SECTION B

NIOSH RELs AND GENERAL RECOMMENDATIONS FOR SAFETY AND HEALTH

This section contains three tables listing occupational hazards and the NIOSH RELs and general recommendations for safety and health. Table 1 lists chemical hazards, Table 2 presents physical hazards, and Table 3 contains industry, process, and work environment hazards. Health effects cited in Tables 1 and 2 are those generally associated with the hazard; they are for humans unless otherwise noted. Consult primary sources in Section A for definitive information. The Chemical Abstracts Service (CAS) number and the Registry of Toxic Effects of Chemical Substances (RTECS) number are included in Table 1 where appropriate.

Table 1.—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Acetaldehyde†	75-07-0 AB1925000	Ca (18 ppm LOQ)	Potential for cancer; eye, skin, and respiratory irritation; nasal tumors in animals; mutagenesis in vitro
Acetic acid†,‡	64-19-7 AF1225000	10 ppm (25 mg/m^3) TWA, 15 ppm (37 mg/m^3) STEL	Skin, eye, and mucous membrane irritation
Acetic anhydride†	108-24-7 AK1925000	5 ppm (20 mg/m^3) ceiling	Skin, eye, and respiratory irritation
Acetone‡ *Class: Ketones*§	67-64-1 AL3150000	250 ppm (590 mg/m^3) TWA	Narcosis; CNS depression; eye, nose, throat, and skin irritation
Acetone cyanohydrin *Class: Nitriles*§	75-86-5 OD9275000	1 ppm (4 mg/m^3) ceiling (15-min)	Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects resulting from dissociation of the compound to hydrogen cyanide
Acetonitrile *Class: Nitriles*§	75-05-8 AL7700000	20 ppm (34 mg/m^3) TWA	Eye, nose, and throat irritation from vapor; skin and eye irritation from liquid; nervous system effects
2-Acetylaminofluorene	53-96-3 AB9450000	Ca; use 29 CFR 1910.1014	Potential for cancer; tumors of the liver, bladder, lungs, pancreas, and skin in animals
Acetylene	74-86-2 AO9600000	2,500 ppm (2,662 mg/m^3) ceiling (15-min)	Asphyxia

Acetylene dichloride (see 1,2-Dichloroethylene)			
Acetylene tetrabromide (see Appendix III)	79-27-6 KI8225000		
Acetylsalicylic acid† (aspirin)	50-78-2 VO0700000	5 mg/m^3 TWA	Mucosal irritation, respiratory effects, internal bleeding
Acrolein†,‡	107-02-8 AS1050000	0.1 ppm (0.25 mg/m^3) TWA, 0.3 ppm (0.8 mg/m^3) STEL	Eye, nose, respiratory, and mucous membrane irritation
Acrylamide**	79-06-1 AS3325000	Ca; 0.03 mg/m^3 TWA (skin)	Potential for cancer, skin irritation, central and peripheral nervous system effects; reproductive effects and tumors of the lung, testes, thyroid, and adrenal glands in animals
Acrylic acid†	79-10-7 AS4375000	2 ppm (6 mg/m^3) TWA (skin)	Skin, eye, and respiratory irritation
Acrylonitrile‡ (vinylcyanide)	107-13-1 AT5250000	Ca; 1 ppm, 8-hr TWA, 10 ppm ceiling (15-min) (skin)	Brain tumors, lung and bowel cancer
Adiponitrile *Class: Nitriles*§	111-69-3 AV2625000	4 ppm (18 mg/m^3) TWA	Skin and eye irritation; respiratory, circulatory, and CNS effects in animals
Aldehydes§	††	See individual chemical	

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Aldrin‡,**	309-00-2 IO2100000	Ca; 0.25 mg/m³ TWA (skin) (0.15 mg/m³ LOQ)	Potential for cancer; tumors of the lungs, liver, thyroid, and adrenal glands in animals
Alkanes§	††	See individual chemical	
Allyl alcohol†‡	107-18-6 BA5075000	2 ppm (5 mg/m³) TWA (skin), 4 ppm (10 mg/m³) STEL	Upper respiratory irritation and burns of the eyes and skin
Allyl chloride**	107-05-1 UC7350000	1 ppm (3 mg/m³) TWA, 2 ppm (6 mg/m³) STEL Liver, kidney, and lung effects	
Allyl glycidyl ether** (AGE) *Class: Glycidyl ethers*§	106-92-3 RR0875000	5 ppm (22 mg/m³) TWA, 10 ppm (44 mg/m³) STEL (skin)	Skin and mucous membrane effects, dermatitis and eye irritation, possible hematopoietic and reproductive system effects
Allyl propyl disulfide†	2179-59-1 JO0350000	2 ppm (12 mg/m³) TWA, 3 ppm (18 mg/m³) STEL	Eye, nose, and upper respiratory irritation
α-Alumina (see Appendix III)			

Aluminum metal[†]	7429-90-5 BD0330000		
Total dust		10 mg/m^3 TWA	Lung changes that may lead to pulmonary fibrosis
Respirable fraction		5 mg/m^3 TWA	
Pyro powders		5 mg/m^3 TWA	
Welding fumes		5 mg/m^3 TWA	Respiratory and skin irritation
Soluble salts		2 mg/m^3 TWA	Skin irritation
Alkyls		2 mg/m^3 TWA	Skin irritation
4-Aminodiphenyl	92-67-1 DU8925000	Ca; use 29 CFR 1910.1011	Bladder cancer
2-Aminoethanol (see Ethanolamine)			
2-Aminopyridine[†,‡]	504-29-0 US1575000	0.5 ppm (2 mg/m^3) TWA	CNS excitation, convulsions, severe acute effects
Amitrole[†,‡]	61-82-5 XZ3850000	Ca; 0.2 mg/m^3, 8-hr TWA	Potential for cancer; tumors of the thyroid and pituitary glands in animals
Ammonia[‡,**]	7664-41-7 BO0875000	25 ppm (18 mg/m^3) TWA, 35 ppm (27 mg/m^3) STEL	Respiratory and eye irritation
Ammonium chloride fume[†]	12125-02-9 BP4550000	10 mg/m^3 TWA, 20 mg/m^3 STEL	Skin and respiratory irritation

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[*]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[**]REL revised during OSHA hearings (Appendix IV).
[††]CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Ammonium sulfamate†‡	7773-06-0 WO6125000		Eye and nose irritation, interference with vision
Total dust		10 mg/m³ TWA	
Respirable dust		5 mg/m³ TWA	
n-Amyl acetate†	628-63-7 AJ1925000	100 ppm (525 mg/m³) TWA	Acute irritation of the eyes and upper respiratory tract, possible CNS depression, chronic skin irritation
sec-Amyl acetate†	626-38-0 AJ2100000	125 ppm (650 mg/m³) TWA	Eye and upper respiratory irritation; possible CNS depression (narcosis); lung, liver, and kidney injury
Aniline and homologs	62-53-3 BW6650000	Ca; lowest feasible concentration	Potential for cancer; tumors of the spleen in animals
o-Anisidine†	90-04-0 BZ5410000	Ca; 0.5 mg/m³ TWA (skin)	Potential for cancer; tumors of the bladder, thyroid, and kidneys in animals
p-Anisidine†	104-94-9 BZ5450000	0.5 mg/m³ TWA (skin)	CNS, blood, urogenital system, liver, and skin effects
Antimony	7440-36-0 CC4025000	0.5 mg/m³ TWA	Irritation, cardiovascular and lung effects
α-Naphthylthiourea† (ANTU)	86-88-4 YT9275000	0.3 mg/m³ TWA	Drug rashes, decrease in white blood cells, pulmonary edema

