclusive, does not address materials, which cause a direct irritant effect on the skin surface (acids, bases, etc), and does not address materials, which may cause allergic reactions or dermatitis due to skin contact. Consult the TLV term definitions at the end of the list. Please take special precautions in handling hydrofluoric acid (not listed below). Remember that some materials, which do not readily pass through the skin, may do so when mixed with a carrier, which is readily absorbed (e.g. DMSO) or may pass through skin through cuts, breaks, or other damage such as dermatitis. Please also note that materials listed below, or others, may be components of solvent mixtures, so be sure to read your MSDS and use proper skin protection.

Contact the Environmental Health and Safety Center at 515-6860 with additional questions you may have concerning skin protection.

	TWA		STEL/CEILING (C)	
SUBSTANCE	**ppm**	**mg/m3**	**ppm**	**mg/m3**
Acetone cyanohydrin	-	-	C 4.7 (1.4)	C 5
Acetonitrile	20	33.6	-	-
Acrolein	-	-	C 0.1	-
Acrylamide	-	0.03	-	-
Acrylic acid	2	5.9	-	-
Acrylonitrile	2	4.3	-	-
Adiponitrile	2	8.8	-	-
Aldicarb	-	0.005	-	-
Aldrin	-	0.05	-	-
Allyl alcohol	0.5	-	-	-
Allyl bromide	0.1	-	0.2	-
Allyl chloride	1	-	2	-
Allyl methacrylate	1	-	-	-
4-Aminodiphenyl	-	-	-	-
Ammonium perfluorooctanoate	-	0.01	-	-
Aniline and homologues	2	-	-	-
Anisidine (o- and p-isomers)	0.1	0.5	-	-
ANTU		-	0.3	-
Azinphos-methyl		-	0.2	-
Bendiocarb	-	0.1	-	-
Benzene	0.5	-	2.5	-
Benzidine	-	-	-	-
Benzotrichloride	-	-	C 0.1	-
Beryllium (soluble compounds)	-	0.00005	-	-
Bis (2-dimethylaminoethyl) ether (DMAEE)	0.05	-	0.15	-
n-Butylamine	-	-	C 5	C 15

	TWA		STEL/CEILING (C)	
SUBSTANCE	**ppm**	**mg/m3**	**ppm**	**mg/m3**
n-Butyl glycidyl ether (BGE)	3	-	-	-
tert-Butyl hydroperoxide	0.1	-	-	-
o-sec-Butylphenol	5	31	-	-
Cadusafos	0.001	-	-	-
Captafol	-	0.1	-	-
Carbaryl	-	0.5	-	-
Carbon disulfide	1	-	-	-
Carbon tetrachloride (Tetrachloromethane) 5	31	10	63	-
Catechol	5	22.5	-	-
Chlordane	-	0.5	-	-
Chlorinated camphene (Toxaphene)	-	0.5	-	1
Chloroacetone	-	-	C1	-
Chloroacetyl chloride	0.05	0.23	0.15	0.69
o-Chlorobenzylidene malononitrile	-	-	C 0.05	C 0.39
Chlorodiphenyl - 42% chlorine	-	1	-	-
Chlorodiphenyl - 54% Chlorine	-	0.5	-	-
B-Chloroprene	1	3.6	-	-
1-chloro-2-propanol	1	-	-	-
2-chloro-1-propanol	1	-	-	-
2-Chloropropionic acid	0.1	0.44	-	-
Chlorpyrifos	-	0.1	-	-
Hexavalent chromium, as Cr(VI)	-	0.0002	-	0.0005
Chromyl chloride, as Cr(VI)	0.0001	-	0.00025	-
Citral	5	-	-	-
Coumaphos	-	0.05	-	-
Cresol, all isomers	-	20	-	-
Crotonaldehyde	-	-	C 0.3	-

	TWA		STEL/CEILING (C)	
SUBSTANCE	**ppm**	**mg/m3**	**ppm**	**mg/m3**
Cyclohexanol	50	205	-	-
Cyclohexanone	20	80	50	-
Cyclonite	-	0.5	-	-
Decaborane	0.05	0.25	0.15	0.75
Demeton	-	0.05	-	-
Demeton-S-methyl	-	0.05	-	-
Diazinon	-	0.01	-	-
-	-	-	-	-
2-N-Dibutylaminoethanol	0.5	-	-	-
Dibutyl phenyl phosphate	0.3	-	-	-
Dibutyl phosphate	-	5	-	-
Dichloroacetic acid	0.5	-	-	-
3,3'-Dichlorobenzidine	-	-	-	-
1,4-Dichloro-2-butene	0.005	0.025	-	-
Dichloroethyl ether	5	29	10	58
1,3-Dichloroproene	1	4.5	-	-
Dichlorvos	-	0.1	-	-
Dicrotophos	-	0.05	-	-
Dieldrin	-	0.1	-	-
Diesel Fuel as total hydrocarbons	-	100	-	-
Diethanolamine	-	1	-	-
Diethylamine	5	15	15	45
2-Diethylaminoethanol	2	9.6	-	-
Diethylene triamine	1	4.2	-	-
Diisopropylamine	5	21	-	-
N, N-Dimethylacetamide	10	36	-	-
Dimethylaniline (N, N-	5	25	10	50
Dimethyl carbamoyl	0.005	-	-	-
Dimethyl disulfide	*0.5*	-	-	-
Dimethylformamide	5	15	-	-
1,1-Dimethylhydrazine	0.01	0.025	-	-
Dimethyl sulfate	0.1	0.52	-	-

