APPENDIX V-B

LIST OF PROPOSED RERENENCE SUBSTANCES FOR VALIDATION STUDIES OF *IN VITRO* TEST METHODS FOR THE IDENTIFICATION OF OCULAR CORROSIVES/SEVERE IRRITANTS (SORTED BY GHS OCULAR HAZARD CLASSIFICATION CATEGORY AND SUBSTANCE NAME)

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Reference Substances (Sorted by GHS Classification and Substance Name)

GHS Classification	NICEATM Category 1 SubClass.[2]	Substance	CASRN	In Vivo Data Source	Substance Source	Commercial Availability	Chemical Class	Product Class	Conc. Tested	Amount Tested[1]	Purity	MW	pH	Dermal Corrosivity	# of Animals Tested	Water Solubility	Log Kow	Color	Physical Form Tested	MMAS score
Category 1	4	Acetic Acid	64-19-7	NIHS-Ohno	Japanese Cosmetic Industry Assn.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid]	Industrial Chemical; Laboratory Agent, Solvent	10%	0.1 mL	n.a.	60.1	2.4	R35 (60%)	3	soluble	-0.17 (60%)	colorless	liquid	68.0
Category 1	4	Acid blue 40	6424-85-7	TSCA	Crompton and Knowles Corp.	Sigma-Aldrich Corp.	Amine, Quinone, Salt (organic)	Industrial Chemical	n.a.	100 mg	n.a.	473.4	8.0	noncorrosive	6	soluble (30 g/L@ 80C)	2.2	deep blue	solid	39.7
Category 1	4	Methoxyethyl acrylate	3121-61-7	ECETOC	Elf Atochem, Inc.	Sigma-Aldrich Corp.	Ester, Ether	Chemical Intermediate, Industrial Chemical, Laboratory Chemical	100%	0.1 mL	99.6%	130.1	n.a.	noncorrosive	3	Soluble	0.08	?	liquid	45.0
Category 1	4	Aluminum chloride	16603-84-2	TSCA	Monsanto Co.	Fisher Scientific International, Inc.	Salt (inorganic)	Chemical Intermediate, Dye, Industrial Chemical, Laboratory Chemical, Pesticide, Preservative	n.a.	0.1 mL	n.a.	98.9	?	?	6	?	?	light yellow-green	liquid	82.7
Category 1	4	gamma-Aminopropyltriethoxy silane	919-30-2	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Amine, Amidine, Organosilicon Compound	Industrial Chemical	100%	0.1 mL	99%	221.4	?	R34	6	?	?	?	liquid	78.7
Category 1	4	Antimony oxide	1309-64-4	TSCA	Monsanto Co.	Sigma-Aldrich Corp.	Salt (inorganic)	Flame Retardant, Industrial Chemical, Laboratory Chemical, Pharmaceutical Intermediate	100%	100 mg	83.5%	291.5	?	noncorrosive	6	?	?	white powder	solid	107.3
Category 1	3	Benzalkonium chloride	8001-54-5	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Onium Compound	Surfactant (cationic)	5%	0.1 mL	98%	471.5	3.1	R34 (50%)	4	soluble	n.a.	clear	liquid	4.8
Category 1	4	Benzenesulfonyl chloride	98-09-9	TSCA	n.a.	Fisher Scientific International, Inc.	Acyl Halide, Sulfur Compound (organic)	Chemical Intermediate, Pesticide	n.a.	0.1 mL	99.6%	176.6	?	R34	6	?	?	brown	liquid	80.7
Category 1	4	Benzethonium chloride	121-54-0	LNS	n.a.	Sigma-Aldrich Corp.	Amine, Onium Compound	Anti-Infective, Pharmaceutical, Veterinary Chemical	10%	0.1 mL	n.a.	448.1	?	?	3	?	?	?	liquid	76.3
Category 1	4	2-Benzyl-4-chlorophenol	120-32-1	TSCA	Monsanto Co.	Sigma-Aldrich Corp.	Phenol	Anti-Fungal, Anti-Infective, Herbicide	100%	100 mg	95%	218.7	?	?	6	?	?	light brown	solid	100.0
Category 1	1	2,2-Dimethyl butanoic acid	595-37-9	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid]	Pharmaceutical	100%	0.1 mL	96%	116.2	n.a.	R34	6	n.a.	n.a.	?	liquid	44.7
Category 1	4	n-Butanol	71-36-3	NIHS-Ohno	Japanese Cosmetic Industry Assn.	Sigma-Aldrich Corp.	Alcohol	Chemical Intermediate, Cosmetic Ingredient, Food Additive, Industrial Chemcial, Pesticide Intermediate, Pharmaceutical Intermediate, Solvent, Veterinary Chemical	10%	0.1 mL	n.a.	74.1	n.a.	noncorrosive	3	insoluble	0.88	colorless	liquid	34.0
Category 1	1	Butyl cellosolve	111-76-2	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Alcohol	Solvent	100%	0.1 mL	99%	118.2	n.a.	noncorrosive	3	soluble (5 g/L)	0.83	?	liquid	68.7
Category 1	4	4-tert-Butylcatechol	98-29-3	TSCA	n.a.	Sigma-Aldrich Corp.	Phenol	Chemical Intermediate, Laboratory Chemical	85%	0.1 mL	n.a.	166.2	?	?	6	?	?	?	liquid	83.7
Category 1	4	p-tert-Butylphenol	98-54-4	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Phenol	Chemical Intermediate, Perfume, Pesticide	100%	80 mg	n.a.	150.2	?	?	6	?	?	?	solid	71.3
Category 1	4	Captan 90-concentrate (solid)	133-06-2	ECETOC	US EPA	Gustafson, LLC	Heterocyclic Compound, Sulfur Compound (organic)	Pesticide	100%	100 mg	90%	300.6	8.0	noncorrosive	3	soluble (5.1 mg/L)	2.35	white	solid	83.0
Category 1	2	Cetylpyridinium bromide	140-72-7	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Onium Compound, Heterocyclic Compound	Anti-Infective; Laboratory Chemical; Surfactant (cationic)	6%	0.1 mL	99%	384.4	6.0-8.0 (0.5%)	noncorrosive	4	soluble (5 g/L)	1.83 (100%)	faintly beige	liquid	85.8
Category 1	4	Cetyltrimethylammonium bromide	57-09-0	NIHS-Ohno	Japanese Cosmetic Industry Assn.	Sigma-Aldrich Corp.	Onium Compound, Salt (organic)	Cosmetic Ingredient	10%	0.1 mL	n.a.	364.4	5.9	noncorrosive	3	soluble (30 g/L)	3.18/2.26	?	liquid	96.0
Category 1	4	Chlorhexidine	55-56-1	ECETOC	n.a.	Sigma-Aldrich Corp.	Amidine	Anti-Infective, Pharmaceutical	100%	100 mg	n.a.	505.5	?	?	3	?	n.a.	?	solid	82.3
Category 1	2	Cyclohexanol	108-93-0	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Alcohol	Solvent	100%	0.1 mL	97%	100.2	4.5	noncorrosive	4	soluble (3.6 mg/100 mL)	1.23	colorless	liquid	79.8
Category 1	1	3,4-Dichlorophenyl isocyanate	102-36-3	TSCA	Mobay Corp.	Fisher Scientific International, Inc.	Isocyanate	Chemical Intermediate, Industrial Chemical	100%	0.1 mL	n.a.	188.0	?	?	3	?	?	?	liquid	10.3