Arsenic, inorganic[§]	7440-38-2 CG0525000	Ca; 0.002 mg/m^3 ceiling (15-min)	Lung and lymphatic cancer, dermatitis
Arsine	7784-42-1 CG6475000	Ca; 0.002 mg/m^3 ceiling (15-min)	Cancer, sudden extensive hemolysis
Asbestos[§]	1332-21-4 CI6475000	Ca; 0.1 fiber/cc in a 400-liter air sample (fibers >5 μm long), 100-min TWA; (use 29 CFR 1910.1001)	Lung cancer, mesothelioma, asbestosis
Asphalt fumes[**]	8052-42-4 CI9900000	Ca; 5 mg/m^3 ceiling (15-min) measured as total particulates	Potential for cancer; tumors of the skin in animals; eye and respiratory tract irritation
Atrazine[†,‡]	1912-24-9 XY5600000	5 mg/m^3 TWA	Primary eye and skin irritation; ingestion can cause ataxia, dyspnea, and convulsions in animals
Azinphos-methyl (Guthion®)[†,‡]	86-50-0 TE1925000	0.2 mg/m^3 TWA (skin)	Cholinesterase inhibition after metabolic activation
Barium,[†] soluble compounds	7440-39-3 CQ8370000	0.5 mg/m^3 TWA	Eye, mucous membrane, and skin irritation
Barium sulfate[†]	7727-43-7 CR0600000		Eye, nose, and upper respiratory irritation; pneumoconiosis
Total dust		10 mg/m^3 TWA	
Respirable fraction		5 mg/m^3 TWA	

[*]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[**]REL revised during OSHA hearings (Appendix IV).

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Benomyl‡ (see Appendix III)	17804-35-2 DD6475000		
Benzene	71-43-2 CY1400000	Ca; 0.1 ppm (0.32 mg/m^3), 8-hr TWA, 1 ppm (3.2 mg/m^3) ceiling (15-min)	Cancer (leukemia)
Benzenethiol (phenyl mercaptan) *Class: Thiols*§	108-98-5 DC0525000	0.1 ppm (0.5 mg/m^3) ceiling	Eye and skin irritation, blood and nervous system effects
Benzidine	92-87-5 DC9625000	Ca; use 29 CFR 1910.1010	Bladder, liver, and kidney cancer
Benzidine-based dyes	††	Ca; lowest feasible concentration	Bladder cancer
Benzo(a)pyrene (see Coal tar pitch volatiles)			
p-Benzoquinone (see Quinone)			
Benzoyl peroxide	94-36-0 DM8575000	5 mg/m^3 TWA	Respiratory and eye irritation, skin effects
Benzyl chloride	100-44-7 XS8925000	1 ppm (5 mg/m^3) ceiling (15-min)	Eye and skin irritation

Beryllium[§]	7440-41-7 DS1750000	Ca; not to exceed 0.0005 mg/m^3	Lung cancer, berylliosis
Biphenyl (see Diphenyl)			
Bismuth telluride,[†] Se-doped	1304-82-1 EB3110000	5 mg/m^3 TWA	Pulmonary lesions in animals
Bismuth telluride,[†] undoped	1304-82-1 EB3110000		Skin and eye irritation
Total dust		10 mg/m^3 TWA	
Respirable fraction		5 mg/m^3 TWA	
Borates,[†] tetra sodium salts			Skin, eye, and upper respiratory irritation;
Anhydrous	1303-43-4 VZ224000	1 mg/m^3 TWA	possible shortness of breath and nose bleeds
Decahydrate	1303-96-4 VZ2275000	5 mg/m^3 TWA	
Pentahydrate	12179-04-3 VZ2540000	1 mg/m^3 TWA	
Boron oxide,[†] total dust	1303-86-2 ED7900000	10 mg/m^3 TWA	Eye and respiratory irritation
Boron tribromide[†]	10294-33-4 ED7400000	1 ppm (10 mg/m^3) ceiling	Pulmonary damage
Boron trifluoride[†]	7637-07-2 ED2275000	1 ppm (3 mg/m^3) ceiling	Severe irritation of the lungs, eyes, and skin

[*]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[††]CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Bromacil[†,‡]	314-40-9 YQ9100000	1 ppm (10 mg/m^3) TWA	Eye irritation; thyroid damage in animals
Bromine[†]	7726-95-6 EF9100000	0.1 ppm (0.7 mg/m^3) TWA, 0.3 ppm (2 mg/m^3) STEL	Severe irritation of the eyes, mucous membranes, lungs, and skin
Bromine pentafluoride[†]	7789-30-2 EF9350000	0.1 ppm (0.7 mg/m^3) TWA	Skin irritation, corneal necrosis
Bromoform[†]	75-25-2 PB5600000	0.5 ppm (5 mg/m^3) TWA (skin)	Respiratory irritation, CNS depression
1,3-Butadiene	106-99-0 EI9275000	Ca; lowest feasible concentration (0.19 ppm LOQ)	Hematopoietic cancer, teratogenic and reproductive effects
Butane[†]	106-97-8 EI4200000	800 ppm (1,900 mg/m^3) TWA	Drowsiness and other narcotic effects
1-Butanethiol (butyl mercaptan) *Class: Thiols*[§]	109-79-5 EK6300000	0.5 ppm (1.8 mg/m^3) ceiling (15-min)	Eye and skin irritation, blood and nervous system effects
2-Butanone (see Methyl ethyl ketone [MEK])			
2-Butoxyethanol (see Ethylene glycol monobutyl ether) (EGBE)			

2-Butoxyethyl acetate (see Ethylene glycol monobutyl ether acetate)(EGBEA)			
n-Butyl acetate†	123-86-4 AF7350000	150 ppm (710 mg/m^3) TWA, 200 ppm (950 mg/m^3) STEL	Mucous membrane and eye irritation; high concentrations cause nervous system effects in animals
sec-Butyl acetate†	105-46-4 AF7380000	200 ppm (950 mg/m^3) TWA	Eye and respiratory irritation, CNS depression
tert-Butyl acetate†	540-88-5 AF7400000	200 ppm (950 mg/m^3) TWA	Eye and throat irritation, CNS depression
Butyl acrylate†	141-32-2 UD3150000	10 ppm (55 mg/m^3) TWA	Eye and skin irritation
n-Butyl alcohol†	71-36-3 EO140000	50 ppm (150 mg/m^3) ceiling (skin)	Eye and mucous membrane irritation, CNS depression
sec-Butyl alcohol†	78-92-2 EO1750000	100 ppm (305 mg/m^3) TWA, 150 ppm (455 mg/m^3) STEL	Eye and skin irritation; narcosis in animals
tert-Butyl alcohol†,‡	75-65-0 EO1925000	100 ppm (300 mg/m^3) TWA, 150 ppm (450 mg/m^3) STEL	Narcosis in animals
Butylamine†	109-73-9 EO2975000	5 ppm (15 mg/m^3) ceiling (skin)	Eye, mucous membrane, and skin irritation

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
tert-Butyl chromate *Class: Chromium*[§], *hexavalent*	1189-85-1 GB2900000	Ca; 0.001 mg/m^3 TWA	Lung cancer, skin ulcers, lung irritation
Butyl glycidyl ether (BGE) *Class: Glycidyl ethers*[§]	2426-08-6 TX4200000	5.6 ppm (30 mg/m^3) ceiling (15-min)	Skin and mucous membrane effects, sensitization potential, possible hematopoietic effects
n-Butyl lactate[†]	138-22-7 OD4025000	5 ppm (25 mg/m^3) TWA	Headache, irritation of the pharyngeal and laryngeal mucosa
Butyl mercaptan (see 1-Butanethiol)			
o-sec-Butylphenol[†]	89-72-5 SJ8920000	5 ppm (30 mg/m^3) TWA (skin)	Skin, eye, and respiratory irritation; skin burns
p-tert-Butyltoluene[†]	98-51-1 XS8400000	10 ppm (60 mg/m^3) TWA, 20 ppm (120 mg/m^3) STEL	Mucous membrane irritation
n-Butyronitrile *Class: Nitriles*[§]	109-74-0 ET8750000	8 ppm (22 mg/m^3) TWA	Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects
Cadmium,[§] dust and fume	7440-43-9 EU9800000	Ca; lowest feasible concentration (0.01 mg/m^3 LOQ)	Lung cancer, prostatic cancer, renal system effects