SUBSTANCE	TWA ppm	TWA mg/m3	STEL/CEILING (C) ppm	STEL/CEILING (C) mg/m3
Dinitrobenzene (all-isomers)	0.15	1	-	-
Dinitro-o-cresol	-	0.2	-	-
Dinitrotoluene	-	0.2	-	-
1,4 Dioxane	20	-	-	-
Dioxathion	-	0.1	-	-
Diquat (ALL)	-	0.5	-	-
Diquat (Respirable Fraction)	-	0.1	-	-
Disulfoton	-	0.05	-	-
Endosulfan	-	0.1	-	-
Endrin	-	0.1	-	-
Epichlorohydrin	0.5	1.9	-	-
EPN	-	0.1	-	-
Ethion	-	0.05	-	-
2-Ethoxyethanol (EGEE)	5	18	-	-
2-Ethoxyethyl acetate (EGEEA)	5	27	-	-
Ethylamine	5	9.2	15	27.6
Ethyl bromide	5	22	-	-
Ethyl chloride	100	264	-	-
Ethylene chlorohydrin	-	-	C 1	C 3.3
Ethylenediamine	10	25	-	-
Ethylene dibromide	-	-	-	-
Ethylene glycol dinitrate	0.05	0.31	-	-
Ethylenimine	0.05	-	0.1	-
Ethyl isocyanate	0.02	-	0.06	-
N-Ethylmorpholine	5	24	-	-
Fenamiphos	-	0.0 5	-	-
Fensulfothion	-	0.01	-	-
Fenthion	-	0.05	-	-

	TWA		STEL/CEILING (C)	
SUBSTANCE	**ppm**	**mg/m3**	**ppm**	**mg/m3**
Fonofos	-	0.1	-	-
Formamide	10	18	-	-
Furfural	-	0.2	-	-
Furfuryl alcohol	-	0.2	-	-
Heptachlor and Heptachlor epoxide	-	0.05	-	-
Hexachlorobenzene	-	0.002	-	-
Hexachlorobutadiene	0.02	0.21	-	-
Hexachloroethane	1	9.7	-	-
Hexachloronaphthalene	-	-	0.2	-
Hexafluoroacetone	0.1	0.68	-	-
Hexamethyl phosphoramide	-	-	-	-
n-Hexane	50	-	-	-
Hydrazine	0.01	0.013	-	-
Hydrogen cyanide and Cyanide salts as CN:				
Hydrogen cyanide	-	-	C 4.7	-
Cyanide salts	-	-	-	C 5
Hydrogen fluoride	0.5	-	C2	-
2-Hydroxypropyl acrylate	0.5	2.7	-	-
Isoctyl alcohol	50	-	-	-
2-Isopropoxyethanol	25	106	-	-
N-Isopropylaniline	2	11	-	
Kerosene as total hydrocarbon vapor	-	200	-	-
Lindane	-	0.5	-	-
Malathion	-	1	-	
Manganese cyclopentadienyl tricarbonyl	-	0.1	-	-

SUBSTANCE	TWA ppm	TWA mg/m3	STEL/CEILING (C) ppm	STEL/CEILING (C) mg/m3
Mercury as Hg:				
Alkyl compounds	-	0.01	-	0.03
Aryl compounds	-	0.1		-
Elemental and inorganic forms	-	0.025	-	
Methanol	200	262	250	328
Methomyl	-	0.2	-	-
2-Methoxyethanol (EGME)	0.1	-	-	-
2-Methoxyethyl acetate (EGMEA)	0.1	-	-	-
(2-Methoxymethylethoxy) propanol (DPGME)	100	-	150	-
Methyl acrylate	2	7	-	-
Methylacrylonitrile	1	2.7	-	-
N-Methyl aniline	0.5	2.2	-	-
Methyl bromide	1	3.9	-	-
Methyl n-butyl ketone	5	-	10	-
Methyl chloride	50	103	100	207
o-Methylcyclohexanone	50	229	75	344
2-Methylcyclopentadienyl manganese tricarbonyl, asMn	-	0.2	-	-
Methyl demeton	-	0.05	-	-
4,4'-Methylene bis (2-chloroaniline) [MBOCA; MOCA®]	0.01	0.11	-	-
4,4'-Methylene dianiline	0.1	0.81	-	-
Methyl formate	50	-	100	-
Methyl hydrazine	0.01	0.019	-	-
Methyl iodide	2	12	-	-
Methyl isobutyl carbinol	25	104	40	167
Methyl isocyanate	0.02	0.047	0.05	-