GHS Classification	NICEATM Category 1 SubClass.[2]	Substance	Corneal score	Irital score	Conjunctival score	Tested in BCOP	Tested in HET-CAM	Tested in ICE	Tested in IRE	EPA Classification	EU Classification	FHSA Classification	Human Exposure Summary
Category 1	4	Acetic Acid	n=2/3, CO=4	-	-	-	X	X	X	Category I	R41	SCNM	Has caused extreme eye and nasal irritation at concentrations in air in excess of 25 ppm. Has caused conjunctivitis at concentrations below 10 ppm. Concentrations of 200 ppm caused conjunctival hyerperemia. Glacial (100%) acetic acid has caused permanent corneal opacification. A splash of vinegar (4 to 10% acetic acid solution) in the eye causes immediate pain and conjunctival hyperemia, sometimes with injury of the corneal epithelium (2 patients). Accidental application of glacial acetic acid to the eyes followed very quickly by irrigation with water resulted in immediate corneal opacification. These corneas cleared sufficiently in a few days to reveal severe iritis and small pupils fixed by posterior synechiae. Regeneration of the epithelium took many months, but corneal anesthesia and opacity were permanent. In workers exposed to aerosol concentrations of 60 ppm for 7-12 years, with daily exposures as high as 100-200 ppm, investigators found conjunctivitis (in addition to bronchitis, pharyngitis, and erosion of exposed teeth) (1, 13,
Category 1	4	Acid blue 40	n=2/6, CO=4	-	-	-	-	-	-	SCNM	R36	irritant	Human data not located
Category 1	4	Methoxyethyl acrylate	n=2/3, CO=4	-	-	-	-	-	-	SCNM	R36	SCNM	Human data not located
Category 1	4	Aluminum chloride	n=5/6, CO=4	-	-	-	-	-	-	Category I	R41	irritant	Is caustic and irritating to the human eye, but in only 1 out of 55 instances of industrial corneal burns has healing been delayed beyond 2 days (10)
Category 1	4	gamma-Aminopropyltriethoxy silane	n=5/6, CO=4	-	-	-	-	-	-	SCNM	Review Data	irritant	Human data not located
Category 1	4	Antimony oxide	n=6/6, CO=4	n=6/6, IR=2 D14	n=6/6, CR=3, n=3/6, CC=4 D14	-	-	-	-	Category I	R41	irritant	Chronic exposure causes eye irritation (6, 53)
Category 1	3	Benzalkonium chloride	n=1/4, CO=4; n=2/4, CO=3; n=2/4, CO>0 D21	n=1/4, IR>1.5 D21	n=1/4, CR/CC>0 D21	X	X	X	X	Category I	R41	SCNM	A severe irritant to the human eye. Concentrations as low as 0.1 to 0.5% cause mild discomfort and conjunctival irritation. Slit lamp examination within 90 seconds of exposure to a single drop of 0.1% shows fine gray dots of keratitis epithelias in the corneal epithelium. Within 10 minutes of exposure, a gray haze may be seen in the corneal surface; superficial desquamation of the conjunctival epithelium may follow. These effects disappear in a day or less. (9, 17)
Category 1	4	Benzenesulfonyl chloride	n=5/6, CO=4	-	-	-	-	-	-	Category I	R41	irritant	Human data not located
Category 1	4	Benzethonium chloride	n=2/3, CO=4	-	-	-	-	-	-	Category I	R41	SCNM	Human data not located
Category 1	4	2-Benzyl-4-chlorophenol	n=6/6, CO=4	-	-	-	-	-	-	Category I	R41	irritant	Human data not located
Category 1	1	2,2-Dimethyl butanoic acid	n=1/6, CO=3 D14	n=1/6, IR=2 D14	-	X	X	X	X	Category I	R41	irritant	Human data not located
Category 1	4	n-Butanol	n=1/3, CO=4	-	-	-	X	-	-	SCNM	R41	SCNM	Is reported to cause irritation of the eyes from exposure to either vapor or liquid. Circumstantial evidence points to butyl alcohol vapor as cause of a special vacuolar keratopathy in some patients; the most severely affected it has been associated with pain & tearing, characteristically most marked on first opening eyes in morning. It can cause transient mild edema of conjunctiva of the eye. Vapor: Irritating to eyes. Considered a strong irritant of the eyes. (9, 11, 13, 27)
Category 1	1	Butyl cellosolve	-	-	n=2/3, CR>0, n=1/3, CC>0 D21	X	-	-	-	Category II	R36	SCNM	An irritant to the human eye. In several, single 8 hour exposures to concentrations of 100 to 200 ppm in air, participants reported discomfort and mild eye irritation. 7 workers exposed to aerosol concentrations of 200 to 300 ppm reported intense eye irritation, followed by recurrent ocular irritation after the initial exposure. (1, 14, 21, 24, 30)
Category 1	4	4-tert-Butylcatechol	n=6/6, CO=4	n=2/6, IR=2 D21	-	-	-	-	-	Category I	R41	irritant	Human data not located
Category 1	4	p-tert-Butylphenol	n=4/6, CO=4	-	-	-	-	-	-	Category I	R41	irritant	Human data not located
Category 1	4	Captan 90-concentrate (solid)	n=3/3, CO=4	n=1/3, IR>0 D21	n=2/3, CR/CC>0 D21	X	X	X	-	Category I	R41	SCNM	Has been reported to cause conjunctivitis (12)
Category 1	2	Cetylpyridinium bromide	-	n=3/4, I>1.5	-	X	-	X	X	Category II	R36	irritant	Human data not located
Category 1	4	Cetyltrimethylammonium bromide	n=3/3, CO=4	-	n=1/3, CR=3, n=3/3, CC=2 D14	-	-	-	-	Category I	R41	SCNM	In 179 patients treated with eye drops containing cetrimide (Cetyltrimethylammonium bromide) for 30 days, adverse effects were reported for 21 patients. The adverse events consisted of discomfort, blurred vision, hyperemia, burning and itching. Accidental application of cetrimide occurred during cataract surgery. This resulted in immediate corneal edema which in turn resulted in a bullous keratopathy. Four patients underwent a penetrating keratoplasty. In one patient the cornea was covered with a conjunctival flap. Light microscopy of the corneas included epithelial edema, loss of keratocytes, and a disrupted and sometimes absent endothelial cell layer. (3, 29)
Category 1	4	Chlorhexidine	n=1/3, CO=4	-	-	X	X	X	X	SCNM	R41	SCNM	Acutely toxic when applied to the eye. Irreversible corneal injuries and opacification attributed to Hibiclens (chlorhexidine gluconate, a 4% topical preparation), reported in 4 female patients, aged 9 months to 83 year, in whom the drug was accidentally introduced into the eye during surgical preparation. Inadvertently used as an intraocular irrigating solution in three patients undergoing surgery. In two of the three patients, corneal endothelium damage was so severe that penetrating keratoplasty had to be performed. Further effects included pronounced iris atrophy, anterior chamber applanation, and a retrocorneal membrane. (25, 28, 31)
Category 1	2	Cyclohexanol	n=3/4, CO=3	-	-	X	X	X	X	Category I	R41	SCNM	Irritation to the eyes of human subjects results at air concentrations of 100 ppm, and which occurs after 3 to 5 minutes exposure (13, 22)
Category 1	1	3,4-Dichlorophenyl isocyanate	n=3/3, CO>0 D21	-	-	-	-	-	-	Category I	R41	SCNM	An irritant to the human eye, causing lacrimation, and (rarely), conjunctivitis (13, 17)

GHS Classification	NICEATM Category 1 SubClass.[2]	Substance	Animal Exposure Summary for Category 1(H) Substances	Notes
Category 1	4	Acetic Acid		
Category 1	4	Acid blue 40		
Category 1	4	Methoxyethyl acrylate		
Category 1	4	Aluminum chloride		
Category 1	4	gamma-Aminopropyltriethoxy silane		
Category 1	4	Antimony oxide		
Category 1	3	Benzalkonium chloride		
Category 1	4	Benzenesulfonyl chloride		
Category 1	4	Benzethonium chloride		
Category 1	4	2-Benzyl-4-chlorophenol		
Category 1	1	2,2-Dimethyl butanoic acid		
Category 1	4	n-Butanol		
Category 1	1	Butyl cellosolve		
Category 1	4	4-tert-Butylcatechol		
Category 1	4	p-tert-Butylphenol		
Category 1	4	Captan 90-concentrate (solid)		
Category 1	2	Cetylpyridinium bromide		
Category 1	4	Cetyltrimethylammonium bromide		
Category 1	4	Chlorhexidine		
Category 1	2	Cyclohexanol		
Category 1	1	3,4-Dichlorophenyl isocyanate		