Calcium carbonate[†]	1317-65-3 EV9580000		Moderate skin irritation, severe eye irritation
Total dust		10 mg/m^3 TWA	
Respirable fraction		5 mg/m^3 TWA	
Calcium cyanamide[†,‡]	156-62-7 GS6000000	0.5 mg/m^3 TWA	Eye, skin, and lung irritation
Calcium hydroxide[†]	1305-62-0 EW2800000	5 mg/m^3 TWA	Caustic irritation of all exposed body surfaces and the respiratory tract
Calcium oxide[†]	1305-78-8 EW3100000	2 mg/m^3 TWA	Eye, mucous membrane, and skin irritation
Calcium silicate[†]	1344-95-2 VV9150000		Physical irritation
Total dust		10 mg/m^3 TWA	
Respirable fraction		5 mg/m^3 TWA	
Calcium sulfate[†]	7778-18-9 WS6920000		Physical irritation
Total dust		10 mg/m^3 TWA	
Respirable fraction		5 mg/m^3 TWA	
Camphor, synthetic[†,‡]	76-22-2 EX1225000	2 mg/m^3 TWA	Eye, skin, and mucous membrane irritation; CNS effects

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Caprolactam†	105-60-2 CM3675000		Convulsions, dermal and respiratory irritation, dermal sensitization
Dust		1 mg/m^3 TWA, 3 mg/m^3 STEL	
Vapor		0.22 ppm (1 mg/m^3) TWA, 0.66 ppm (3 mg/m^3) STEL	
Captafol†,‡ (Difolatan®)	2425-06-1 GW4900000	Ca; 0.1 mg/m^3 TWA (skin)	Potential for cancer; skin and respiratory irritation; cancers in mice
Captan†,‡	133-06-2 GW5075000	Ca; 5 mg/m^3 TWA	Potential for cancer; duodenal tumors in animals
Carbaryl‡ (Sevin®)	63-25-2 FC5950000	5 mg/m^3 TWA; minimize exposure during pregnancy	CNS and reproductive effects
Carbofuran†,‡ (Furadan®)	1563-66-2 FB9450000	0.1 mg/m^3 TWA	Anticholinesterase agent
Carbon black	1333-86-4 FF5800000	3.5 mg/m^3 TWA; In presence of PAHs: Ca; limit PAHs to 0.1 mg/m^3 TWA (determined as cyclohexane extractable fraction)	Lung, cardiovascular, and skin effects; cancer of the lymphatic/bone-marrow complex when workers are exposed to carbon black in the presence of PAHs
Carbon dioxide**	124-38-9 FF6400000	5,000 ppm (9,000 mg/m^3) TWA, 30,000 ppm (54,000 mg/m^3) STEL	Respiratory effects

Carbon disulfide[‡,**]	75-15-0 FF6650000	1 ppm (3 mg/m^3) TWA (skin), 10 ppm (30 mg/m^3) STEL (skin)	Cardiovascular, CNS, and reproductive effects
Carbon monoxide	630-08-0 FG3500000	35 ppm (40 mg/m^3) 8-hr TWA, 200 ppm (229 mg/m^3) ceiling	Cardiovascular effects
Carbon tetrabromide[†]	558-13-4 FG4725000	0.1 ppm (1.4 mg/m^3) TWA, 0.3 ppm (4 mg/m^3) STEL	Eye, skin, lung, and kidney irritation; severe liver toxicity
Carbon tetrachloride[‡,**] (tetrachloromethane)	56-23-5 FG4900000	Ca; 2 ppm (12.6 mg/m^3) STEL (60-min)	Liver cancer
Carbonyl fluoride[†]	353-50-4 FG6125000	2 ppm (5 mg/m^3) TWA, 5 ppm (15 mg/m^3) STEL	Toxic effects from the liberation of fluoride by hydrolysis
Catechol[†] (pyrocatechol)	120-80-9 UX1050000	5 ppm (20 mg/m^3) TWA (skin)	CNS depression; liver, respiratory, and renal effects
Cellulose[†]	9004-34-6 FJ5691460		Eye, skin, and physical irritation
Total dust Respirable fraction		10 mg/m^3 TWA 5 mg/m^3 TWA	
Cesium hydroxide[†]	21351-79-1 FK9800000	2.0 mg/m^3 TWA	Skin, eye, and respiratory irritation
Cetylmercaptan (see 1-Hexadecanethiol)			

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[*]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[**]REL revised during OSHA hearings (Appendix IV).

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Chlordane†‡	57-74-9 PB9800000	Ca; 0.5 mg/m³ TWA (skin)	Potential for cancer, CNS effects (e.g., irritability, tremors, and convulsions), skin and mucous membrane irritation, kidney and nerve damage; liver cancer in animals
Chlorinated camphene†	8001-35-2 XW5250000	Ca; lowest feasible concentration (skin) (0.01 mg/m³ LOQ)	Potential for cancer, skin irritation, strong CNS stimulation; cancer in animals
Chlorinated diphenyl oxide†	55720-99-5 KO4200000	0.5 mg/m³ TWA	Skin irritation, dermatitis; liver damage in animals
Chlorine‡	7782-50-5 FO2100000	0.5 ppm (1.45 mg/m³) ceiling (15-min)	Severe eye, mucous membrane, and skin irritation
Chlorine dioxide†‡	10049-04-4 FO3000000	0.1 ppm (0.3 mg/m³) TWA, 0.3 ppm (0.9 mg/m³) STEL	Severe respiratory and eye irritation
Chlorine trifluoride†	7790-91-2 FO2800000	0.1 ppm (0.4 mg/m³) ceiling	Severe eye, respiratory, and skin irritation
Chloroacetaldehyde†	107-20-0 AB2450000	1 ppm (3 mg/m³) ceiling	Throat, nose, and lung irritation; severe eye irritation; skin burns
α-Chloroacetophenone† (phenacyl chloride)	532-27-4 AM6300000	0.05 ppm (0.3 mg/m³) TWA	Eye and upper respiratory irritation, possible conjunctivitis and corneal damage
Chloroacetyl chloride†	79-04-9 AO6475000	0.05 ppm (0.2 mg/m³) TWA	Skin and respiratory irritation

Chlorobenzene (see Appendix III)	108-90-7 CZ0175000		
o-Chlorobenzylidene malononitrile†	2698-41-1 OO3675000	0.05 ppm (0.4 mg/m^3) ceiling (skin)	Eye and respiratory irritation
Chlorobromomethane†	74-97-5 PA5250000	200 ppm (1,050 mg/m^3) TWA	Narcotic effects, eye and respiratory irritation
2-Chloro-1,3-butadiene (see ß-Chloroprene)			
Chlorodifluoromethane†	75-45-6 PA6390000	1,000 ppm (3,500 mg/m^3) TWA, 1,250 ppm (4,375 mg/m^3) STEL	Asphyxia; chronic changes in the lungs, CNS, liver, kidneys, and spleen
Chlorodiphenyl (42% chlorine) (Aroclor 1242) *Class: Polychlorinated biphenyls*§	53469-21-9 TQ1356000	Ca; 0.001 mg/m^3 TWA	Potential for cancer, skin, liver, and reproductive effects; tumors of the liver and pituitary gland and leukemias in animals
Chlorodiphenyl (54% chlorine) (Aroclor 1254) *Class: Polychlorinated biphenyls*§	11097-69-1 TQ1360000	Ca; 0.001 mg/m^3 TWA	Potential for cancer and skin, liver, and reproductive effects; tumors of the liver and pituitary gland and leukemias in animals
1-Chloro-2,3-epoxypropane (see Epichlorohydrin)			