SUBSTANCE	TWA ppm	TWA mg/m3	STEL/CEILING (C) ppm	STEL/CEILING (C) mg/m3
1-Methylnaphthalene/2-Methylnaphthalene 0.5	0.5	-	-	-
Methyl parathion	-	0.02	-	-
Methyltetrahydrophthalic anhyrdride isomers	0.07 ppb	-	0.3 ppb	-
Mevinphos	-	0.01	-	-
Monochloroacetic acid	0.5	-	-	-
Monocrotophos	-	0.05	-	-
Monomethylformamide	1	-	-	-
Morpholine	20	71	-	-
Naled	-	0.1	-	-
Napthalene	10	-	15	-
Natural rubber latex as total proteins	-	0.0001	-	-
Nicotine	-	0.5	-	-
p-Nitroaniline	-	3	-	-
Nitrobenzene	1	5	-	-
p-Nitrochlorobenzene	0.1	0.64	-	-
4-Nitrodiphenyl	-	-	-	-
Nitroglycerin (NG)	0.05	0.46	-	-
N-Nitrosodimethylamine	-	11	-	-
Nitrotoluene, All isomers	2	-	-	-
Octachloronaphthalene	-	0.1	-	0.3
Paraquat	-	0.05	-	-
Parathion	-	0.05	-	-
Pentachloronaphthalene	-	0.5	-	-
2,4-Pentanedione	25	-	-	2
Pentachlorophenol	-	0.5	-	1
Phenol	5	19	-	-
Phenyl isocyanate	0.005	-	0.015	-

SUBSTANCE	TWA ppm	TWA mg/m3	STEL/CEILING (C) ppm	STEL/CEILING (C) mg/m3
Phenothiazine	-	5	-	-
Phenyl glycidyl ether (PGE)	0.1	0.6	-	-
Phenylhydrazine	0.1	0.44	-	-
Phenyl mercaptan	0.1	0.05	-	-
Phorate	-	-	-	0.2
o-Phthalaldehyde	-	25 ug/100 cm^2	C0.1 ppb	-
Propargyl alcohol	1	2.3	-	-
Propylene glycol dinitrate	0.05	0.34	-	-
Phthalic anyhydride	-	0.002	-	0.005
Propylene glycol ethyl ether	50	-	200	-
Propyleneimine	0.2	-	0.4	-
Sodium fluoroacetate	-	0.05	-	-
Sulfotepp	-	0.1	-	-
Sulprofos	-	0.1	-	-
Temephos	-	1	-	-
Terbufos	-	0.01	-	-
1,1,2,2-Tetrachloroethane	1	6.9	-	-
Tetraethyl Lead	-	0.1	-	-
Tetraethyl Pyrophosphate (TEPP)	-	0.01	-	-
Tetrahydrofuran	50	147	100	295
Tetramethyl lead	-	0.15	-	-
Tetramethyl	0.5	2.8	-	-
Thallium, elemental and soluble compounds as TI	-	0.02	-	-
Thiacloprid	-	0.2	-	-
Thioglycolic acid	1	3.8	-	-
Tin-Organic compounds,	-	0.1	-	0.2
Toluene diisocyanate,	0.001	-	0.005	-

SUBSTANCE	TWA ppm	TWA mg/m3	STEL/CEILING (C) ppm	STEL/CEILING (C) mg/m3
o, m, or p-Toluidine	2	8.8	-	-
1,1,2-Trichloroethane	10	55	-	-
Trichloronaphthalene	-	5	-	-
1,2,3-Trichloropropane	0.005	-	-	-
Triethylamine	0.5	-	1	-
Trimellitic anhydride	-	0.0005	-	0.002
2,4,6-Trinitrotoluene	-	0.1	-	-
Triorthocresyl phosphate	-	0.02	-	-
Vinyl cyclohexene dioxide	0.1	0.57	-	-
m-Xylene aa‘-diamine	-	-	-	C0.018
Xylidine (mixed isomers)	0.5	2.5	-	-
Warfarin	-	0.01	-	-

TLV TERM DEFINITIONS

TWA The time-weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

STEL The concentration to which workers can be exposed continuously for a short period of time without suffering from 1) irritation, 2) chronic or irreversible tissue damage, or
3) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency, and provided that the daily TLV- TWA is not exceeded. It is not a separate independent exposure limit; rather, it supplements the time-weighted average where there are recognized acute effects from a substance whose toxic effects are primarily of a chronic nature. STELs are recommended only where toxic effects have been reported from high short-term exposures in either humans or animals.
A STEL is defined as a 15-minute TWA exposure, which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. Exposures above the TLV-TWA up to the STEL should not be longer than 15 minutes and should occur more than four times per day. There should be at least 60 minutes between successive exposures in this range. An averaging period other than 15 minutes may be recommended when this is warranted by observed biological effects.

Ceiling The concentration that should not be exceeded during any part of the working exposure.