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	CASRN	In Vivo Data Source	Substance Source	Commercial Availability	Chemical Class	Product Class	Conc. Tested	Amount Tested[1]	Purity	MW	pH	Dermal Corrosivity	# of Animals Tested	Water Solubility	Log Kow	Color	Physical Form Tested	MMAS score
Category 1	4	Diethylaminopropionitrile	5351-04-2	ECETOC	Elf Atochem, Inc.	Fisher Scientific International, Inc.	Amine, Nitrile	Industrial Chemical	100%	0.1 mL	>98.8%	126.2	n.a.	noncorrosive	3	soluble	0.77	yellow	liquid	62.3
Category 1	4	Diethylethanolamine	100-37-8	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Alcohol, Amine	Chemical Intermediate, Pharmaceutical Intermediate	25%	0.1 mL	n.a.	117.2	?	?	6	?	?	colorless	liquid	94.7
Category 1	4	1,3-Diiminobenz (f)-isoindoline	65558-69-2	TSCA	Hoechst Celanese Corp.	Sigma-Aldrich Corp.	Amine, Heterocyclic Compound	Dye, Laboratory Chemical	100%	100 mg	n.a.	195.2	n.a.	?	3	?	?	?	solid	93.0
Category 1	1	2,5-Dimethylhexanediol	110-03-2	ECETOC	BASF	Sigma-Aldrich Corp.	Alcohol	Chemical Intermediate	100%	40 mg	99.5%	146.2	5.7	noncorrosive	3	soluble	n.a.	?	solid	28.3
Category 1	4	Bis-(3-aminopropyl) tetramethyl disiloxane	2469-55-8	TSCA	General Electric Co.	Sigma-Aldrich Corp.	Amine, Amidine, Organosilicon Compound	Industrial Chemical	100%	0.1 mL	n.a.	248.5	n.a.	R34	2	n.a.	n.a.	?	liquid	109.0
Category 1	4	Domiphen bromide	538-71-6	NIHS-Ohno	Japanese Cosmetic Industry Assn.	Sigma-Aldrich Corp.	Ether, Onium Compound, Salt (organic)	Anti-Infective, Pharmaceutical	10%	0.1 mL	n.a.	414.5	6.2	noncorrosive	3	n.a.	n.a.	?	liquid	96.3
Category 1	4	Granuform	30525-89-4	ZEBET	n.a.	Sigma-Aldrich Corp.	Aldehyde, Ether	Anti-Fungal, Anti-Infective, Industrial Chemical, Laboratory Chemical	n.a.	0.1 mL or 100 mg	n.a.	30.0	4.0	?	3	?	?	?	solid	75.3
Category 1	4	Hydroxyethyl acrylate	818-61-1	TSCA	n.a.	Dow Chemical Co. (Bulk)	Alcohol, Ester	Chemical Intermediate	100%	0.1 mL	n.a.	116.1	?	?	6	?	?	?	liquid	96.7
Category 1	2	2-Hydroxyisobutyric acid ethylester	80-55-7	ZEBET	n.a.	Sigma-Aldrich Corp.	Alcohol, Ester	Industrial Chemical	n.a.	0.1 mL or 100 mg	n.a.	132.2	?	?	3	?	?	?	solid	81.0
Category 1	4	2-Hydroxyisobutyric acid	594-61-6	ZEBET	n.a.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid]	Industrial Chemical	n.a.	0.1 mL or 100 mg	n.a.	104.1	?	?	3	?	?	?	solid	98.7
Category 1	4	Imidazole	288-32-4	ECETOC	n.a.	Sigma-Aldrich Corp.	Heterocyclic Compound	Anti-Fungal	100%	100 mg	99%	68.1	10.3	R34	3	soluble (633 g/L)	n.a.	?	solid	59.3
Category 1	4	Cyclohexyl isocyanate	3173-53-3	TSCA	Mobay Corp.	Sigma-Aldrich Corp.	Isocyanate	Anesthetic, Chemical Intermediate, Cleaning Agent, Industrial Chemical, Pharmaceutical Intermediate, Solvent	100%	0.1 mL	Technical Grade	125.2	n.a.	R34	2	insoluble	6.11	?	liquid	101.0
Category 1	4	alpha-Ketoglutaric acid alpha	328-50-7	ZEBET	n.a.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid]	Chemical Intermediate, Laboratory Chemical, Pharmaceutical,	n.a.	0.1 mL or 100 mg	n.a.	146.1	?	?	3	?	?	?	solid	93.0
Category 1	4	Lactic Acid	50-21-5	NIHS-Ohno	Japanese Cosmetic Industry Assn.	Sigma-Aldrich Corp.	Alcohol, Acid (organic) [carboxylic acid]	Cosmetic Ingredient	100%	0.1 mL	n.a.	90.1	1.9	R34	3	soluble	-0.72	colorless	liquid	102.7
Category 1	1	Lauric acid	143-07-7	ECETOC	Unichema International, Inc.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid]	Surfactant (anionic)	100%	52 mg	>92%	200.3	4.2	noncorrosive	3	insoluble	4.20	colorless	solid	38.0
Category 1	4	4-Chloro-methanilic acid	98-36-2	ZEBET	n.a.	Fisher Scientific International, Inc.	Amine, Sulfur Compound (organic)	Chemical Intermediate, Laboratory Chemical	n.a.	0.1 mL or 100 mg	n.a.	207.6	?	?	1	?	?	?	solid	17.0
Category 1	4	*n*-Acetyl-methionine	1115-47-5	ZEBET	n.a.	Sigma-Aldrich Corp.	Amide, Amino Acid	Cosmetic Ingredient, Food Additive, Laboratory Chemical	n.a.	0.1 mL or 100 mg	n.a.	191.3	2.2	?	3	?	?	?	solid	57.3
Category 1	4	2-Methylbutyric acid	116-53-0	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid]	Chemical Intermediate, Cosmetic Ingredient, Solvent	100%	0.005 mL	97.9%	102.1	?	R34	6	?	1.18	?	liquid	38.3
Category 1	4	Methylpentynol	77-75-8	ZEBET	n.a.	Sigma-Aldrich Corp.	Alcohol	Pharmaceutical, Veterinary Chemical	n.a.	0.1 mL or 100 mg	n.a.	98.1	?	?	1	?	?	?	liquid	34.0
Category 1	4	Methylthioglycolate	2365-48-2	ECETOC	Elf Atochem, Inc.	Sigma-Aldrich Corp.	Ester, Sulfur Compound (organic)	Industrial Chemical	100%	0.1 mL	99.7%	106.1	pKa 8.22	noncorrosive	3	Soluble	0.65	?	liquid	53.0
Category 1	4	1-Naphthaleneacetic acid (solid)	86-87-3	ECETOC	US EPA	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid], Polycyclic Compound	Pesticide	100%	100 mg	96%	186.2	3.3	noncorrosive	6	insoluble (420 mg/L)	2.24	?	solid	46.7
Category 1	4	*n*-Octylamine	111-86-4	TSCA	Hoechst Celanese Corp.	Sigma-Aldrich Corp.	Amine	Chemical Intermediate, Laboratory Chemical	100%	0.1 mL	n.a.	129.2	?	?	4	?	?	?	liquid	79.5
Category 1	0 (likely 4)	tetra-N-Octylammonium bromide	14866-33-2	GSK	n.a.	Sigma-Aldrich Corp.	Onium Compound	Industrial Chemical, Laboratory Chemical	100%	0.1 mL or 100 mg	n.a.	546.8	?	?	1	?	?	?	solid	0.0
Category 1	1	Organofunctional Silane 45-49	82985-35-1	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Amine, Organosilicon Compound	Polish	100%	0.005 mL	n.a.	341.6	?	?	6	?	?	?	liquid	54.2
Category 1	2	4-(1,1,3,3-Tetramethylbutyl)phenol	140-66-9	TSCA	Rohm and Haas Co.	Sigma-Aldrich Corp.	Phenol	Chemical Intermediate	100%	100 mg	n.a.	206.3	?	?	6	?	?	?	solid	90.0
Category 1	4	Phosphorodicloridic acid, ethyl ester	1498-51-7	TSCA	Rhone-Poulenc, Inc.	Sigma-Aldrich Corp.	Ester, Organophosphorus Compound	Chemical Intermediate, Pesticide	100%	0.1 mL	96%	162.9	?	R34	6	?	?	?	liquid	100.0
Category 1	4	Polyethylene glycol nonylphenyl ether (Surfonic HDL-1)	9016-45-9	TSCA	Texaco, Inc.	Houghton Chemical Corp.	Alcohol, Ether	Cleaning Agent, Industrial Chemical, Pesticide, Surfactant (nonionic)	100%	0.1 mL	n.a.	308.5	?	?	6	?	?	?	liquid	52.3
Category 1	4	Potassium laurate	10124-65-9	NIHS-Ohno	Japanese Cosmetic Industry Assn.	Pfaltz & Bauer, Inc.	Acid (organic) [carboxylic acid], Salt (organic)	Cosmetic Ingredient, Pesticide	10%	0.1 mL	n.a.	238.4	?	?	3	?	?	?	liquid	33.7
Category 1	3	Promethazine hydrochloride	58-33-3	ECETOC	n.a.	Sigma-Aldrich Corp.	Amine, Amidine, Heterocyclic Compound, Sulfur Compound (organic)	Pharmaceutical	100%	100 mg	98%	320.9	?	?	3	n.a.	n.a.	white to faint yellow	solid	71.7
Category 1	1	Protectol PP	80-54-6	TSCA	BASF	Sigma-Aldrich Corp.	Aldehyde	Food Additive, Perfume	100%	0.1 mL	84.8%	204.3	n.a.	noncorrosive	3	n.a.	?	white powder	liquid	34.3
Category 1	4	Pyridine	110-86-1	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Heterocyclic Compound	Pesticide Intermediate, Pharmaceutical Intermediate, Solvent	100%	0.1 mL	99.9+%	79.1	9.9	noncorrosive	3	soluble	0.65	?	liquid	48.0
Category 1	3	Quinacrine	69-05-6	ECETOC	n.a.	Sigma-Aldrich Corp.	Amine, Heterocyclic Compound, Polycyclic Compound	Pharmaceutical	100%	100 mg	90%	472.9	?	noncorrosive	3	soluble (1 g/36 mL)	n.a.	?	solid	82.0
Category 1	4	beta-Resorcylic acid	89-86-1	ZEBET	n.a.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid], Phenol	Chemical Intermediate, Dye	n.a.	0.1 mL or 100 mg	n.a.	154.1	?	?	1	?	?	?	solid	63.0

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	Corneal score	Irital score	Conjunctival score	Tested in BCOP	Tested in HET-CAM	Tested in ICE	Tested in IRE	EPA Classification	EU Classification	FHSA Classification	Human Exposure Summary
Category 1	4	Diethylaminopropionitrile	n=3/3, CO=4	-	-	-	-	-	-	Category II	R41	SCNM	Human data not located
Category 1	4	Diethylethanolamine	n=6/6, CO=4	n=3/3, IR=2 D14	-	-	-	-	-	Category I	R41	irritant	A human eye irritant (18, 42, 43)
Category 1	4	1,3-Diiminobenz (f)-isoindoline	n=4/4, CO=4	-	-	-	-	-	-	SCNM	R41	SCNM	Human data not located
Category 1	1	2,5-Dimethylhexanediol	-	n=1/3, IR = 1 D21	n=1/3, CR=2 D21	X	X	X	-	Category I	R41	SCNM	Human data not located
Category 1	4	Bis-(3-aminopropyl) tetramethyl disiloxane	n=2/2, CO=4	n=2/2, IR=2	n=2/2, CR=3, CC=4	-	-	-	-	Category I	Review Data	SCNM	Human data not located
Category 1	4	Domiphen bromide	n=3/3, CO=4	-	-	-	X	-	-	Category I	R41	SCNM	Human data not located
Category 1	4	Granuform	n=1/3, CO=4	-	-	-	X	-	-	SCNM	Review Data	SCNM	A human eye irritant (27, 55)
Category 1	4	Hydroxyethyl acrylate	n=4/6, CO=4	n=6/6, IR=2 D14	-	-	-	-	-	Category I	R41	SCNM	Severe eye irritant (27)
Category 1	2	2-Hydroxyisobutyric acid ethylester	n=3/3, CO=3	-	-	-	-	-	-	SCNM	R41	SCNM	Human data not located
Category 1	4	2-Hydroxyisobutyric acid	n=3/3, CO=4	-	n=1/3, CR=3, n=3/3, CC=4	-	X	-	-	SCNM	R41	SCNM	Human data not located
Category 1	4	Imidazole	n=2/3, CO=4	n=2/3, I>1.5	-	X	X	X	X	Category I	R41	SCNM	Human data not located
Category 1	4	Cyclohexyl isocyanate	n=2/2, CO=4	-	-	-	-	X	-	Category I	R41	SCNM	Human data not located
Category 1	4	alpha-Ketoglutaric acid alpha	n=2/3, CO=4	-	-	-	-	-	-	SCNM	R41	SCNM	Human data not located
Category 1	4	Lactic Acid	n=3/3, CO=4	-	n=3/3, CR/CC=2 D14	-	X	-	-	Category I	R41	SCNM	Effect on the eye is similar to that of other acids of moderate strength, causing initial epithelial coagulation on the cornea and conjunctiva; more concentrated solutions can cause severe burns of the skin or eye (10, 20)
Category 1	1	Lauric acid	n=3/3, CO>1 D21	-	n=3/3, CR=1 D21	-	-	-	-	Category I	R41	SCNM	Human data not located
Category 1	4	4-Chloro-methanilic acid	n=1/1, CO=4	-	-	-	-	-	-	SCNM	Review Data	SCNM	Human data not located
Category 1	4	*n*-Acetyl-methionine	n=1/3, CO=4	-	-	-	X	-	-	SCNM	R41	SCNM	Human data not located
Category 1	4	2-Methylbutyric acid	n=2/6, CO=4	-	-	-	-	-	-	Category I	Review Data	SCNM	Human data not located
Category 1	4	Methylpentynol	n=1/1, CO=4	-	-	-	X	-	-	Category I	R41	SCNM	Human data not located
Category 1	4	Methylthioglycolate	n=1/3, CO=4	-	-	-	-	-	-	Category II	R36	SCNM	Human data not located
Category 1	4	1-Naphthaleneacetic acid (solid)	n=1/6, CO=4	-	-	X	X	X	-	Category I	R41	irritant	Has been reported to cause severe irritation to the human eye (17)
Category 1	4	*n*-Octylamine	n=4/4, CO=4	-	-	-	-	-	-	Category I	R41	SCNM	Human data not located
Category 1	0 (likely 4)	tetra-N-Octylammonium bromide	-	-	-	-	-	-	X	Category I	R41	SCNM	Human data not located
Category 1	1	Organofunctional Silane 45-49	n=2/6, CO>0 D21	n=2/6, IR>0 D21	n=2/6, CR>0 D21	-	-	-	-	Category I	R41	SCNM	Human data not located
Category 1	2	4-(1,1,3,3-Tetramethylbutyl)phenol	n=6/6, CO=3	n=6/6, IR=2	-	-	-	-	-	SCNM	R41	SCNM	A human eye irritant (23)
Category 1	4	Phosphorodicloridic acid, ethyl ester	n=6/6, CO=4	-	n=6/6, CR=3, CC=4 D21	-	-	-	-	Category I	R41	irritant	Vapor causes eye irritation; liquid causes sever burns to eye (27)
Category 1	4	Polyethylene glycol nonylphenyl ether (Surfonic HDL-1)	n=5/6, CO=4	-	-	-	-	-	-	Category I	R41	irritant	Human data not located
Category 1	4	Potassium laurate	n=1/3, CO=4 D14	-	-	-	-	-	-	Category I	R41	SCNM	Human data not located
Category 1	3	Promethazine hydrochloride	n=3/3, CO=3	n=3/3, IR=2	-	X	X	X	X	Category I	R41	SCNM	Severe eye irritant (17)
Category 1	1	Protectol PP	n=2/3, CO>0 D21	-	n=3/3, CR>0 D21	-	-	-	-	Category I	R41	SCNM	Severe eye irritant (17)
Category 1	4	Pyridine	n=1/3, CO=4	n=1/3, IR=2 D14	-	X	X	X	-	Category I	R41	SCNM	Causes irritation upon contact with the eyes (6, 20)
Category 1	3	Quinacrine	n=3/3, CO=3	n=3/3, IR=2	-	X	X	X	-	Category I	R41	SCNM	Direct contact with the eye causes yellow staining of the bulbar conjunctiva and cornea; in more severe reactions striate keratopathy or wrinkling of the posterior surface of cornea develops, presumably due to corneal edema (11)
Category 1	4	beta-Resorcylic acid	n=1/1, CO=4	-	-	-	-	-	-	SCNM	Review Data	SCNM	Human data not located