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Chloroethanes[§]	††	See individual chemical	
2-Chloroethanol (see Ethylene chlorohydrin)			
Chloroethylene (see Vinyl chloride)			
Chloroform[‡,••] (trichloromethane)	67-66-3 FS9100000	Ca; 2 ppm (9.78 mg/m^3) STEL (60-min)	Potential for cancer, CNS effects; cancer of the liver and kidneys in animals
bis(Chloromethyl) ether	542-88-1 KN1575000	Ca; use 29 CFR 1910.1008	Lung cancer
Chloromethyl methyl ether (methyl chloromethyl ether)	107-30-2 KN6650000	Ca; use 29 CFR 1910.1006	Potential for cancer; skin and lung cancer in animals
1-Chloro-1-nitropropane[†]	600-25-9 TX5075000	2 ppm (10 mg/m^3) TWA	Pulmonary irritation; liver, kidney, and heart damage in animals
Chloropentafluoroethane[†]	76-15-3 KH7877500	1,000 ppm (6,320 mg/m^3) TWA	Cardiotoxicity; skin, CNS, and respiratory effects
Chloropicrin[†,‡] (nitrotrichloromethane)	76-06-2 PB6300000	0.1 ppm (0.7 mg/m^3) TWA	Severe eye, skin, and respiratory irritation
ß-Chloroprene (2-chloro-1,3-butadiene)	126-99-8 EI9625000	Ca; 1 ppm (3.6 mg/m^3) ceiling	Lung and skin cancer, reproductive effects

o-Chlorostyrene[†]	2039-87-4 WL4160000	50 ppm (285 mg/m^3) TWA, 75 ppm (430 mg/m^3) STEL	Liver and kidney changes
o-Chlorotoluene[†]	95-49-8 XS9000000	50 ppm (250 mg/m^3) TWA, 75 ppm (375 mg/m^3) STEL	Moderate skin and eye irritation
2-Chloro-6-trichloromethyl pyridine[†]	1929-82-4 US7525000		
Total dust		10 mg/m^3 TWA, 20 mg/m^3 STEL	
Respirable fraction		5 mg/m^3 TWA	
Chlorpyrifos[†,‡]	2921-88-2 TF63000000	0.2 mg/m^3 TWA, 0.6 mg/m^3 STEL (skin)	Depression of plasma cholinesterase
Chromic acid[‡]	7738-94-5 GB2450000	Ca; carcinogenic Cr(VI), 0.001 mg Cr(VI)/m^3 10-hr TWA	Lung cancer, skin ulcers, and lung irritation
Chromium, hexavalent[§] [Cr(VI)]	18540-29-9 GB6262000	Ca; carcinogenic Cr(VI), 0.001 mg/m^3 10-hr TWA	Lung cancer
Chromium(II) compounds[†]	22541-79-3 GB6260000	0.5 mg/m^3 TWA	Low-order toxicity
Chromium(III) compounds[†]	16065-83-1 GB6261000	0.5 mg/m^3 TWA	Low-order toxicity

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[•]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[••]REL revised during OSHA hearings (Appendix IV).
[††]CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Chromium metal†	7440-47-3 GB4200000	0.5 mg/m^3 TWA	Pulmonary effects
Chromyl chloride *Class: Chromium, hexavalent*§	14977-61-8 GB5775000	Ca; 0.001 mg/m^3 TWA [Cr(VI)]	Respiratory cancer
Chrysene	218-01-9 GC0700000	Ca; lowest feasible concentration	Liver and skin cancer
Clopidol†	2971-90-6 UU7711500		Eye and skin irritation
Total dust		10 mg/m^3 TWA, 20 mg/m^3 STEL	
Respirable fraction		5 mg/m^3 TWA	
Coal dust (<5% SiO_2) (see Appendix III)	††		
Coal dust (>5% SiO_2) (see Appendix III)	††		
Coal tar pitch volatiles‡ *Class: Coal tar products*§	65996-93-2 GF8655000	Ca; 0.1 mg/m^3 TWA (cyclohexane extractable fraction)	Lung and skin cancer
Cobalt metal,† dust, and fume *Class: Cobalt*§	7440-48-4 GF8750000	0.05 mg/m^3 TWA	Dermatitis, potential for pulmonary fibrosis

Cobalt carbonyl[†] *Class: Cobalt*[§]	10210-68-1 GG0300000	0.1 mg/m^3 TWA	Respiratory irritation
Cobalt hydrocarbonyl[†] *Class: Cobalt*[§]	16842-03-8 GG0900000	0.1 mg/m^3 TWA	Respiratory irritation
Coke oven emissions	†† GH0346000	Ca; 0.5–0.7 mg/m^3 (total particulates as screening level)	Lung and bladder cancer
Copper[†]	7440-50-8 GL5325000		Upper respiratory irritation
Fume		0.1 mg/m^3 TWA	
Dusts and mists		1 mg/m^3 TWA	
Cotton dust	†† GN2275000	Lowest feasible concentration (<0.2 mg/m^3 lint-free cotton dust)	Pulmonary disease (byssinosis)
Crag® herbicide[†] (Sesone)	136-78-7 KK4900000		Eye and skin irritation; liver and kidney damage; dust causes nervous system effects and convulsions in animals
Total dust		10 mg/m^3 TWA	
Respirable fraction		5 mg/m^3 TWA	

[•]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[††]CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Cresol‡, all isomers	1319-77-3 GO5950000	2.3 ppm (10 mg/m^3) TWA	Skin, liver, kidney, and pancreas effects
m-Cresol	108-39-4 606125000		
o-Cresol	95-48-7 606300000		
p-Cresol	106-44-5 606475000		
Crotonaldehyde†	123-73-9 GP9625000	2 ppm (6 mg/m^3) TWA	Eye and respiratory irritation
Crufomate†,‡	299-86-5 TB3850000	5 mg/m^3 TWA, 20 mg/m^3 STEL	Neurotoxicity, cholinesterase inhibition
Cumene†	98-82-8 GR8575000	50 ppm (245 mg/m^3) TWA (skin)	Eye, skin, and upper respiratory irritation
Cyanamide†	420-04-2 GS5950000	2 mg/m^3 TWA	Skin irritation
Cyanides *Class: Hydrogen cyanide and cyanide salts*§	††	4.7 ppm (5 mg/m^3) ceiling (10-min)	Thyroid, blood, and respiratory effects
Cyanogen†	460-19-5 GT1925000	10 ppm (20 mg/m^3) TWA	Respiratory and eye irritation

Cyanogen chloride[†,‡]	506-77-4 GT2275000	0.3 ppm (0.6 mg/m^3) ceiling	Severe eye and pulmonary irritation
Cyclohexane[†,‡]	110-82-7 GU6300000	300 ppm (1,050 mg/m^3) TWA	Local irritation and CNS depression
Cyclohexanethiol (cyclohexylmercaptan)	1569-69-3 GV7525000	0.5 ppm (2.4 mg/m^3) ceiling	Irritation; eye, skin, blood, and nervous system effects
Cyclohexanol[†]	108-93-0 GV7875000	50 ppm (200 mg/m^3) TWA (skin)	Eye, nose, throat, and skin irritation; narcotic effect at high concentrations
Cyclohexanone[‡,**] *Class: Ketones*[§]	108-94-1 GW1050000	25 ppm (100 mg/m^3) TWA (skin)	Irritation; liver, kidney, and nervous system effects
Cyclohexene[†]	110-83-8 GW2500000	300 ppm (1,015 mg/m^3) TWA	Mild respiratory irritation, CNS depression
Cyclohexylamine[†]	108-91-8 GX0700000	10 ppm (40 mg/m^3) TWA	Severe skin and eye irritation and sensitization
Cyclohexylmercaptan (see Cyclohexanethiol)			
Cyclonite[†]	121-82-4 XY9450000	1.5 mg/m^3 TWA, 3 mg/m^3 STEL (skin)	Neurotoxicity

