Supplement 1. Safe Handling of Hazardous Substances

Appendix 1-3 Threshold Limit Values of Hazardous Substances

Admonishment for TLV May 7, 1999
Japan Society for Occupational Health

Each permissible standard for the Threshold Limit Value (TLV) of hazardous substances stated herein has been recommended by the Japan Society for Occupational Health in order to be used as an introduction to prevent workers' health disorders caused by environmental factors.

1. Definition of TLV

TLV caused by hazardous substances in the air at a workplace is defined as follows in order to prevent health disorders. TLV is the concentration that is lower than the defined value that assures no damage to almost all workers' health when they are exposed to hazardous substances.

2. Characteristic of TLV

1) Even when exposure is less than TLV, indisposition, deterioration of existing health disorders, or occupational diseases could occur as the receptivity of each individual toward hazardous substances differs.
2) TLV is based on various knowledge that has been obtained from experience in industry and experimental research about people and animals etc. Therefore, the volume and the quality of the obtained information that is used to decide TLV may differ depending on substances.
3) The types of biological effect that were taken into consideration in order to decide TLV vary from substance to substance. The reason for the effect on health disorders are required for some substances and the reason for the effect on indisposition, excitement, and central nervous system depressant are required for other substances.

3. Precautions For Use

When TLV is used, the following must be noted.

1) User Requirement
   The TLV should be used only by those who have sufficient knowledge and experience in industrial hygiene.
2) Meaning of the numeric value without [*] mark
   The numeric value without [*] mark in Appendix Table 1 & 2 indicates the TLV that does not have any effect on workers' health if the value of the exposure concentration (note 1) is smaller than the indicated value in the table under the condition that workers are engaged in light labor with 40 working hours a week, 8 hours a day.
   If working hours are divided into several parts in accordance with the description of work, place of work, and degree of exposure and the average exposure concentration or the estimate value of each part are known, the overall average exposure concentration or its estimate value can be drawn from the average value calculated with the weight of working hours.

3) Evaluation of concentration fluctuation

Exposure concentration fluctuates above and below the average value. The numeric value without [*] mark is used when the fluctuation range is not so big. The permissible fluctuation range depends on substances. Unless there is a notation, it is desirable that the average exposure concentration for 15 minutes including the moment when the exposure concentration becomes the maximum does not become more than one and a half times of the numeric value of the TLV.

4) Meaning of the numeric value with [*] mark

The numeric value with [*] mark in Appendix Table 1 & 2 shows the maximum TLV (note 2). It means that there will be no damage to almost all the workers' health, if the exposure concentration during the working hours stays below the maximum value. The reason for recommending the TLV of some substances as maximum TLV is because the toxicity of the substances principally involves biological effects such as excitement and central nervous system depressant that occur after brief exposure.

5) The substances with the (skin) mark in Appendix Table 1 & 2 are easily absorbed through the skin. The amount of absorption by the contact of skin and the substance could reach the amount that cannot be ignored. The average exposure concentration, therefore, needs to be of smaller value than the TLV that is equivalent to the amount of skin absorption, if the absorption exposure of the substances with (skin) mark and the skin exposure coexist.

6) TLV of mixed substances

Indicated value of the TLV is the value when the substances are in the air independently. In case of exposure by more than two substances, one should not judge the TLV only by individual substance's TLV. If an assumption that several substances' toxicities are added to one another can be made and the value of 'I' calculated by the following expression exceeds 1, the exposure is considered to be above the TLV.

$I = (C1/T1) + (C2/T2) + \cdots + (Ci/Ti)$

Ci = individual substance's average concentration in incoming air

Ti = individual substance's TLV

Also, one should be careful about the individual substance's toxicity of mixed substances when the toxicity shows stronger than additive toxicity.

7) Relation with labor condition other than hazardous substances

When using the TLV, labor intensity, thermal condition, nuclear radiation, and atmospheric pressure should be considered. When these conditions are added, one needs to pay attention to the fact that the hazardous substances' effect on health can be enhanced.

8) Restriction on application of TLV

i. Do not think that the TLV shows the clear borderline between safety and danger.

ii. Do not use the numeric value of the TLV as a unit of measurement for relative comparison of severity of substance toxicity.

iii. Do not use the numeric value of the TLV as a limiting value for air pollution or general indoor pollution.

iv. Do not judge certain substance as the reason for health disorder just because the substance exceeds the TLV when workers have some sort of health problem under the work environment that exceeds TLV. Also, do not judge a certain substance as no reason for health disorder just

because the substance does not exceed the TLV.

9) Revision & addition of TLV

TLV should be revised and added to depending on the increase of knowledge, accumulation of information, use of new substances regarding the health effect of hazardous substances and work conditions. To bring this admonishment to perfection, we are always ready to accept ideas based on scientific basis about each TLV from all quarters.

Note 1. Exposure concentration is the concentration of substances in the air that a worker may inhale while at work without wearing a mask.

Note 2. Measurement for judging momentary exposure that exceeds the maximum TLV is extremely difficult to be precise. In practice, maximum value that can be measured in a total of 5 minutes maximum is appropriate.