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	Animal Exposure Summary for Category 1(H) Substances	Notes
Category 1	4	Diethylaminopropionitrile		
Category 1	4	Diethylethanolamine		
Category 1	4	1,3-Diiminobenz (f)-isoindoline		
Category 1	1	2,5-Dimethylhexanediol		
Category 1	4	Bis-(3-aminopropyl) tetramethyl disiloxane		
Category 1	4	Domiphen bromide		
Category 1	4	Granuform		
Category 1	4	Hydroxyethyl acrylate		
Category 1	2	2-Hydroxyisobutyric acid ethylester		
Category 1	4	2-Hydroxyisobutyric acid		
Category 1	4	Imidazole		
Category 1	4	Cyclohexyl isocyanate		
Category 1	4	alpha-Ketoglutaric acid alpha		
Category 1	4	Lactic Acid		
Category 1	1	Lauric acid		
Category 1	4	4-Chloro-methanilic acid		
Category 1	4	*n*-Acetyl-methionine		
Category 1	4	2-Methylbutyric acid		
Category 1	4	Methylpentynol		
Category 1	4	Methylthioglycolate		
Category 1	4	1-Naphthaleneacetic acid (solid)		
Category 1	4	*n*-Octylamine		
Category 1	0 (likely 4)	tetra-N-Octylammonium bromide		
Category 1	1	Organofunctional Silane 45-49		
Category 1	2	4-(1,1,3,3-Tetramethylbutyl)phenol		
Category 1	4	Phosphorodicloridic acid, ethyl ester		
Category 1	4	Polyethylene glycol nonylphenyl ether (Surfonic HDL-1)		
Category 1	4	Potassium laurate		
Category 1	3	Promethazine hydrochloride		
Category 1	1	Protectol PP		
Category 1	4	Pyridine		
Category 1	3	Quinacrine		
Category 1	4	beta-Resorcylic acid		

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	CASRN	In Vivo Data Source	Substance Source	Commercial Availability	Chemical Class	Product Class	Conc. Tested	Amount Tested[1]	Purity	MW	pH	Dermal Corrosivity	# of Animals Tested	Water Solubility	Log Kow	Color	Physical Form Tested	MMAS score
Category 1	4	Sodium hydrogen sulfate	7681-38-1	ZEBET	n.a.	Sigma-Aldrich Corp.	Salt (inorganic)	Cleaning Agent, Laboratory Chemical, Pesticide	n.a.	0.1 mL or 100 mg	n.a.	120.1	?	?	1	?	?	?	solid	8.0
Category 1	4	Sodium hydroxide	1310-73-2	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Alkali	Caustic Agent, Chemical Intermediate, Industrial Chemical, Pharmaceutical Intermediate, Veterinary Chemical	10%	0.1 mL	Reagent Grade	40.0	12.7	R35 (5%)	1	soluble (1 g/0.9 mL)	"virtually 0"	?	liquid	108.0
Category 1	4	Sodium oxalate	62-76-0	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid]	Industrial Chemical, Laboratory Chemical	100%	100 mg	>99%	134.0	9.4	corrosive	3	soluble (37 g/L)	n.a.	?	solid	61.3
Category 1	1	Sodium perborate tetrahydrate	10486-00-7	ECETOC	Dupont Corp.	Sigma-Aldrich Corp.	Boron Compound, Salt (inorganic)	Cleaning Agent	100%	60 mg	98.6%	153.9	10.0	noncorrosive	6	n.a.	n.a.	?	solid	30.5
Category 1	4	Di(2-ethylhexyl) sodium sulfosuccinate	98-09-9	NIHS-Ohno	Japanese Cosmetic Industry Assn.	Sigma-Aldrich Corp.	Ester, Salt (organic), Sulfur Compound (organic)	Adjuvant, Cleaner, Solubilizer, Wetting Agent	10%	0.1 mL	n.a.	444.6	6.5	noncorrosive	3	soluble (15 g/L)	n.a.	?	liquid	57.0
Category 1	3	Dibenzoyl-L-tartaric acid	2743-38-6	ECETOC	n.a.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid], Ester	Chemical Intermediate	100%	100 mg	98%	358.3	n.a.	noncorrosive	3	slightly soluble	n.a.	?	solid	36.7
Category 1	4	Tetraethylene glycol diacrylate	17831-71-9	TSCA	Rhone-Poulenc, Inc.	Sigma-Aldrich Corp.	Ether, Nitro Compound	Chemical Intermediate, Industrial Chemical	100%	0.1 mL	n.a.	302.3	?	?	6	?	?	?	liquid	103.3
Category 1	4	Tetrahydrofuran	109-99-9	TSCA	International Specialty Products Co.	Sigma-Aldrich Corp.	Ether, Heterocyclic Compound	Chemical Intermediate, Industrial Chemical, Pharmaceutical Intermediate, Solvent	100%	0.1 mL	n.a.	72.1	?	?	6	?	?	?	liquid	31.2
Category 1	4	N,N,N',N'-Tetramethylhexanediamine	111-18-2	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Amine	Anti-Infective, Industrial Chemical, Laboratory Chemical	100%	0.005 mL	n.a.	172.3	?	?	6	?	?	?	liquid	96.0
Category 1	0 (likely 4)	2-Nitro-4-thiocyanoaniline	54029-45-7	GSK	n.a.	Sigma-Aldrich Corp.	Amine, Nitro Compound, Sulfur Compound (organic)	Industrial Chemical	100%	0.1 mL or 100 mg	n.a.	195.2	?	?	1	?	?	?	solid	63.0
Category 1	1	TNO-35 (Propyl lactate)	616-09-1	TNO-Prinsen	n.a.	Cook Aromatics Ltd. (Bulk)	Alcohol, Ester	Cleaning Agent, Food Additive	n.a.	0.1 mL or 100 mg	n.a.	132.2	?	?	1	?	?	?	solid	63.0
Category 1	4	1,2,4-Triazole, sodium salt	41253-21-8	ECETOC	Elf Atochem, Inc.	Sigma-Aldrich Corp.	Heterocyclic Compound, Salt (organic)	Anti-Fungal	100%	100 mg	99%	91.1	n.a.	noncorrosive	1	soluble	n.a.	brown	solid	104.0
Category 1	4	Trichloroacetic acid	76-03-9	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid]	Caustic Agent, Herbicide	30%	0.1 mL	Reagent Grade	163.4	0.7	R34 (0.6N); R35 (undiluted)	1	soluble (10 g/mL)	1.33	?	liquid	106.0
Category 1	4	Trichloroacetyl chloride	76-02-8	TSCA	Rhone-Poulenc, Inc.	Sigma-Aldrich Corp.	Acyl Halide	Chemical Intermediate, Industrial Chemical	n.a.	0.1 mL	n.a.	163.4	?	?	4	?	?	?	liquid	91.0
Category 1	4	Triton X-100	9002-93-1	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Ether	Surfactant (nonionic)	100%	0.1 mL	n.a.	250.4	n.a.	noncorrosive	6	soluble	n.a.	colorless	liquid	65.8
Category 1(H)	-	Ammonia	7664-41-7	-	-	Sigma-Aldrich Corp.	Alkali	Anti-Fungal, Chemical Intermediate, Cleaning Agent, Fertilizer, Herbicide, Industrial Chemical, Refrigerant	-	-	-	17.0	-	-	-	n.a.	n.a.	?	Liquid	-
Category 1(H)	-	Chloroform	67-66-3	-	n.a.	Sigma-Aldrich Corp.	Hydrocarbon (acyclic)	Anesthetic, Chemical Intermediate, Cleaning Agent, Industrial Chemical, Pharmaceutical Intermediate, Solvent	-	-	-	119.4	-	-	-	n.a.	n.a.	?	liquid	-
Category 1(H)	-	Lime	1305-78-8	-	-	Sigma-Aldrich Corp.	Salt (inorganic)	Building Material, Chemical Intermediate, Cleaning Agent, Fertilizer, Industrial Chemical	-	-	-	56.1	-	-	-	n.a.	n.a.	white to grayish	solid	-
Category 1(H)	-	Magnesium hydroxide	12141-11-6	-	-	Sigma-Aldrich Corp.	Salt (inorganic)	Chemical Intermediate, Flame Retardant, Industrial Chemical, Pharmaceutical, Veterinary Agent	-	-	-	42.3	-	-	-	n.a.	n.a.	?	solid	-
Category 1(H)	-	Nitric acid	7697-37-2	-	-	Sigma-Aldrich Corp.	Acid, Salt (inorganic)	Chemical Intermediate, Industrial Chemical, Laboratory Reagent, Pharmaceutical Intermediate	-	-	-	63.0	-	-	-	n.a.	n.a.	colorless to yellow	liquid	-
Category 1(H)	-	Potassium hydroxide	1310-58-3	-	-	Sigma-Aldrich Corp.	Alkali, Salt (inorganic)	Chemical Intermediate, Cleaning Agent, Fertilizer, Food Additive, Industrial Chemical, Veterinary Chemical	-	-	-	56.1	-	-	-	n.a.	n.a.	?	solid	-