[*]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[**]REL revised during OSHA hearings (Appendix IV).
[††]CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Cyclopentadiene†	542-92-7 GY1000000	75 ppm (200 mg/m^3) TWA	Eye and nose irritation
Cyclopentane†	287-92-3 GY2390000	600 ppm (1,720 mg/m^3) TWA	CNS depression, skin irritation
Cyhexatin†,‡	13121-70-5 WH8750000	5 mg/m^3 TWA	Skin, eye, and respiratory irritation
2,4,-D† (dichlorophenoxyacetic acid)	94-75-7 AG6825000	10 mg/m^3 TWA	Skin irritation, CNS effects
DDT (dichlorodiphenyl-trichloroethane)	50-29-3 KJ3325000	Ca; 0.5 mg/m^3 TWA (0.1 mg/m^3 LOQ)	Potential for cancer; liver, lung, and lymphatic tumors in animals
Decaborane†	17702-41-9 HD1400000	0.05 ppm (0.3 mg/m^3) TWA (skin), 0.15 ppm (0.9 mg/m^3) STEL (skin)	Nervous system effects and narcosis; liver and kidney effects in animals
1-Decanethiol (decylmercaptan) *Class: Thiols*§	143-10-2 ††	0.5 ppm (3.6 mg/m^3) ceiling	Eye and skin irritation; blood and nervous system effects
Decylmercaptan (see 1-Decanethiol)			
Demeton†,‡ (Systox®)	8065-48-3 TF3150000	0.1 mg/m^3 TWA (skin)	Anticholinesterase agent

Di-2-ethylhexylphthalate** (DEHP) (di-sec-octylphthalate)	117-81-7 TI0350000	Ca; 5 mg/m^3 TWA, 10 mg/m^3 STEL (0.15 mg/m^3 LOQ)	Potential for cancer; liver tumors in animals
2,6-Di-tert-butyl-p-cresol†,‡	128-37-0 GO7875000	10 mg/m^3 TWA	Decreased growth rate and increased liver weight in animals
Diacetone alcohol‡ (4-hydroxy- 4-methyl- 2-pentanone) *Class: Ketones*§	123-42-2 SA9100000	50 ppm (240 mg/m^3) TWA	Irritation; liver, kidney, and nervous system effects
2,4-Diaminoanisole	615-05-4 BZ8580500	Ca; lowest feasible concentration	Potential for cancer; tumors of the thyroid, skin, and lymphatic system in animals
1,2-Diaminoethane (see Ethylenediamine)			
o-Dianisidine-based dyes	††	Ca; lowest feasible concentration	Potential for cancer; tumors of the bladder, stomach, and mammary glands in animals
Diazinon†,‡	333-41-5 TF3325000	0.1 mg/m^3 TWA (skin)	Skin and eye irritation, cholinesterase inhibition
Diazomethane†	334-88-3 PA7000000	0.2 ppm (0.4 mg/m^3) TWA	Severe respiratory irritation and sensitization, asthma attacks, eye and mucous membrane irritation

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Diborane†	19287-45-7 HQ9275000	0.1 ppm (0.1 mg/m^3) TWA	Pulmonary irritation; liver and kidney damage in animals
1,2-Dibromo-3-chloropropane‡ (DBCP)	96-12-8 TX8750000	Ca; use 29 CFR 1910.1044	Sterility; renal and liver effects; cancer of the nasal cavity, tongue, pharynx, lungs, stomach, adrenal glands, and mammary glands in animals
2-N-Dibutylaminoethanol† (DBAE)	102-81-8 KK3850000	2 ppm (14 mg/m^3) TWA (skin)	Acetylcholinesterase inhibition in vitro; weight loss in animals
Dibutyl phosphate†	107-66-4 TB9605000	1 ppm (5 mg/m^3) TWA, 2 ppm (10 mg/m^3) STEL	Respiratory irritation, headaches
Dibutyl phthalate†	84-74-2 TI0875000	5 mg/m^3 TWA	Heated compound is an irritant of the eyes and respiratory tract
1,3-Dichloro-5,5-dimethyl hydantoin†	118-52-5 MU0700000	0.2 mg/m^3 TWA, 0.4 mg/m^3 STEL	Eye and mucous membrane irritation
Dichloroacetylene†	7572-29-4 AP1080000	Ca; 0.1 ppm (0.4 mg/m^3) ceiling	Potential for cancer, neurotoxicity, CNS depression; kidney tumors in animals
o-Dichlorobenzene†,‡	95-50-1 CZ4500000	50 ppm (300 mg/m^3) ceiling	Upper respiratory and eye irritation; liver and kidney toxicity in animals

p-Dichlorobenzene†,‡	106-46-7 CZ4550000	Ca (1.7 ppm LOQ)	Potential for cancer, eye and upper respiratory irritation, liver toxicity; kidney and liver cancer in animals
3,3'-Dichlorobenzidine	91-94-1 DD0525000	Ca; use 29 CFR 1910.1007	Potential for cancer; bladder and liver cancer in animals
Dichlorodifluoromethane†	75-71-8 PA8200000	1,000 ppm (4,950 mg/m^3) TWA	Narcotic effects and possible asphyxia from vapor
1,1-Dichloroethane† (ethylidene chloride) *Class: Chloroethanes*§	75-34-3 KI0175000	100 ppm (400 mg/m^3) TWA	Narcotic effects from vapor; possible damage to the liver, kidneys, and lungs
1,2-Dichloroethylene†	540-59-0 KV9360000	200 ppm (790 mg/m^3) TWA	Narcotic effects, mucous membrane irritation
Dichloroethyl ether†	111-44-4 KN0875000	Ca; 5 ppm (30 mg/m^3) TWA (skin), 10 ppm (60 mg/m^3) STEL (skin)	Eye and respiratory irritation, pulmonary damage
Dichloromethane (see Methylene chloride)			
Dichloromonofluoromethane† (Refrigerant 21)	75-43-4 PA8400000	10 ppm (40 mg/m^3) TWA	Respiratory irritation, asphyxia at high concentrations
1,1-Dichloro-1-nitroethane†	594-72-9 KI1050000	2 ppm (10 mg/m^3) TWA	Vapor causes pulmonary, skin, and eye irritation in animals; also causes liver, kidney, and heart damage in animals

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
1,2-Dichloropropane (see Propylene dichloride)			
1,3-Dichloropropene†,‡	542-75-6 UC8310000	Ca; 1 ppm (5 mg/m^3) 8-hr TWA (skin)	Potential for cancer; cancer of the bladder, lung, and forestomach in animals
2,2-Dichloropropionic acid†	75-99-0 UF0690000	1 ppm (6 mg/m^3) TWA	Skin, eye, respiratory, and gastrointestinal irritation
Dichlorotetrafluoroethane† (Refrigerant 114)	76-14-2 KI1101000	1,000 ppm (7,000 mg/m^3) TWA	Respiratory irritation, asphyxia at high concentrations
Dichlorvos†,‡ (DDVP)	62-73-7 TC0350000	1 mg/m^3 TWA (skin)	Cholinesterase inhibition
Dicrotophos†,‡	141-66-2 TC3850000	0.25 mg/m^3 TWA (skin)	Cholinesterase inhibition
Dicyclohexylmethane 4,4'-diisocyanate** [methylene bis(4-cyclohexyl-isocyanate)] *Class: Diisocyanates*§	5124-30-1 NQ9250000	0.01 ppm (0.11 mg/m^3) ceiling	Respiratory effects and sensitization, pulmonary irritation
Dicyclopentadiene†	77-73-6 PC1050000	5 ppm (30 mg/m^3) TWA	Skin and eye irritation

