Google Visualizza questa pagina in: Italiano Traduci Disattiva per: Inglese Opzioni ▼ ×



# OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary

Oct 11, 2023

**All OEHHA Acute, 8-hour and Chronic Reference Exposure Levels (RELs) as of August, 2020**

Documentation available in the Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments 2015 (Appendices A, B and C)

**OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary[1]**

| Substance | REL type[1] | Inhalation REL (ug/m$^3$) | Oral REL (ug/kg BW·day) | Hazard Index Target Organs | Species[2] |
|---|---|---|---|---|---|
| **Acetaldehyde (75-07-0)** | A | 470[5] | | Eyes; respiratory system (sensory irritation) | H |
| | 8 | 300[4,5] | | Respiratory system | R |
| | C | 140[4,5] | | Respiratory system | R |
| **Acrolein (107-02-8)** | A | 2.5[5] | | Eyes, respiratory system (sensory irritation) | H |
| | 8 | 0.7[5] | | Respiratory system | R |
| | C | 0.35[5] | | Respiratory system | R |
| **Acrylic Acid (79-10-7)** | A | 6,000 | | Respiratory system; eyes | R |
| **Acrylonitrile (107-13-1)** | C | 5[4] | | Respiratory system | R |
| **Ammonia (7664-41-7)** | A | 3200[4] | | Respiratory system; eyes | H |
| | C | 200 | | Respiratory system | H |
| **Arsenic (7440-38-2) & inorganic arsenic compounds (including arsine)** | A | 0.20[5] | | Development; cardiovascular system; nervous system | M |
| | 8 | 0.015[5] | | Development; cardiovascular system; nervous system; respiratory system; skin | H |
| | C | 0.015[5] | 0.0035[5] | *Inhalation & oral:* Development; cardiovascular system; nervous system; respiratory system; skin | H |
| **Benzene (71-43-2)** | A | 27 | | Developmental; Immune system; Hematologic system | M |
| | 8 | 3 | | Hematologic system | H |
| | C | 3 | | Hematologic system | H |
| **Benzyl Chloride(100-44-7)** | A | 240 | | Respiratory system; eyes | M, R |
| **Beryllium& beryllium compounds (7440-41-7)** | C | 0.007 | 2.0 | Inhalation: Respiratory system; immune system Oral: Alimentary system (Gastrointestinal tract) | H |
| **1-Bromopropane (106-94-5)** | A | 3300[4,5] | | Developmental | R |
| | 8 | 3.4[5] | | Nervous system; respiratory system | H |
| | C | 1.7[5] | | Nervous system; respiratory system | H |
| **Butadiene (106-99-0)** | A | 660[4,5] | | Development | M |
| | 8 | 9[4,5] | | Reproductive system | M |
| | C | 2[4,5] | | Reproductive system | M |
| **Cadmium & cadmium compounds (7440-43-9)** | C | 0.02 | 0.5 | Inhalation: Kidney; respiratory system Oral: kidney | H |
| **Carbon disulfide (75-15-0)** | A | 6,200 | | Reproductive/ Development; nervous system | R |
| | C | 800[4] | | Nervous system; reproductive system | H |
| **Carbon monoxide (630-08-0)** | A | 23,000 | | Cardiovascular system | H |
| **Carbonyl Sulfide (463-58-1)** | A | 660[5] | | Nervous system | R |
| | 8 | 10[4, 5] | | Nervous system | R |
| | C | 10[4, 5] | | Nervous system | R |
| **Caprolactam (105-60-2)** | A | 50 | | Eyes (sensory irritation) | H |
| | 8 | 7 | | Respiratory system | R |
| | C | 2.2 | | Respiratory system | R |
| **Carbon tetrachloride (56-23-5)** | A | 1,900 | | Alimentary system (liver); Reproductive/ Developmental; nervous system | R |
| | C | 40 | | Alimentary and nervous systems; development | GP |
| **Chlorinated dibenzo-p dioxins and dibenzofurans** **Unspeciated mixtures treated as 2,3,7,8-tetrachlorodibenzo-p-dioxin (1746-01-6)** | C | 0.00004 | 1 x 10$^{-5}$ | Inhalation and Oral: Alimentary (liver) reproductive, endocrine, respiratory, hematologic systems; development | R |
| **Chlorine (7782-50-5)** | A | 210 | | Respiratory system; eyes | H |
| | C | 0.2[4] | | Respiratory system | R |
| **Chlorine dioxide (10049-04-4)** | C | 0.6 | | Respiratory system | R |
| **Chlorobenzene (108-90-7)** | C | 1,000 | | Alimentary system (liver); kidney; reproductive system | R |