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	Corneal score	Irital score	Conjunctival score	Tested in BCOP	Tested in HET-CAM	Tested in ICE	Tested in IRE	EPA Classification	EU Classification	FHSA Classification	Human Exposure Summary
Category 1	4	Sodium hydrogen sulfate	n=1/1, CO=4	-	-	-	-	-	-	SCNM	Review Data	SCNM	Human data not located
Category 1	4	Sodium hydroxide	n=1/1, CO=4	n=1/1, IR=2 D21	n=1/1, CR/CC=3 D21	X	X	X	X	Category I	R41	SCNM	Contact with the eyes causes disintegration and sloughing of conjunctival and corneal epithelia, corneal opacification, marked edema, and ulceration; after 7 to 13 days either gradual recovery begins, or there is progression of ulceration and corneal opacification. Opacification may be so severe that iris markings are not discernable. Complications of severe eye burns are symblepharon, with overgrowth of the cornea by a vascularized membrane, progressive or recurrent corneal ulceration, permanent corneal opacification, necrosis of the bulbar conjunctiva, blanched and necrotic corneal cul-de-sac, and blindness. Eye contact; Levels of toxic effect: (1) Irritation. (2) Conjunctivitis, corneal burns. (3) Photophobia. (4) Disintegration and sloughing of conjunctival and corneal epithelium. (5) Corneal edema, ulceration, and opacification. (6) Symblepharon. (7) Overgrowth of the cornea by a vascularized membrane. (8) Permanent corneal opacification. (11, 18)
Category 1	4	Sodium oxalate	n=1/3, CO=4	n=1/3, IR=2 D14	-	X	X	X	-	Category I	R41	SCNM	Human data not located
Category 1	1	Sodium perborate tetrahydrate	n=4/6, CO>1 D21	-	-	X	X	X	-	Category I	R41	SCNM	Very few cases of eye irritation were observed (26)
Category 1	4	Di(2-ethylhexyl) sodium sulfosuccinate	n=1/3, CO=4	-	-	-	-	-	-	SCNM	R41	SCNM	In ophthalmological formulations, concentrations of greater than 0.1% may cause conjunctival irritation; repeated use of such drugs may delay healing of corneal lesions. (7)
Category 1	3	Dibenzoyl-L-tartaric acid	n=3/3, CO=3	-	-	X	X	X	-	Category I	R41	SCNM	Human data not located
Category 1	4	Tetraethylene glycol diacrylate	n=5/6, CO=4	n=6/6, IR=2 D14	-	-	-	-	-	Category I	R41	irritant	Human data not located
Category 1	4	Tetrahydrofuran	n=2/6, CO=4	-	-	-	-	-	-	SCNM	Review Data	irritant	A human eye irritant (27)
Category 1	4	N,N,N',N'-Tetramethylhexanediamine	n=6/6, CO=4	-	-	-	-	-	-	Category I	R41	irritant	Human data not located
Category 1	0 (likely 4)	2-Nitro-4-thiocyanoaniline	-	-	-	-	-	-	X	Category I	R41	SCNM	Human data not located
Category 1	1	TNO-35 (Propyl lactate)	n=1/1, CO>0 D21	n=1/1, IR>0 D21	n=1/1, CC>0 D21	-	-	X	-	Category I	R41	SCNM	Human data not located
Category 1	4	1,2,4-Triazole, sodium salt	n=1/1, CO=4	n=1/1, IR=2	-	-	-	-	-	Category I	R41	SCNM	Human data not located
Category 1	4	Trichloroacetic acid	n=1/1, CO=4	n=1/1, IR=2 D21	n=1/1, CR/CC=2 D21	X	X	X	X	Category I	R41	SCNM	Reported to be irritating and very painful to the human eye (15, 19)
Category 1	4	Trichloroacetyl chloride	n=4/4, CO=4	-	-	-	-	-	-	Category I	R41	SCNM	Reported to be irritating and very painful to the human eye (15, 19)
Category 1	4	Triton X-100	n=2/6, CO=4	-	-	-	-	-	-	SCNM	Review Data	irritant	Human data not located
Category 1(H)	-	Ammonia	-	-	-	-	-	-	-	-	-	-	Ammonia vapors cause irritation of eyes, with high concentrations causing conjunctivitis. Corneal edema and semi-dilated, fixed pupils are typical. Ammonia has a greater tendency than other alkalies to penetrate and damage the iris, and to cause cataract. In severe burns, iritis may be accompanied by hypopyon or hemorrhages, extensive loss of pigment and severe glaucoma. Exposure to high gas concentrations of ammonia may cause temporary blindness and severe eye damage. Direct contact of the eyes with liquid anhydrous ammonia will produce serious eye burns. 2 cases of ocular injuries with a rise in intraocular pressure and cataract formation after ammonia of unknown concentration had been squirted into the victims' eyes during robberies were reported. In both cases, the more severely affected eyes showed marked injection and edema of the conjunctiva; diffuse corneal damage; semi-dilated, oval, and fixed pupils; and a marked increase of the intraocular pressure, which persisted and was controlled only with drugs. Glaucoma was observed to be associated with an open angle.
Category 1(H)	-	Chloroform	-	-	-	-	-	-	-	-	-	-	Splash of liquid chloroform in the eyes causes immediate burning pain, tearing and reddening of the conjunctiva. The corneal corneal epithelium corneal epithelium is usually injured and partially lost. Exposure to liquid or gaseous chloroform causes keratitis, corneal opacities, and ulceration (11, 37, 38, 39, 40, 41)
Category 1(H)	-	Lime	-	-	-	-	-	-	-	-	-	-	The major complaints of workers exposed to lime consist of eye and skin irritation. Calcium oxide dust irritates the eyes primarily because of its alkalinity. Exposure to lime has been reported to cause conjunctival necrosis, symblepharon, keratitis, corneal necrosis, corneal opacities, corneal scarring, corneal ulceration, corneal vascularization and iritis (1,5,44)
Category 1(H)	-	Magnesium hydroxide	-	-	-	-	-	-	-	-	-	-	Human ocular exposure to magnesium hydroxide produces combined thermal and alkali injury. Reported effects of exposure to magnesium hydroxide are conjunctival necrosis, symblepharon, keratitis, corneal necrosis, corneal opacities, corneal scarring, corneal ulceration, corneal vascularization and iritis (44, 45)
Category 1(H)	-	Nitric acid	-	-	-	-	-	-	-	-	-	-	Contact of nitric acid with the eye causes immediate opacification of the corneal and conjunctival epithelium. It also causes symblepharon, shrinkage of the globe, keratitis, corneal ulceration and corneal and conjunctival necrosis (11, 17, 46)
Category 1(H)	-	Potassium hydroxide	-	-	-	-	-	-	-	-	-	-	Eye contact with concentrated alkalis such as potassium hydroxide causes conjunctival edema and corneal destruction. Potassium hydroxide (caustic potash) is one of the strongest alkalies. It is extremely corrosive, and many reports have been made of devastating damage of the eye from contact with either the solid or solutions of potassium hydroxide. The type of injury is essentially the same as that produced by sodium hydroxide and other strong alkalies, and includes iritis, conjunctival necrosis, symblepharon, keratitis, corneal necrosis, opacities, scarring, ulceration and vascularization (1, 11, 27, 45, 47)

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	Animal Exposure Summary for Category 1(H) Substances	Notes
Category 1	4	Sodium hydrogen sulfate		
Category 1	4	Sodium hydroxide		
Category 1	4	Sodium oxalate		
Category 1	1	Sodium perborate tetrahydrate		
Category 1	4	Di(2-ethylhexyl) sodium sulfosuccinate		
Category 1	3	Dibenzoyl-L-tartaric acid		
Category 1	4	Tetraethylene glycol diacrylate		
Category 1	4	Tetrahydrofuran		
Category 1	4	N,N,N',N`-Tetramethylhexanediamine		
Category 1	0 (likely 4)	2-Nitro-4-thiocyanoaniline		
Category 1	1	TNO-35 (Propyl lactate)		
Category 1	4	1,2,4-Triazole, sodium salt		
Category 1	4	Trichloroacetic acid		
Category 1	4	Trichloroacetyl chloride		
Category 1	4	Triton X-100		
Category 1(H)	-	Ammonia	Corneal opacity was observed in rabbits following continuous exposure to ammonia vapor (470 mg/M3). Swine exposed to ammonia for 2 to 6 weeks at 100 PPM in air developed conjunctival irritation. Continuous exposure of rabbits to 470 mg/cu m for several weeks produced opacities over ¼ to ½ of the cornea. Even fairly low airborne concentrations of ammonia produce rapid eye and nose irritation. Contact with concentrated ammonia solutions, such as some industrial cleaners, can cause serious corrosive injury (6, 11, 56).	
Category 1(H)	-	Chloroform	Liquid chloroform produced slight injury to the eyes which took over a week to heal. (62)	
Category 1(H)	-	Lime	Animal Data Not Located	
Category 1(H)	-	Magnesium hydroxide	Milk of magnesia applied to rabbit eyes twice a day for three or four days caused damage to the corneal epithelium, demonstrable by staining with fluorescein. After the applications were discontinued, the corneas returned to normal in two or three days. (10)	
Category 1(H)	-	Nitric acid	Animal Data Not Located	
Category 1(H)	-	Potassium hydroxide	Animal Data Not Located	