Dicyclopentadienyl iron† (ferrocene) Total dust Respirable fraction	102-54-5 LK0700000	 10 mg/m^3 TWA 5 mg/m^3 TWA	Mutagenesis in dogs
Dieldrin‡,** (Aldrin/dieldrin)	60-57-1 IO1750000	Ca; 0.25 mg/m^3 TWA (skin) (0.15 mg/m^3 LOQ)	Potential for cancer; tumors of the lungs, liver, thyroid, and adrenal glands in animals
Diesel exhaust	†† HZ1760000	Ca; lowest feasible concentration	Potential for cancer; tumors of the lungs in animals
Diethanolamine†	111-42-2 KL2975000	3 ppm (15 mg/m^3) TWA	Skin irritation, eye damage
Diethyl ether (see Ethyl ether)			
Diethyl ketone†	96-22-0 SA8050000	200 ppm (705 mg/m^3) TWA	Skin and eye irritation
Diethyl phthalate†	84-66-2 TI1050000	5 mg/m^3 TWA	Mild toxic effects; smaller than normal fetuses in animals
Diethylamine†	109-89-7 HZ8750000	10 ppm (30 mg/m^3) TWA, 25 ppm (75 mg/m^3) STEL	Eye, skin, and respiratory irritation; myocardial degeneration in animals
2-Diethylaminoethanol†	100-37-8 KK5075000	10 ppm (50 mg/m^3) TWA (skin)	Skin, eye, and respiratory irritation
Diethylene triamine†	111-40-0 IE1225000	1 ppm (4 mg/m^3) TWA (skin)	Skin and respiratory irritation and sensitization

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•Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Difluorodibromomethane†	75-61-6 PA7525000	100 ppm (860 mg/m^3) TWA	Respiratory irritation and narcotic effects
Diglycidyl ether** (DGE) *Class: Glycidyl ethers*§	2238-07-5 KN2350000	Ca; 0.1 ppm (0.5 mg/m^3) TWA	Potential for cancer, skin and mucous membrane effects, potential for sensitization, possible hematopoietic and reproductive effects; skin tumors in animals
Dihydroxybenzene (see Hydroquinone)			
Diisobutyl ketone‡ (2,6-dimethyl-4-heptanone) *Class: Ketones*§	108-83-8 MJ5775000	25 ppm (150 mg/m^3) TWA	Irritation; liver, kidney, and nervous system effects
Diisocyanates§	††	See individual chemical	
Diisopropylamine†	108-18-9 IM4025000	5 ppm (20 mg/m^3) TWA (skin)	Respiratory and severe eye irritation
Dimethoxymethane (see Methylal)			
Dimethyl acetamide†	127-19-5 AB7700000	10 ppm (35 mg/m^3) TWA (skin)	Liver damage
Dimethylamine†	124-40-3 IP8750000	10 ppm (18 mg/m^3) TWA	Gas produces respiratory, eye, and mucous membrane irritation in animals
4-Dimethylaminoazobenzene	60-11-7 BX7350000	Ca; use 29 CFR 1910.1015	Potential for cancer; tumors of the liver and bladder in animals

Dimethylaminobenzene (see Xylidine)			
Dimethylaminopropionitrile *Class: NIAX® catalyst ESN*[§]	1738-25-6 UG1575000	Minimize exposure to NIAX® catalyst ESN	Urological disorders, nervous system effects
Dimethylaniline[†] (N,N-dimethylaniline)	121-69-7 BX4275000	5 ppm (25 mg/m^3) TWA (skin), 10 ppm (50 mg/m^3) STEL (skin)	Anoxia resulting from the formation of methemoglobin
Dimethylbenzene (see Xylene)			
Dimethylcarbamoylchloride	79-44-7 FD4200000	Ca; lowest feasible concentration	Potential for cancer; nasal cancer found in animals
Dimethyl-1,2-dibromo-2, 2-dichloroethyl phosphate[†] (naled)	300-76-5 TB9450000	3 mg/m^3 TWA (skin)	Cholinesterase inhibition
Dimethylformamide[†]	68-12-2 LQ2100000	10 ppm (30 mg/m^3) TWA (skin)	Vapors are toxic to the liver
2,6-Dimethyl-4-heptanone (see Diisobutyl ketone)			
1,1-Dimethylhydrazine *Class: Hydrazines*[§]	57-14-7 MV2450000	Ca; 0.06 ppm (0.15 mg/m^3) ceiling (120-min)	Potential for cancer; blood, liver, and skin effects; tumors of the lungs, liver, blood vessels, and intestines in animals

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*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
bis[2-(Dimethylaminoethyl) ether] *Class: NIAX® catalyst ESN*[§]	3033-62-3 KR9460000	Minimize exposure to NIAX® catalyst ESN	Urological disorders, nervous system effects
Dimethylphthalate[†,‡]	131-11-3 TI1575000	5 mg/m^3 TWA	Heated compound causes eye and upper respiratory irritation
Dimethyl sulfate[†]	77-78-1 WS8225000	Ca; 0.1 ppm (0.5 mg/m^3) 8-hr TWA (skin)	Potential for cancer, severe irritation of the eyes, mucous membranes, and skin; nasal and lung cancer in animals
Dinitrolmide[†] (3,5-dinitro-o-toluamide)	148-01-6 XS4200000	5 mg/m^3 TWA	Hepatic changes
Dinitro-o-cresol[**]	534-52-1 GO9625000	0.2 mg/m^3 TWA (skin)	CNS and metabolic effects
Dinitrobenzene[†] (all isomers)		1 mg/m^3 TWA (skin)	Anoxia resulting from the formation of methemoglobin, liver damage
meta	99-65-0 CZ7350000		
ortho	528-29-0 CZ7450000		
para	100-25-4 CZ7525000		
Dinitrotoluenes[§,**]	25321-14-6 XT1300000	Ca; 1.5 mg/m^3 TWA (skin)	Potential for cancer; reproductive effects; tumors of the liver, skin, and kidneys in animals

Dioxane (diethylene dioxide)	123-91-1 JG8225000	Ca; 1 ppm (3.6 mg/m^3) ceiling (30-min)	Potential for cancer; liver and kidney effects; liver, lung, and nasal cavity tumors in animals
Dioxathion[†,‡] (Delnav)	78-34-2 TE3350000	0.2 mg/m^3 TWA (skin)	Cholinesterase inhibition
Diphenyl[†,‡] (biphenyl)	92-52-4 DU8050000	0.2 ppm (1 mg/m^3) TWA	Eye and throat irritation, liver and CNS damage
Diphenylamine[†,‡]	122-39-4 JJ7800000	10 mg/m^3 TWA	Skin, eye, and mucous membrane irritation; urinary and teratogenic effects in animals
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate)			
Dipropylene glycol methyl ether[†]	34590-94-8 JM1575000	100 ppm (600 mg/m^3) TWA (skin), 150 ppm (900 mg/m^3) STEL (skin)	Narcotic effects, mild irritation of the nose and eyes
Dipropyl ketone[†]	123-19-3 MJ5600000	50 ppm (235 mg/m^3) TWA	Mild toxicity; liver effects at high concentrations in animals
Diquat[†]	85-00-7 JM5690000	0.5 mg/m^3 TWA	CNS effects, skin and respiratory irritation from mists or dusts
Disulfiram[†]	97-77-8 JO1225000	2 mg/m^3 TWA	Inhibition of cytochrome P450, d-amino acid oxidase, and aldehyde dehydrogenase

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[*]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[**]REL revised during OSHA hearings (Appendix IV).