| **Chloroform (67-66-3)** | A | 150 | | Reproductive/ Developmental; respiratory system; nervous system | R |
| | C | 300 | | Alimentary system; kidney; development | R |
| **Chloropicrin (76-06-2)** | A | 29 | | Respiratory system; eyes | M |
| | C | 0.4[4] | | Respiratory system | M |
| **Chromic trioxide (as chromic acid mist)** | C | 0.002 | 20 | Inhalation: Respiratory system Oral: Hematologic system | H |
| **Chromium (hexavalent) (18540-29-9) & soluble hexavalent chromium compounds (except chromic trioxide)** | C | 0.2[4] | 20 | Inhalation: Respiratory system Oral: Hematologic system | R |
| **Chromium (trivalent) inorganic water-soluble compounds (Inhalation concentrations as µg Cr(III)/m$^3$)** | A | 0.48[5] | | Respiratory system | Ha |
| | 8 | 0.12[4,5] | | Respiratory system | R |
| | C | 0.06[4,5] | | Respiratory system | R |
| **Copper and compounds** | A | 100 | | Respiratory system | H |
| **Cresol mixtures (1319-77-3)** | C | 600 | | Nervous system | R |
| **Dichlorobenzene (1,4-) (106-46-7)** | C | 800 | | Nervous and respiratory; alimentary systems (liver); kidney | R |
| **Dichloroethylene (1,1) (75-35-4)** | C | 70 | | Alimentary system (liver) | GP |
| **Diesel Exhaust** | C | 5[3] | | Respiratory system | R |
| **Diethanolamine (111-42-2)** | C | 3 | | Respiratory and hematologic systems | R |
| **Dimethylformamide (N,N-) (68-12-2)** | C | 80 | | Alimentary (liver) and respiratory systems | H |
| **Dioxane (1,4-) (123-91-1)** | A | 3,000 | | Respiratory system; eyes | H |
| | C | 3,000 | | Alimentary system; kidney; cardiovascular system | R |
| **Epichlorohydrin (106-89-8)** | A | 1,300 | | Respiratory system; eyes | H |
| | C | 3 | | Respiratory system; eyes | R |
| **Epoxybutane (1,2-) (106-88-7)** | C | 20 | | Respiratory system; cardiovascular system | M |
| **Ethylbenzene(100-41-4)** | C | 2,000 | | Alimentary system (liver); kidney; endocrine system; development | M, R |
| **Ethyl chloride (75-00-3)** | C | 30,000 | | Development; alimentary system (liver) | M |
| **Ethylene dibromide (106-93-4)** | C | 0.8 | | Reproductive system | H |
| **Ethylene dichloride (107-06-2)** | C | 400 | | Alimentary system (liver) | R |
| **Ethylene glycol (107-21-1)** | C | 400 | | Respiratory system; kidney; development | H |
| **Ethylene glycol monobutyl ether (111-76-2)** | A | 4700 | | Eyes and respiratory system | H |
| | 8 | 164 | | Respiratory system | R |
| | C | 82 | | Respiratory system | R |
| **Ethylene glycol monoethyl ether acetate (111-15-9)** | A | 140 | | Reproductive/ Development; nervous system | R |
| | C | 300 | | Development | Rb |
| **Ethylene glycol monomethyl ether (109-86-4)** | A | 93 | | Reproductive/ Development | R |
| | C | 60 | | Reproductive system | Rb |
| **Ethylene glycol monomethyl ether acetate (110-49-6)** | C | 90 | | Reproductive system | Rb |
| **Ethylene oxide (75-21-8)** | C | 30 | | Nervous system | R |
| **Fluorides (except Hydrogen Fluoride - listed below separately)** | C | 13[4] | 40 | Inhalation: Bone and teeth; respiratory system Oral: Bone and teeth | H |
| **Formaldehyde (50-00-0)** | A | 55[5] | | Eyes (Sensory irritation) | H |
| | 8 | 9[5] | | Respiratory system | H |
| | C | 9[5] | | Respiratory system | H |
| **Glutaraldehyde (111-30-8)** | C | 0.08[4] | | Respiratory system | M |
| **Hexamethylene diisocyanate** (monomer, 822-06-0) | A | 0.3[5] | | Respiratory system | R |
| | 8 | 0.06[5] | | Respiratory system | H |
| | C | 0.03[5] | | Respiratory system | H |
| **Hexamethylene diisocyanate** (polyisocyanate mixtures, including, but not limited to isocyanurate (3779-63-3) and biuret (4035-89-6)) | A | 4.5[5] | | Respiratory system | R |
| | 8 | 0.8[5] | | Respiratory system | R |
| | C | 0.4[5] | | Respiratory system | R |