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	CASRN	In Vivo Data Source	Substance Source	Commercial Availability	Chemical Class	Product Class	Conc. Tested	Amount Tested[1]	Purity	MW	pH	Dermal Corrosivity	# of Animals Tested	Water Solubility	Log Kow	Color	Physical Form Tested	MMAS score
Category 1(H)	-	Silver nitrate	7761-88-8	-	-	Sigma-Aldrich Corp.	Nitrate, Salt (inorganic)	Anti-Infective, Chemical Intermediate, Dye, Industrial Chemical, Laboratory Chemical, Pharmaceutical, Pharmaceutical Intermediate	-	-	-	169.9	-	-	-	n.a.	n.a.	white to grayish-black	liquid	-
Category 1(H)	-	Sodium hydrogen difluoride	1333-83-1	-	-	Sigma-Aldrich Corp.	Salt (inorganic)	Anti-Infective, Cleaning Agent, Industrial Chemical, Preservative	-	-	-	62.0	-	-	-	n.a.	n.a.	?	liquid	-
Category 1(H)	-	Sulfuric acid	7664-93-9	-	-	Sigma-Aldrich Corp.	Acid (inorganic), Sulfur Compound (inorganic)	Battery Acid, Chemical Intermediate, Cleaning Agent, Fertilizer, Food Additive, Industrial Chemical, Laboratory Chemical	-	-	-	98.1	-	-	-	n.a.	n.a.	?	liquid	-
Category 1(H)	-	Zinc chloride	7646-85-7	-	-	Sigma-Aldrich Corp.	Salt (inorganic)	Anti-Infective, Flame Retardant, Herbicide, Industrial Chemical. Pesticide, Preservative	-	-	-	136.3	-	-	-	n.a.	n.a.	?	solid	-
Category 2A	-	Methyl acetate	79-20-9	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Ester	Chemical Intermediate, Food Additive, Herbicide, Laboratory Chemical,Solvent	100%	0.1 mL	98%	74.1	n.a.	?	4	243 g/L	0.18	colorless	liquid	39.5
Category 2A	-	Acetone	67-64-1	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Ketone	Chemical Intermediate, Cleaning Agent, Industrical Chemical, Pharmaceutical Intermediate, Preservative, Solvent	100%	0.1 mL	99%	58.1	5.3	noncorrosive	4	soluble	-0.24	?	liquid	65.8
Category 2A	-	Benzotrichloride	98-07-7	TSCA	Velsicol Chemical Corp.	Sigma-Aldrich Corp.	Hydrocarbon (cyclic)	Chemical Intermediate	100%	0.1 mL	n.a.	195.5	?	?	6	?	?	?	liquid	11.7
Category 2A	-	gamma-Butyrolactone	96-48-0	ECETOC	Shell Oil Co. of California	Sigma-Aldrich Corp.	Heterocyclic Compound, Lactone	Solvent	100%	0.1 mL	>99%	86.1	4.5	noncorrosive	6	miscible	-0.57	colorless	liquid	43.0
Category 2A	-	4-Carboxybenzaldehyde	619-66-9	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Aldehyde, Acid (organic) [carboxylic acid]	Industrial Chemical	100%	0.1 mL	>95%	150.1	3.1	noncorrosive	3	Very soluble	n.a.	?	liquid	50.3
Category 2A	-	Cetylpyridinium bromide	140-72-7	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Onium Compound, Heterocyclic Compound	Anti-Infective; Laboratory Chemical; Surfactant (cationic)	1%	0.1 mL	99%	384.4	6.4	noncorrosive	6	soluble (5 g/L)	1.83 (100%)	faintly beige	liquid	36.0
Category 2A	-	Deoxycholic acid sodium salt	302-95-4	LNS	n.a.	Sigma-Aldrich Corp.	Alcohol, Acid (organic) [carboxylic acid], Polycyclic Compound, Salt (organic)	Anti-Infective, Laboratory Chemical, Solvent	10%	0.1 mL	n.a.	414.6	?	?	3	?	?	?	liquid	38.0
Category 2A	-	Dibenzyl phosphate	1623-08-1	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Ester, Organophosphorus Compound	Pesticide	100%	100 mg	99%	278.2	2.4	noncorrosive	3	n.a.	n.a.	?	solid	30.0
Category 2A	-	2,6-Dichlorobenzoyl chloride	4659-45-4	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Acyl Halide	Anti-Fungal, Anti-Infective	100%	0.1 mL	99%	209.5	2.5	R34	6	insoluble	2.57	slight yellow	liquid	23.8
Category 2A	-	2-Ethyl-1-hexanol	104-76-7	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Alcohol	Solvent	100%	0.1 mL	99%	130.2	4.8	noncorrosive	4	slightly soluble	2.82	?	liquid	51.3
Category 2A	-	*n*-Hexanol	111-27-3	ECETOC	Kodak Co.	Sigma-Aldrich Corp.	Alcohol	Solvent	100%	0.1 mL	98%	102.2	5.5	noncorrosive	4	soluble (5.8 g/L)	2.03	?	liquid	64.8
Category 2A	-	Methyl ethyl ketone	78-93-3	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Ketone	Solvent	100%	0.1 mL	99%	72.1	5.5	noncorrosive	4	soluble (353 g/L)	0.29	colorless	liquid	50.0
Category 2A	-	Methyl cyanoacetate	105-34-0	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Ester, Nitrile	Chemical Intermediate	100%	0.1 mL	99%	99.1	5.7	noncorrosive	3	soluble (54 g/L)	n.a.	light yellow	liquid	27.7
Category 2A	-	*n*-Octanol	111-87-5	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Alcohol	Solvent	100%	0.1 mL	>99%	130.2	6.1	noncorrosive	3	insoluble (540 mg/L)	3.00	?	liquid	41.0
Category 2A	-	Triton X-100	9002-93-1	ECETOC	n.a.	Sigma-Aldrich Corp.	Ether	Surfactant (nonionic)	5%	0.1 mL	98%	250.4	n.a.	noncorrosive	6	soluble	n.a.	colorless	liquid	33.8
Category 2B	-	Ethyl-2-methyl acetoacetate	609-14-3	ECETOC	Fluka, Inc.	Sigma-Aldrich Corp.	Ester, Ketone	Chemical Intermediate	100%	0.1 mL	97%	144.2	7.5	noncorrosive	3	Slightly soluble	n.a.	?	liquid	18.0
Category 2B	-	Ammonium nitrate	6484-52-2	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Onium Compound, Nitrate, Salt (organic)	Industrial Chemical	100%	100 mg	99.999%	80.0	4.8	noncorrosive	3	soluble (1920 g/L)	n.a.	white, hot concentrate	solid	18.3
Category 2B	-	Butyl Dipropasol Solvent	29911-27-1	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Alcohol, Ether	Solvent	100%	0.1 mL	99%	176.3	?	?	6	?	?	?	liquid	24.7
Category 2B	-	3-Chloropropionitrile	542-76-7	ECETOC	Fluka, Inc.	Sigma-Aldrich Corp.	Nitrile	Chemical Intermediate, Pharmaceutical Intermediate	100%	0.1 mL	99.9%	89.5	n.a.	noncorrosive	3	soluble (45 g/100 mL)	0.18	?	liquid	13.7
Category 2B	-	Cyclopentanol	96-41-3	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Alcohol	Pharmaceutical Intermediate	100%	0.1 mL	99%	86.1	n.a.	noncorrosive	3	slightly soluble	0.71	colorless	liquid	21.7
Category 2B	-	3,3-Dithiodipropionic acid	1119-62-6	ECETOC	Fluka, Inc.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid], Organosilicon Compound	Chemical Intermediate, Laboratory Chemical	100%	100 mg	99%	210.3	pKa 3.94	R34	3	Very soluble	1.38	?	solid	31.7
Category 2B	-	Hexyl cinnamic aldehyde	101-86-0	TSCA	Confidential	International Flavors and Frangrances, Inc. (Bulk)	Aldehyde	Cosmetic Ingredient, Food Additive, Perfume	12.5% in Alcohol	0.1 mL	n.a.	216.3	?	?	3	?	?	?	liquid	21.3

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	Corneal score	Irital score	Conjunctival score	Tested in BCOP	Tested in HET-CAM	Tested in ICE	Tested in IRE	EPA Classification	EU Classification	FHSA Classification	Human Exposure Summary
Category 1(H)	-	Silver nitrate	-	-	-	-	-	-	-	-	-	-	Solid silver nitrate, known as lunar caustic, can be very injurious to the eye. Particles of solid silver nitrate in the conjunctival sac have been known to cause severe inflammation with deep injury to surrounding tissues, scarring, and symblepharon. In a most unusual case of severe injury from solid nitrate the cornea became dark brown, and the lens became cataractous. Concentration solutions of silver nitrate from 5%-50% applied by mistake or accidentally splashed in the eye have caused severe injury, with permanent corneal opacification in some cases. Solutions of high concentration cause rapid appearance of edema of the conjunctiva and lids, with bloody purulent discharge from the conjunctival sac. Opacification of the cornea may result and may be permanent (5, 11, 13, 48, 49, 50)
Category 1(H)	-	Sodium hydrogen difluoride	-	-	-	-	-	-	-	-	-	-	Exposure to concentrated sodium hydrogen difluoride has caused corneal necrosis, opacification, scarring, ulceration, vascularization (11, 23)
Category 1(H)	-	Sulfuric acid	-	-	-	-	-	-	-	-	-	-	At aerosol concentrations of 1.1 to 2.1 mg/cu m, 40% of human subjects noticed irritation of the eyes. At 2.4 to 6.0 mg/cu m, all subjects experienced eye irritation. Contact of concentrated sulfuric acid with the eye may cause total loss of vision in addition to corneal necrosis, opacification, scarring, ulceration and vascularization. (1, 44, 51, 52)
Category 1(H)	-	Zinc chloride	-	-	-	-	-	-	-	-	-	-	An unstated concentration of zinc chloride solution splashed in 1 eye of a workman at first only caused redness and discomfort, but within 6 days grayish corneal opacities had developed, with irregularity of the overlying epithelium. A patient who had an eye burned with one drop of 50% zinc chloride solution there was immediate severe pain, erosion of the corneal epithelium, corneal vascularization, severe iritis and iridial hemorrhage (11, 27, 54)
Category 2A	-	Methyl acetate	-	-	-	X	X	X	X	Category II	R36	SCNM	Cases of slight poisoning under industrial conditions were manifested by eye burns and lacrimation. One case of blindness has been reported. (1, 13, 18)
Category 2A	-	Acetone	-	-	-	X	X	X	X	Category II	R36	SCNM	Acute exposures of humans to atmospheric concentrations have been reported to produce eye irritation. Exposure of15 minutes to aerosol concentrations of 1660 ppm also reportedly causes eye irritation. Direct contact with the eyes may produce irritation and corneal injury. (14, 16, 30, 32)
Category 2A	-	Benzotrichloride	-	-	-	-	-	-	-	Category II	nonirritant	irritant	Human data not located
Category 2A	-	gamma-Butyrolactone	-	-	-	X	X	X	X	Category II	R36	irritant	Human data not located
Category 2A	-	4-Carboxybenzaldehyde	-	-	-	X	X	X	-	Category II	R36	SCNM	Human data not located
Category 2A	-	Cetylpyridinium bromide	-	-	-	-	X	-	X	SCNM	R41	SCNM	Human data not located
Category 2A	-	Deoxycholic acid sodium salt	-	-	-	X	-	-	-	Category II	R36	SCNM	Human data not located
Category 2A	-	Dibenzyl phosphate	-	-	-	X	-	X	-	Category II	R36	SCNM	Human data not located
Category 2A	-	2,6-Dichlorobenzoyl chloride	-	-	-	X	X	X	-	Category II	R36	irritant	Human data not located
Category 2A	-	2-Ethyl-1-hexanol	-	-	-	X	X	X	-	Category II	R36	SCNM	Irritation of eyes from vapor or liquid (8, 9)
Category 2A	-	*n*-Hexanol	-	-	-	X	X	X	X	Category II	R36	SCNM	Reported to cause eye burns (27)
Category 2A	-	Methyl ethyl ketone	-	-	-	X	X	X	X	Category III	R36	SCNM	High atmospheric concentrations are irritating to the eyes. May produce painful irritation and corneal injury if splashed in the eyes. Workers exposed to 33,000 and100,000 ppm in air reported intolerable irritation of the eyes. Implicated as the cause of retrobulbar neuritis in one patient. A workman splashed his eye accidentally with methyl ethyl ketone, but the next day had only slight conjunctival hyperemia and no residual corneal injury. (2, 5, 11, 20)
Category 2A	-	Methyl cyanoacetate	-	-	-	X	X	X	-	Category II	R36	SCNM	Human data not located
Category 2A	-	*n*-Octanol	-	-	-	X	X	X	X	Category II	R36	SCNM	Has caused injury of the corneal epithelium, with recovery in 48 hours (11)
Category 2A	-	Triton X-100	-	-	-	-	X	X	X	Category I	R41	SCNM	Human data not located
Category 2B	-	Ethyl-2-methyl acetoacetate	-	-	-	X	X	X	X	Category III	nonirritant	SCNM	Human data not located
Category 2B	-	Ammonium nitrate	-	-	-	X	X	X	X	Category III	R36	SCNM	Human data not located
Category 2B	-	Butyl Dipropasol Solvent	-	-	-	-	-	-	-	Category III	nonirritant	irritant	Human data not located
Category 2B	-	3-Chloropropionitrile	-	-	-	-	-	-	-	Category III	nonirritant	SCNM	Human data not located
Category 2B	-	Cyclopentanol	-	-	-	-	-	X	-	Category II	R36	SCNM	Human data not located
Category 2B	-	3,3-Dithiodipropionic acid	-	-	-	-	-	-	-	Category II	nonirritant	SCNM	Human data not located
Category 2B	-	Hexyl cinnamic aldehyde	-	-	-	-	-	-	-	Category III	nonirritant	SCNM	Human data not located