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Disulfoton†,‡	298-04-4 TD9275000	0.1 mg/m^3 TWA (skin)	Cholinesterase inhibition
Diuron†	330-54-1 YS8925000	10 mg/m^3 TWA	Respiratory irritation
Divinyl benzene†	1321-74-0 CZ9450000	10 ppm (50 mg/m^3) TWA	Mild skin, eye, and respiratory irritation; skin burns with prolonged contact
Dodecylmercaptan (see 1-Dodecanethiol)			
1-Dodecanethiol (dodecylmercaptan) *Class: Thiols*§	112-55-0 JR3155000	0.5 ppm (4.1 mg/m^3) ceiling (15-min)	Eye and skin irritation, blood and nervous system effects
Emery (see Appendix III)	12415-34-8 ††		
Endosulfan†,‡	115-29-7 RB9275000	0.1 mg/m^3 TWA (skin)	Convulsions; high toxicity in female animals
Endrin†,‡	72-20-8 IO575000	0.1 mg/m^3 TWA (skin)	Convulsions
Enflurane *Class: Waste anesthetic gases and vapors*§	13838-16-9 KN6800000	2 ppm (15.1 mg/m^3) ceiling (60-min)	Reproductive effects and decreased audio-visual performance

Epichlorohydrin[‡] (1-chloro-2,3-epoxypropane)	106-89-8 TX4900000	Ca; lowest feasible concentration (2.5 mg/m^3 LOQ)	Respiratory cancer; mutagenesis; reproductive, skin, kidney, liver, and respiratory effects
EPN[†,‡]	2104-64-5 TB1925000	0.5 mg/m^3 TWA (skin)	Cholinesterase inhibition
1,2-Epoxypropane (see Propylene oxide)			
2,3-Epoxy-1-propanol (see Glycidol)			
Ethanethiol (ethyl mercaptan) *Class: Thiols*[§]	75-08-1 KI9625000	0.5 ppm (1.3 mg/m^3) ceiling	Skin and eye irritation, blood and nervous system effects
Ethanolamine[†,‡]	141-43-5 KJ5775000	3 ppm (8 mg/m^3) TWA, 6 ppm (15 mg/m^3) STEL	Skin, eye, and respiratory irritation; narcotic effects
Ethion[†,‡]	563-12-2 TE4550000	0.4 mg/m^3 TWA (skin)	Cholinesterase inhibition; toxic effects on nervous, respiratory, and digestive systems
2-Ethoxyethanol (see Ethylene glycol monoethyl ether)			
2-Ethoxyethyl acetate (see Ethylene glycol monoethyl ether acetate)			
Ethyl acetate[†,‡]	141-78-6 AH542500	400 ppm (1,400 mg/m^3) TWA	Eye and respiratory irritation

[*]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[††]CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Ethyl acrylate†	140-88-5 AT0700000	Ca (4.0 ppm LOQ)	Potential for cancer; tumors of the forestomach in animals
Ethyl alcohol† (ethanol)	64-17-5 KQ6300000	1,000 ppm (1,900 mg/m^3) TWA	Eye, respiratory, and skin irritation; teratogenic and reproductive effects
Ethylamine†	75-04-7 KH2100000	10 ppm (18 mg/m^3) TWA	Primary irritation of mucous membranes, eyes, and skin
Ethyl amyl ketone† (5-methyl-3-heptanone)	541-85-5 MJ7350000	25 ppm (130 mg/m^3) TWA	Primary irritation of skin and eyes, CNS depression
Ethyl benzene†	100-41-4 DA0700000	100 ppm (435 mg/m^3) TWA, 125 ppm (545 mg/m^3) STEL	Eye, skin, and upper respiratory irritation
Ethyl bromide (see Appendix III)			
Ethyl butyl ketone† (3-heptanone)	106-35-4 MJ5250000	50 ppm (230 mg/m^3) TWA	Skin and respiratory irritation
Ethyl chloride (see Monochloroethane)			
Ethyl ether (see Appendix III)	74-96-4 KH6475000		
Ethyl formate†,‡	109-94-4 LQ8400000	100 ppm (300 mg/m^3) TWA	Eye and nose irritation; narcosis in animals at high concentrations

Ethyl mercaptan (see Ethanethiol)			
Ethyl silicate[†]	78-10-4 VV9450000	10 ppm (85 mg/m^3) TWA	Eye and nose irritation; lung, liver, and kidney damage in animals
Ethylene chlorohydrin[†] (2-chloroethanol)	107-07-3 KK0875000	1 ppm (3 mg/m^3) ceiling (skin)	Eye, nose, and respiratory irritation; liver, kidney, and brain toxicity
Ethylenediamine[†,‡] (1,2-diaminoethane)	107-15-3 KH8575000	10 ppm (25 mg/m^3) TWA	Sensitization and primary irritation to the skin, mucous membranes, and respiratory tract
Ethylene dibromide[‡]	106-93-4 KH9275000	Ca; 0.045 ppm TWA, 0.13 ppm ceiling (15-min)	Potential for cancer; mutagenesis; damage to skin, eyes, heart, liver, spleen, CNS, and reproductive and respiratory systems
Ethylene dichloride[‡,**]	107-06-2 KI0525000	Ca; 1 ppm (4 mg/m^3) TWA, 2 ppm (8 mg/m^3) STEL	Potential for cancer; nervous system, respiratory, cardiovascular, and liver effects
Ethylene glycol[‡] (see Appendix III)	107-21-1 KW2975000		
Ethylene glycol dinitrate[**]	628-96-6 KW5600000	0.1 mg/m^3 STEL (skin)	Circulatory system effects
Ethylene glycol monobutyl ether (EGBE) (2-butoxyethanol) *Class: Glycol ethers*[§]	111-76-2 KJ8575000	5 ppm (24 mg/m^3) TWA (skin)	Adverse effects on blood and hematopoietic system, tissue irritation, CNS depression

[*]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[**]REL revised during OSHA hearings (Appendix IV).

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Ethylene glycol monobutyl ether acetate (EGBEA) (2-butoxyethyl acetate) *Class: Glycol ethers*§	112-07-2 KJ8925000	5 ppm (33 mg/m^3) TWA (skin)	Adverse effects on blood and hematopoietic system, tissue irritation, CNS depression
Ethylene glycol monoethyl ether (EGEE) (2-ethoxyethanol) *Class: Glycol ethers*§	110-80-5 KK8050000	0.5 ppm (1.8 mg/m^3) TWA (skin)	Reproductive and developmental effects; blood, CNS, and hematopoietic system effects
Ethylene glycol monoethyl ether acetate (EGEEA) (2-ethoxyethyl acetate) *Class: Glycol ethers*§	111-15-9 KK8225000	0.5 ppm (2.7 mg/m^3) TWA (skin)	Reproductive and developmental effects; blood, CNS, and hematopoietic system effects
Ethylene glycol monomethyl ether (EGME) (2-methoxyethanol) *Class: Glycol ethers*§	109-86-4 KL5775000	0.1 ppm (0.3 mg/m^3) TWA (skin)	Reproductive and developmental effects; blood, CNS, and hematopoietic system effects
Ethylene glycol monomethyl ether acetate (EGMEA) (2-methoxyethyl acetate) *Class: Glycol ethers*§	110-49-6 KL5950000	0.1 ppm (0.5 mg/m^3) TWA (skin)	Reproductive and developmental effects; blood, CNS, and hematopoietic system effects
Ethylene oxide‡	75-21-8 KX2450000	Ca; 0.1 ppm (0.18 mg/m^3) 8-hr TWA, 5 ppm (9 mg/m^3) ceiling (10-min)	Peritoneal cancer, leukemia, mutagenesis, reproductive effects

Ethyleneimine	151-56-4 KX5075000	Ca; use 29 CFR 1910.1012	Potential for cancer; liver and lung tumors in animals
Ethylene thiourea	96-45-7 NI9625000	Ca; use in encapsulated form in industry; lowest feasible concentration	Potential for cancer and teratogenesis; liver, thyroid, and lymphatic system tumors in animals
Ethylidene chloride (see 1,1-Dichloroethane)			
Ethylidene norbornene† (ENB)	16219-75-3 RB9450000	5 ppm (25 mg/m^3) ceiling	Eye and skin irritation; kidney, renal, urogenital, and bone marrow effects in animals
N-Ethylmorpholine†	100-74-3 QE4025000	5 ppm (23 mg/m^3) TWA (skin)	Visual disturbances, mucous membrane irritation
Fenamiphos†	22224-92-6 TB3675000	0.1 mg/m^3 TWA (skin)	Cholinesterase inhibition
Fensulfothion†,‡ (Dasanit)	115-90-2 TF3850000	0.1 mg/m^3 TWA	Cholinesterase inhibition, skin irritation
Fenthion‡ (see Appendix III)	55-38-9 TF9625000		
Ferbam†,‡	14484-64-1 NO8750000	10 mg/m^3 TWA	Eye and respiratory irritation from dust