| **Hexane (n-)(110-54-3)** | C | 7000 | | Nervous system | H |
| **Hydrazine (302-01-2)** | C | 0.2 | | Alimentary system (liver); endocrine system | Ha |
| **Hydrogen chloride (7647-01-0)** | A | 2,100 | | Respiratory system; eyes | H |
| | C | 9 | | Respiratory system | H |
| **Hydrogen cyanide (74-90-8)** | A | 340 | | Nervous system | H |
| | C | 9 | | Nervous system; endocrine system; cardiovascular system | H |
| **Hydrogen fluoride (7664-39-3)** | A | 240 | | Respiratory system; eyes | H |
| | C | 14[4] | 40 | Inhalation: Bone and teeth; respiratory system (See "fluorides" summary) Oral: Bone and teeth | H |
| **Hydrogen selenide (7783-07-5)** | A | 5 | | Respiratory system; eyes | GP |
| **Hydrogen sulfide (7783-06-4)** | A | 42 | | Nervous system | H |
| | C | 10 | | Respiratory system | M |
| **Isophorone (78-59-1)** | C | 2,000 | | Development; alimentary system (liver) | R, M |
| **Isopropanol (67-63-0)** | A | 3,200 | | Eyes; respiratory system | H |
| | C | 7,000 | | Kidney; development | R, M |
| **Maleic anhydride (108-31-6)** | C | 0.7[4] | | Respiratory system | R,Ha, Mk |
| **Manganese (7439-96-5) & manganese compounds** | 8 | 0.17[4,5] | | Nervous system | H |
| | C | 0.09[4,5] | | Nervous system | H |
| **Mercury (7439-97-6) & inorganic mercury compounds** | A | 0.6[5] | | Nervous system; development | R |
| | 8 | 0.06[5] | | Nervous system; development; kidney | H |
| | C | 0.03[5] | 0.16[5] | Inhalation & Oral: Nervous system; development; kidney | H |
| **Methanol (67-56-1)** | A | 28,000 | | Nervous system | H |
| | C | 4,000[4] | | Development | M |
| **Methyl bromide (74-83-9)** | A | 3900 | | Nervous system; respiratory system; Reproductive/ development | H |
| | C | 5 | | Respiratory system; nervous system; development | R |
| **Methyl chloroform (71-55-6)** | A | 68,000 | | Nervous system | H |
| | C | 1000 | | Nervous system | Gb |
| **Methylene chloride (75-09-2)** | A | 14,000 | | Cardiovascular system; Nervous system | H |
| | C | 400 | | Cardiovascular system; nervous system | H |
| **Methylene dianiline(4,4'-) (101-77-9)** | C | 20 | | Eyes; alimentary system (liver) | GP |
| **Methylene diphenyl isocyanate (101-68-8) and polymeric methylene diphenyl diisocyanate (9016-87-9)** | A | 12[5] | | Respiratory system | R |
| | 8 | 0.16[5] | | Respiratory system | R |
| | C | 0.08[5] | | Respiratory system | R |
| **Methyl ethyl ketone (78-93-3)** | A | 13,000 | | Respiratory system; eyes | H |
| **Methyl isocyanate (624-83-9)** | C | 1 | | Respiratory system; reproductive system | R |
| **Methyl *t*-butyl ether (1634-04-4)** | C | 8,000 | | Kidney; eyes; alimentary system (liver) | R |
| **Naphthalene (91-20-3)** | C | 9 | | Respiratory system | H |
| **Nickel & nickel compounds (except nickel oxide for chronic inhalation exposures) (Inhalation concentrations as µg Ni/m3: oral dose as µg Ni/kg-day)** | A | 0.2[5] | | Immune system | M |
| | 8 | 0.06[5] | | Respiratory, immune systems | R |
| | C | 0.014[5] | 11[5] | *Inhalation:* Respiratory system; hematologic system *Oral:* Development | R |
| **Nickel oxide (1313-99-1) (Inhalation concentration as µg Ni/m3: oral dose as µg Ni/kg-day)** | C | 0.02[5] | 11[5] | *Inhalation:* Respiratory system *Oral:* Development | M R |
| **Nitric acid (7697-37-2)** | A | 86 | | Respiratory system | H |
| **Nitrogen dioxide (10102-44-0)** | A | 470 | | Respiratory system | H |
| **Ozone (10028-15-6)** | A | 180 | | Respiratory system; eyes | H |
| **Perchloroethylene (127-18-4)** (*syn.* Tetrachloroethylene)*[3]* | A | 20,000 | | Nervous system; respiratory system; eyes | H |
| | C | 35 | | Kidney; alimentary system (liver) | M |
| **Phenol (108-95-2)** | A | 5,800 | | Respiratory system; eyes | H |
| | C | 200 | | Alimentary system; cardiovascular system; kidney; nervous system | R |