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	Animal Exposure Summary for Category 1(H) Substances	Notes
Category 1(H)	-	Silver nitrate	Treatment of rat eyes with a single 3-drops 0.66% silver nitrate soln caused deposition of silver in the cornea, conjunctiva, subconjunctiva, Bowman's layer, reticular fibers of the corneal stroma, Descemete's membrane and the posterior corneal epithelium. Morphologic evolution of the early events of corneal vascularization in the rat cornea induced by silver nitrate cautery was followed by light and electron microscopy. An initial acute inflammatory response occurred within the first 6 hours after cautery as evidenced by vascular dilation, diapedesis of leukocytes, and an increased vascular permeability, as manifested by distended lymphatics and the presence of extravascular fibrin. At 33 hours after cautery, the first new vessels were observed as sprouts from the capillary arcade and postcapillary venules. Adult male Sprague-Dawley rats were anesthetized with halothane gas, and the centers of their right corneas treated with a silver nitrate applicator stick (75% silver nitrate, 25% potassium nitrate) to produce a discrete	
Category 1(H)	-	Sodium hydrogen difluoride	This substance causes the formation of hydrofluoric acid when exposed to mucous membranes. Ocular toxicity is caused by hydrofluoric acid. In inhalation studies in rabbits and guinea pigs, a concentration of 50 MG/CU M, hydrogen fluoride induced discharge from the eyes. Experimental splash burns of hydrofluoric acid into the eyes of rabbits have shown a 20% solution to cause immediate damage with total corneal opacification with conjunctival ischemia, and with corneal stromal edema within an hour, followed by necrosis of anterior ocular structures. An 8% solution produced ischemia and corneal stromal edema persisting for 40-65 days, accompanied by corneal vascularization. Even a 2% a solution caused mild persistent stromal edema and vascularization.. (6, 11)	
Category 1(H)	-	Sulfuric acid	Animals in the vicinity of potato fields sprayed with sulfuric acid during spraying, or gaining access to such fields soon after spraying, may develop eye burns from the spray. (63)	
Category 1(H)	-	Zinc chloride	10% zinc chloride was classified as a mild or non-irritant when test in the rabbit eye. A 50% solution of zinc chloride applied repeatedly during 1 day to 1 eye of an albino rabbit caused immediate corneal opacity. 6 days after exposure, the eye had become very hard, with extensive hemorrhage in the anterior segment, accompanied by infiltration with inflammatory cells, loss of corneal endothelium and clouding of the anterior portion of the lens. (11, 61)	
Category 2A	-	Methyl acetate		
Category 2A	-	Acetone		
Category 2A	-	Benzotrichloride		
Category 2A	-	gamma-Butyrolactone		
Category 2A	-	4-Carboxybenzaldehyde		
Category 2A	-	Cetylpyridinium bromide		
Category 2A	-	Deoxycholic acid sodium salt		
Category 2A	-	Dibenzyl phosphate		
Category 2A	-	2,6-Dichlorobenzoyl chloride		
Category 2A	-	2-Ethyl-1-hexanol		
Category 2A	-	*n*-Hexanol		
Category 2A	-	Methyl ethyl ketone		
Category 2A	-	Methyl cyanoacetate		
Category 2A	-	*n*-Octanol		
Category 2A	-	Triton X-100		
Category 2B	-	Ethyl-2-methyl acetoacetate		
Category 2B	-	Ammonium nitrate		
Category 2B	-	Butyl Dipropasol Solvent		
Category 2B	-	3-Chloropropionitrile		
Category 2B	-	Cyclopentanol		
Category 2B	-	3,3-Dithiodipropionic acid		
Category 2B	-	Hexyl cinnamic aldehyde		

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	CASRN	In Vivo Data Source	Substance Source	Commercial Availability	Chemical Class	Product Class	Conc. Tested	Amount Tested[1]	Purity	MW	pH	Dermal Corrosivity	# of Animals Tested	Water Solubility	Log Kow	Color	Physical Form Tested	MMAS score
Category 2B	-	N-Laurylsarcosine sodium salt	137-16-6	LNS	n.a.	Sigma-Aldrich Corp.	Amide, Amine, Salt (organic)	Cleaning Agent, Detergent, Laboratory Chemical, Surfactant (anionic)	10%	0.1 mL	n.a.	293.4	?	?	3	?	?	?	liquid	31.0
Category 2B	-	Maneb (solid)	12427-38-2	ECETOC	US EPA	Sigma-Aldrich Corp.	Amine, Salt (organic), Urea	Pesticide	100%	100 mg	90% (approx)	265.3	8.4	noncorrosive	6	Moderately soluble	n.a.	?	solid	14.3
Category 2B	-	2-Methyl-1-pentanol	105-30-6	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Alcohol	Solvent	100%	0.1 mL	99%	102.2	n.a.	noncorrosive	3	soluble (6 g/L)	1.75	?	liquid	13.0
Category 2B	-	Propasol Solvent P	1569-01-3	TSCA	Union Carbide Corp.	Sigma-Aldrich Corp.	Alcohol	Solvent	100%	0.1 mL	n.a.	118.2	?	?	6	?	?	?	liquid	31.2
Category 2B	-	6-Methyl purine	2004-03-7	TSCA	Monsanto Co.	Sigma-Aldrich Corp.	Heterocyclic Compound	Laboratory Chemical, Pharmaceutical Intermediate	100%	0.1 mL	n.a.	134.1	-	-	6	?	?	?	liquid	48.7
Category 2B	-	2,6-Dichloro-5-fluoro-beta-oxo-3-pyridinepropanoate	96568-04-6	GSK	n.a.	Sigma-Aldrich Corp.	Ester, Heterocyclic Compound, Ketone	Industrial Chemical, Pharmaceutical Intermediate	100%	0.1 mL or 100 mg	n.a.	280.1	?	?	3	?	?	white	solid	21.3
Category 2B	-	Triton X-100	9002-93-1	ECETOC	n.a.	Sigma-Aldrich Corp.	Ether	Surfactant (nonionic)	5%	0.1 mL	98%	250.4	n.a.	noncorrosive	6	soluble	n.a.	colorless	liquid	33.8
nonirritant	-	iso-Octyl acrylate	29590-42-9	ECETOC	Elf Atochem, Inc.	Sigma-Aldrich Corp.	Ester	Building Material	100%	0.1 mL	>99%	184.3	n.a.	noncorrosive	3	n.a.	n.a.	?	liquid	5.3
nonirritant	-	tetra-Aminopyrimidine sulfate	5392-28-9	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Amine, Heterocyclic Compound, Salt (organic)	Chemical Intermediate	100%	100 mg	97%	238.2	n.a.	noncorrosive	3	slightly soluble	n.a.	?	solid	10.3
nonirritant	-	2,4-Difluoronitrobenzene	446-35-5	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Hydrocarbon (halogenated)	Pesticide, Pharmaceutical Intermediate	100%	0.1 mL	99%	159.1	n.a.	noncorrosive	6	n.a.	n.a.	n.a.	solid	4.7
nonirritant	-	n,n-Dimethylguanidine sulfate	598-65-2	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Amidine, Salt (organic)	Laboratory Chemical	100%	100 mg	>95%	272.3	n.a.	noncorrosive	3	n.a.	n.a.	n.a.	solid	6.7
nonirritant	-	2-(n-Dodecylthio)ethanol	1462-55-1	ECETOC	Elf Atochem, Inc.	Sigma-Aldrich Corp.	Alcohol, Ether, Sulfur Compound (organic)	Chemical Intermediate	100%	100 mg	>99%	206.3	?	?	3	?	?	white	solid	0.0
nonirritant	-	iso-Propyl bromide	75-26-3	ECETOC	Fluka, Inc.	Sigma-Aldrich Corp.	Hydrocarbon (halogenated)	Chemical Intermediate, Pharmaceutical Intermediate	100%	0.1 mL	>99%	123.0	?	?	3	3 g/L	1.9	?	liquid	9.7
nonirritant	-	Di-iso-butyl ketone	108-83-8	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Ketone	Pharmaceutical Intermediate, Solvent	100%	0.1 mL	99%	142.2	n.a.	noncorrosive	3	0.05 g/ 100 mL	n.a.	?	liquid	7.3
nonirritant	-	iso-Octylthioglycolate	25103-09-7	ECETOC	Elf Atochem, Inc.	Sigma-Aldrich Corp.	Ester, Sulfur Compound (organic)	Industrial Chemical	100%	0.1 mL	99%	204.3	n.a.	noncorrosive	3	n.a.	n.a.	clear, water-white	liquid	4.0
nonirritant	-	2,4-Pentanediol	625-69-4	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Alcohol	Chemical Intermediate	100%	0.1 mL	98%	104.2	n.a.	?	3	?	?	?	liquid	4.7
nonirritant	-	2,2-Dimethyl-3-pentanol	3970-62-5	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Alcohol	Pharmaceutical	100%	0.1 mL	97%	116.2	n.a.	noncorrosive	3	insoluble	n.a.	colorless	liquid	8.3
nonirritant	-	Potassium tetrafluoroborate	14075-53-7	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Salt (inorganic)	Industrial Chemical, Pesticide	100%	100 mg	>99%	125.9	n.a.	R34	3	4.4 g/L	n.a.	n.a.	solid	0.0
nonirritant	-	3-Methoxy-1,2-propanediol	623-39-2	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Ether, Phenol	Laboratory Chemical	100%	0.1 mL	98%	106.1	?	?	3	soluble	?	?	liquid	0.0
nonirritant	-	Sodium lauryl sulfate	151-21-3	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Acid (organic) [carboxylic acid], Salt (organic)	Cleaning Agent, Cosmetic Ingredient, Food Additive, Laboratory Chemical, Pesticide Intermediate, Surfactant (anionic)	3%	0.1 mL	98 %	288.4	8.0-10.0 (1% aq.)	noncorrosive	6	1 g/10 mL	1.60 (100%)	?	liquid	7.3
nonirritant	-	Toluene	108-88-3	ECETOC	Fisher Scientific International, Inc.	Sigma-Aldrich Corp.	Hydrocarbon (cyclic)	Chemical Intermediate, Industrial Chemical, Laboratory Chemical	100%	0.1 mL	99%	92.1	?	?	4	?	?	colorless	liquid	9.0
nonirritant	-	Triton X-100	9002-93-1	ECETOC	Sigma-Aldrich Corp.	Sigma-Aldrich Corp.	Ether	Surfactant (nonionic)	1%	0.1 mL	98%	250.4	7.2	noncorrosive	6	soluble	n.a.	colorless	liquid	1.7