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Ferrovanadium dust** *Class: Vanadium*§	12604-58-9 LK2900000	1 mg/m^3 TWA, 3 mg/m^3 STEL	Eye, skin, and lung effects
Fibrous glass *Class: Synthetic vitreous fibers*§	†† LK3651000	3 million fibers/m^3 TWA (fibers $\leq$3.5 μm in diameter and $\geq$10 μm long); 5 mg/m^3 TWA (total fibrous glass)	Eye, skin, and respiratory effects
Fluorides, inorganic§	††	2.5 mg/m^3 TWA	Kidney and bone effects
Fluorine†	7782-41-4 LM6475000	0.1 ppm (0.2 mg/m^3) TWA	Severe irritation of the eyes, mucous membranes, and skin; lung damage
Fluorotrichloromethane† (trichlorofluoromethane)	75-69-4 PB6125000	1,000 ppm (5,600 mg/m^3) ceiling	Narcotic effects; asphyxia at high concentrations
Fluroxene *Class: Waste anesthetic gases and vapors*§	406-90-6 KO4250000	2 ppm (10.3 mg/m^3) ceiling (60-min)	Reproductive effects and decreased audiovisual performance
Fonofos†,‡	944-22-9 TA5950000	0.1 mg/m^3 TWA (skin)	Cholinesterase inhibition
Formaldehyde‡	50-00-0 LP8925000	Ca; 0.016 ppm 8-hr TWA, 0.1 ppm ceiling (15-min)	Nasal cancer
Formamide†	75-12-7 LQ0525000	10 ppm (15 mg/m^3) TWA (skin)	Skin, eye, and mucous membrane irritation; reproductive effects in animals

Formic acid†	64-18-6 LQ4900000	5 ppm (9 mg/m³) TWA	Severe irritation of the eyes, mucous membranes, upper respiratory tract, and skin
Furfural (see Appendix III)	98-01-1 LT7000000		
Furfuryl alcohol**	98-00-0 LU9100000	10 ppm (40 mg/m³) TWA (skin), 15 ppm (60 mg/m³) STEL (skin)	Respiratory effects
Gallium arsenide	1303-00-0 LW8800000	Ca; 0.002 mg As/m³ ceiling (15-min)	Lung and lymphatic cancer resulting from dissociation of gallium arsenide to arsenic
Gasoline†	8006-61-9 LX3300000	Ca (15 ppm LOQ)	Potential for cancer; skin and eye irritation; kidney and liver cancer in animals
Germanium tetrahydride†	7782-65-2 LY4900000	0.2 ppm (0.6 mg/m³) TWA	Toxic effects; flammable gas may cause burns
Glutaraldehyde†‡	111-30-8 MA2450000	0.2 ppm (0.8 mg/m³) ceiling	Mutagenesis; possible teratogenesis; eye, nose, and throat irritation
Glycerin (see Appendix III)	56-81-5 MA8050000		
Glycidol† (2,3-epoxy-1-propanol)	556-52-5 UB4375000	25 ppm (75 mg/m³) TWA	Eye, upper respiratory, and skin irritation; CNS depression

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
Glycidyl ethers§	††	See individual chemical	
Glycol ethers§	††	See individual chemical	
Glycolonitrile *Class: Nitriles*§	107-16-4 AM0350000	2.0 ppm (5.0 mg/m^3) ceiling (15-min)	Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects
Grain dust†	††	4 mg/m^3 TWA	Chronic bronchitis, asthma, and chronic obstructive pulmonary disease
Graphite,† natural respirable dust	7782-42-5 MD9659600	2.5 mg/m^3 TWA	Graphite pneumoconiosis
Graphite, synthetic (see Appendix III)	††		
Guthion® (see Azinphos-methyl)			
Gypsum†	13397-24-5 MG2360000		Eye, skin, and physical irritation
Total dust		10 mg/m^3 TWA	
Respirable fraction		5 mg/m^3 TWA	
Hafnium†	7440-58-6 MG4600000	0.5 mg/m^3 TWA	Liver damage and eye and skin irritation in animals

Halothane *Class: Waste anesthetic gases and vapors*[§]	151-67-7 KH6550000	2 ppm (16.2 mg/m^3) ceiling (60-min)	Reproductive effects and decreased audiovisual performance
Heptachlor[†,‡]	76-44-8 PC0700000	Ca; 0.5 mg/m^3 TWA (skin)	Potential for cancer; liver tumors in animals
Heptane *Class: Alkanes*[§]	142-82-5 MI7700000	85 ppm (350 mg/m^3) TWA, 440 ppm (1,800 mg/m^3) ceiling (15-min)	Skin and nervous system effects
1-Heptanethiol (n-heptyl-mercaptan) *Class: Thiols*[§]	1639-09-4 MJ1400000	0.5 ppm (2.7 mg/m^3) ceiling (15-min)	Eye and skin irritation, blood and nervous system effects
n-Heptylmercaptan (see 1-Heptanethiol)			
Hexachlorobutadiene[†]	87-68-3 EJ0700000	Ca; 0.02 ppm (0.24 mg/m^3) TWA (skin)	Potential for cancer; kidney tumors in animals
Hexachlorocyclopentadiene[†,‡]	77-47-4 GY1225000	0.01 ppm (0.1 mg/m^3) TWA	Mucous membrane and skin irritation
Hexachloroethane[‡,••] *Class: Chloroethanes*	67-72-1 KI4025000	Ca; 1 ppm (10 mg/m^3) 8-hr TWA	Potential for cancer; liver tumors in animals
Hexachloronaphthalene[†] (Halowax 1014)	1335-87-1 QJ3500000	0.2 mg/m^3 TWA (skin)	Toxic effects on liver and skin

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[•]Consult primary sources in Section A for definitive information.
[†]REL adopted during OSHA hearings (Appendix II).
[‡]Also listed as a pesticide in Appendix V.
[§]Appendix I lists all members of the class indicated; refer to class name in Section A.
[••]REL revised during OSHA hearings (Appendix IV).
[††]CAS No. or RTECS No. not assigned.

Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

Hazardous agent	CAS No. and RTECS No.	NIOSH REL	Health effects*
1-Hexadecanethiol (cetylmercaptan) *Class: Thiols*§	2917-26-2 ††	0.5 ppm (5.3 mg/m^3) ceiling (15-min)	Eye and skin irritation, blood and nervous system effects
Hexafluoroacetone†	684-16-2 UC2450000	0.1 ppm (0.7 mg/m^3) TWA (skin)	Severe lung irritation; eye, nose, throat, and skin irritation. In animals, damage to the liver, kidneys, thymus, spleen, lungs, lymph nodes, and testes; fetotoxic, embryotoxic, and teratogenic effects
Hexamethylphosphoric triamide (HMPA)	680-31-9 TD0875000	Ca; lowest feasible concentration	
Hexamethylene diisocyanate (HDI) *Class: Diisocyanates*§	822-06-0 MO1740000	0.035 mg/m^3 TWA, 0.14 mg/m^3 ceiling (10-min)	Respiratory effects, sensitization, and pulmonary irritation
Hexane** *Class: Alkanes*§	110-54-3 MN9275000	50 ppm (180 mg/m^3) TWA	Skin and nervous system effects
Hexane isomers *Class: Alkanes*§	†† MO3860000	100 ppm (350 mg/m^3) TWA, 510 ppm (1,800 mg/m^3) ceiling	Skin and nervous system effects
l-Hexanethiol (n-hexylmercaptan) *Class: Thiols*§	111-31-9 MO4550000	0.5 ppm (2.7 mg/m^3) ceiling	Eye and skin irritation, blood and nervous system effects