| **Phosgene (75-44-5)** | A | 4 | | Respiratory system | R |
| **Phosphine (7803-51-2)** | C | 0.8 | | Respiratory system; alimentary system (liver); nervous system; kidney; hematologic system | M |
| **Phosphoric acid (7664-38-2)** | C | 7[4] | | Respiratory system | R |
| **Polychlorinated biphenyls (PCBs)** **Individual congeners evaluated using TEF methodology, relative to as 2,3,7,8-tetrachlorodibenzo-p-dioxin (see Appendix C in the TSD for Cancer Potency Factors** | C | - | - | *Inhalation & oral:* Alimentary (liver) reproductive, endocrine, respiratory, hematologic systems; development | R |
| **Phthalic anhydride (85-44-9)** | C | 20 | | Respiratory system | H |
| **Propylene(115-07-1)** | C | 3,000 | | Respiratory system | R |
| **Propylene glycol monomethyl ether (107-98-2)** | C | 7,000 | | Alimentary system (liver) | R |
| **Propylene oxide (75-56-9)** | A | 3,100 | | Respiratory system; eyes; reproductive/development | H |
| | C | 30 | | Respiratory system | R |
| **Selenium and selenium compounds (other than hydrogen selenide)** | C | 20 | 5 | Inhalation & oral: Alimentary system (liver); cardiovascular system; nervous system | H |
| **Silica (crystalline, respirable)** | C | 3[4] | | Respiratory system | H |
| **Sodium hydroxide (1310-73-2)** | A | 8 | | Respiratory system; eyes; skin | H |
| **Styrene (100-42-5)** | A | 21,000 | | Respiratory system; eyes; reproductive/development | H |
| | C | 900[4] | | Nervous system | H |
| **Sulfates** | A | 120 | | Respiratory system | H |
| **Sulfur dioxide (7446-09-5)** | A | 660 | | Respiratory system | H |
| **Sulfuric acid (7664-93-9) [& oleum, *acute only*]** | A | 120 | | Respiratory system | H |
| | C | 1 | | Respiratory system | Mk |
| **Toluene (108-88-3)** | A | 5,000 | | Respiratory, nervous systems; eyes | H |
| | 8 | 830 | | Eyes | H |
| | C | 420 | | Eyes | H |
| **Toluene diisocyanates: 2,4- (584-84-9)and 2,6- (91-08-7) isomers and mixed isomers (26471-62)** | A | 2[5] | | Respiratory system | H |
| | 8 | 0.015[5] | | Respiratory system | H |
| | C | 0.008[5] | | Respiratory system | H |
| **Trichloroethylene (79-01-6)** | C | 600 | | Nervous system; eyes | H |
| **Triethylamine (121-44-8)** | A | 2,800 | | Nervous system; eyes | H |
| | C | 200 | | Eyes | R |
| **Trimethylbenzenes (25551-13-7): 1,3,5- (108-67-8), 1,2,4- (95-63-6), 1,2,3-(526-73-8)** | A | 2400[4, 5] | | Nervous System | R |
| | 8 | 8[4, 5] | | Nervous system | R |
| | C | 4[4, 5] | | Nervous system | R |
| **Vanadium pentoxide(1314-62-1)** | A | 30 | | Respiratory system; eyes | H |
| **Vinyl acetate (108-05-4)** | C | 200 | | Respiratory system | R, M |
| **Vinyl chloride (75-01-4)** | A | 180,000 | | Nervous system; respiratory system; eyes | H |
| **Xylenes: technical mixture (1330-20-7) and o-xylene (95-47-6), m-xylene (108-38-3) and p-xylene (106-42-3) isomers.** | A | 22000 | | Nervous & respiratory systems; eyes | H |
| | C | 700 | | Nervous & respiratory systems; eyes | H |

Footnotes:

[1] REL types: A = acute, 8 = 8-hour, C = chronic. Exposure averaging time for acute RELs is 1 hour. For 8-hour RELs, the exposure averaging time is 8 hours, which may be repeated. Chronic RELs are designed to address continuous exposures for up to a lifetime: the exposure metric used is the annual average exposure.

[2] Species used in key study for REL development: D = dog; Gb = gerbil; GP = guinea pig; H = human; Ha = hamster; M = mouse; Mk = monkey; R = rat; Rb = rabbit

[3] These peer-reviewed chronic REL values were developed under the Toxic Air Contaminant (TAC) Program mandated by AB1807.

[4] REL based on benchmark dose (BMC) approach.

[5] REL developed using the revised methodology (OEHHA, 2008)].



CALIFORNIA ALL Your Actions Save Lives COVID-19 UPDATES

CALIFORNIA GRANTS PORTAL

IF CALLED CONSERVE



Copyright ©2024 OEHHA