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	Corneal score	Irital score	Conjunctival score	Tested in BCOP	Tested in HET-CAM	Tested in ICE	Tested in IRE	EPA Classification	EU Classification	FHSA Classification	Human Exposure Summary
Category 2B	-	N-Laurylsarcosine sodium salt	-	-	-	X	-	-	-	Category III	nonirritant	SCNM	Human data not located
Category 2B	-	Maneb (solid)	-	-	-	X	X	X	X	Category III	R36	irritant	Generally regarded as harmless, with no irritation, except for mild conjunctivitis (9)
Category 2B	-	2-Methyl-1-pentanol	-	-	-	-	-	-	-	Category III	nonirritant	SCNM	Human data not located
Category 2B	-	Propasol Solvent P	-	-	-	-	-	-	-	Category II	nonirritant	irritant	Human data not located
Category 2B	-	6-Methyl purine	-	-	-	-	-	-	-	Category IV	R36	irritant	Human data not located
Category 2B	-	2,6-Dichloro-5-fluoro-beta-oxo-3-pyridinepropanoate	-	-	-	-	-	-	-	Category III	nonirritant	SCNM	Human data not located
Category 2B	-	Triton X-100	-	-	-	-	X	X	X	Category I	R41	SCNM	Human data not located
nonirritant	-	iso-Octyl acrylate	-	-	-	-	-	-	-	Category IV	nonirritant	SCNM	Human data not located
nonirritant	-	tetra-Aminopyrimidine sulfate	-	-	-	X	X	X	-	Category III	nonirritant	SCNM	Human data not located
nonirritant	-	2,4-Difluoronitrobenzene	-	-	-	-	-	-	-	Category III	nonirritant	SCNM	Human data not located
nonirritant	-	n,n-Dimethylguanidine sulfate	-	-	-	-	-	-	-	Category III	nonirritant	SCNM	Human data not located
nonirritant	-	2-(n-Dodecylthio)ethanol	-	-	-	-	-	-	-	Category IV	nonirritant	SCNM	Human data not located
nonirritant	-	iso-Propyl bromide	-	-	-	-	-	-	-	Category IV	nonirritant	SCNM	Human data not located
nonirritant	-	Di-iso-butyl ketone	-	-	-	-	-	-	-	Category IV	nonirritant	SCNM	Causes minor irritation to the eye (4, 20)
nonirritant	-	iso-Octylthioglycolate	-	-	-	-	-	-	-	Category IV	nonirritant	SCNM	Human data not located
nonirritant	-	2,4-Pentanediol	-	-	-	-	-	-	-	Category IV	nonirritant	SCNM	Human data not located
nonirritant	-	2,2-Dimethyl-3-pentanol	-	-	-	-	-	-	-	Category III	nonirritant	SCNM	Human data not located
nonirritant	-	Potassium tetrafluoroborate	-	-	-	-	-	-	-	Category IV	nonirritant	SCNM	Human data not located
nonirritant	-	3-Methoxy-1,2-propanediol	-	-	-	-	-	-	-	Category IV	nonirritant	SCNM	Human data not located
nonirritant	-	Sodium lauryl sulfate	-	-	-	X	X	X	X	Category III	nonirritant	irritant	Sodium lauryl sulfate is said to have been the commonest cause of eye irritation by commercial shampoos (10)
nonirritant	-	Toluene	-	-	-	-	X	X	X	Category III	nonirritant	SCNM	Vapors of toluene cause noticeable sensation of irritation to human eyes at 300-440 ppm in air, but even at 800 ppm, irritation is slight. Vapors irritate eyes and upper respiratory tract; liquid irritates eyes (10, 27).
nonirritant	-	Triton X-100	-	-	-	X	-	-	-	Category II	R36	irritant	Human data not located

GHS Classification	NICEATM Category 1 SubClass [2]	Substance	Animal Exposure Summary for Category 1(H) Substances	Notes
Category 2B	-	N-Laurylsarcosine sodium salt		
Category 2B	-	Maneb (solid)		
Category 2B	-	2-Methyl-1-pentanol		
Category 2B	-	Propasol Solvent P		
Category 2B	-	6-Methyl purine		
Category 2B	-	2,6-Dichloro-5-fluoro-beta-oxo-3-pyridinepropanoate		
Category 2B	-	Triton X-100		
nonirritant	-	iso-Octyl acrylate		
nonirritant	-	tetra-Aminopyrimidine sulfate		
nonirritant	-	2,4-Difluoronitrobenzene		
nonirritant	-	n,n-Dimethylguanidine sulfate		
nonirritant	-	2-(n-Dodecylthio)ethanol		
nonirritant	-	iso-Propyl bromide		
nonirritant	-	Di-iso-butyl ketone		
nonirritant	-	iso-Octylthioglycolate		
nonirritant	-	2,4-Pentanediol		
nonirritant	-	2,2-Dimethyl-3-pentanol		
nonirritant	-	Potassium tetrafluoroborate		
nonirritant	-	3-Methoxy-1,2-propanediol		
nonirritant	-	Sodium lauryl sulfate		
nonirritant	-	Toluene		
nonirritant	-	Triton X-100		

Abbreviations: ? = Data has not been obtained at this time; - = not applicable; AG = Aktiengesellschaft (incorporated); Assn. = Association; BASF = Badische Anilin- & Soda Fabrik AG; BCOP = Bovine Corneal Opacity and Permeability; CASRN = Chemical Abstracts Service Registry Number; CC = Conjunctival Chemosis; Co. = Company; CO = Corneal Opacity; Conc. = concentration; Corp. = Corporation; CR = Conjunctival Redness; CTFA = Cosmetic, Toiletries and Fragrance Association; D = Day; ECETOC= European Center for Ecotoxicology and Toxicology of Chemicals; GmbH = Gesellschaft mit beschränkter Haftung (Inc.); GSK = Glaxo Smith-Kline; HET-CAM = Hen's Egg Test- Chorioallantoic Membrane; ICE = Isolated Chicken Eye; IRE = Isolated Rabbit Eye; ISOPA = European Diisocyanate and Polyol Producers Association; I = Iritis; Lab. = Laboratory; LNS= Laboratoire National de la Sante; Log Kow = octanol/water partition coefficient; Ltd. = Limited; LLC = Limited Liability Company; MeSH = Medical Subject Headings, information on chemical class criteria can be obtained at www.nlm.nih.gov/mesh; MG CU/ M = Milligrams Per Cubic Meter; MMAS = Modified Maximum Average Score; the highest (maximum) average of the individual animal weighted scores for observation times greater than or equal to 24 hours after test substance instillation.; MW = molecular weight; n = number of animals; n.a. = not available; noncorrosive = not classified as a dermal corrosive; NIHS-Ohno = National Institute of Health Sciences, Japan, Yasuo Ohno; PPM = Parts Per Million; R34 = causes burns; R35 = causes severe burns; SCNM = Study Criteria Not Met; (H) = classification based on inducing severe ocular damage in humans; TNO-Prinsen = Institute CIVO, Menk Prinsen; TSCA = Toxic Substances Control Act; ZEBET = German Center for Documentation and Evaluation of Alternative Methods to Animal Experiments; X = Where a substance has been tested in BCOP, HET-CAM, ICE, or IRE, the presence of an "X" indicates that the substance has been tested in the proposed version of this test method.

NICEATM Cat. 1 Subcat. = Category 1 subcategories = NICEATM-assigned subcategories for GHS Category 1 substances (ocular corrosives and severe irritants) were assigned based on the following: 0 = not classifiable; 1 = positive response based on a persistent lesion involving the cornea, iris, and/or conjunctiva through to day 21 in at least one of three rabbits and not on severity; 2 = positive response based on mean for first 3 days (corneal opacity [CO] score >3 and <4 or iritis [IR] score >1.5) in at least two of three rabbits but lesions do not persist through day 21; 3 = positive response based on mean for first 3 days (CO >3 and <4 or IR >1.5) in at least two of three rabbits and a persistent (>21 days) lesion in at least one rabbit; 4 = CO score of 4 at any time in at least one of three rabbits

“100 mg or 0.1 mL” indicates studies which were conducted according to Draize, but for which the amount tested was not provided in the study information provided or obtained.

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