Appendix Table 1. Threshold Limit Volume

Substance [CAS No.]	Chemical Formula	TLV		Absorp. via skin	Car-cino-gen Class	Sensitiza-tion Class		Pro-posed Year
		ppm	mg/m^2			Wind-pipe	skin	
Acrylaldehyde[79-06-1]	CH_2=CHCONH$_2$	-	0.3	skin	2A			‘80
Acrylaldehyde[107-02-8]	CH_2=CHCHO	0.1	0.23					‘73
Acrylonitrile[107-13-1]	CH_2=CHCN	2	4.3	skin	2A			‘88
Acetaldehyde[75-07-2]	CH_3CHO	50*	90*		2B			‘90
Acetone[67-64-1]	CH_3COCH_3	200	470					‘72
o-Anisidine[90-40-0]	$CH_3OC_6H_4NH_2$	0.1	0.5	skin	2B			‘96
p-Anisidine[104-94-9]	$CH_3OC_6H_4NH_2$	0.1	0.5	skin				‘96
Aniline[62-53-3]	$C_6H_5NH_2$	1	3.8	skin				‘88
2-Aminoethanol [141-43-5]	$H_2NCH_2CH_2OH$	3	7.5					‘65
Allyl alcohol[107-18-6]	CH_2=CHCH$_2$OH	1	2.4	skin				‘78
Arsine[7784-42-1]	AsH_3	0.01 0.1*	0.032 0.32*					‘92
Antimony and Antimony compounds (exclude Stibine as Sb) [7440-36-0]	Sb	-	0.1		2B			‘91
Ammonia[7664-41-7]	NH_3	25	17					‘79
Isobutyl alcohol [78-83-1]	$(CH_3)_2CHCH_2OH$	50	150					‘87

Isoprothiolane [50512-35-1]	$C_{12}H_{18}O_4S_2$	-	5					‘93
Isopropyl alcohol [78-83-1]	$CH_3CH(OH)CH_3$	400*	980*					‘87
Isopentyl alcohol [123-51-3]	$(CH_3)_2CHCH_2CH_2OH$	100	360					‘66
Carbon monoxide [630-08-0]	CO	50	57					‘71
Ethylamine[75-04-7]	$C_2H_5NH_2$	10	18					‘79
Ethyl ether[60-29-7]	$(C_2H_5)_2O$	400	1200					(‘97)
Ethylbenzene [100-41-4]	$C_6H_5\ C_2H_5$	100	430					‘78
Ethyleneimine [151-56-4]	C_5H_5N	0.5	0.88	skin				(‘90)
Ethylene oxide [75-21-8]	C_2H_4O	1	1.8		1		2	‘90
Ethylene glycol monoethyl ether [110-80-5]	$C_2H_5OCH_2CH_2OH$	5	18	skin				‘85
Ethylene glycol monoethyl ether acetate [111-15-9]	$C_2H_5OCH_2CH_2OCOCH_3$	5	27	skin				‘85
Ethylene glycol monomethyl ether [109-86-4]	$CH_3OCH_2CH_2OH$	5	16	skin				‘85
Ethylene glycol monomethyl ether acetate[110-49-6]	$CH_3OCH_2CH_2OCOCH_3$	5	24	skin				‘85
Ethylenediamine [107-15-3]	$H_2N\ CH_2CH_2NH_2$	10	25	skin		2	1	‘91
Etofenprox[#] [80844-07-1]	$C_{25}H_{28}O_3$	-	3					‘95
Hydrogen chloride [7647-01-0]	HCl	5*	7.5*					‘79
Vinyl chloride [75-01-4]	CH_2=CHCl	2.5[a]	6.5[a]		1			‘75
Chlorine[7782-50-5]	Cl_2	(ten-tative value)						‘99
Yellow phosphorus [7723-14-0]	P_4	-	0.1					(‘88)
Octane[111-65-9]	$CH_3(CH_2)_6CH_3$	300	1400					‘89

Ozone[10028-15-6]	O_3	0.1	0.20					‘63
Gasoline[80006-61-9]		100[b]	300[b]					‘85
Cadomium and cadomium compounds (as Cd)[7440-43-9]	Cd	-	0.05		1			‘76
Carbaryl[#] [63-25-2]	$C_{12}H_{11}NO_2$	-	5	skin				‘89
Formic acid[64-18-6]	HCOOH	5	9.4					‘78
Xylene (all isomers)	$C_6H_4(CH_3)_2$	100	430					‘78
Silver and silver Compounds (as Ag) [7440-22-4]	Ag	-	0.01					‘91
Cresol(all isomers)	$C_6H_4CH_3(OH)$	5	22	skin		2	1	‘86
Chrome and Chrome compounds (as Cr) [7440-47-3] Chrome metal- Cr(III) compds. Cr(IV) compds. Some Cr(VI) compounds	Cr	 - - - -	 0.5 0.5 0.05 0.01		 1			‘89
Chloroethane [75-00-3]	C_2H_5Cl	100	260					‘93
Chlorodifluoromethane [75-45-6]	$CHClF_2$	1000	3500					‘87
Chloropicrin [76-06-2]	CCl_3NO_2	0.1	0.67					‘68
Chlorobenzene[108-90-7]	C_6H_5Cl	10	46					‘93
Chloroform [67-66-3]	$CHCl_3$	10	49		2B			‘91
Chloromethane [74-87-3]	CH_3Cl	50	100					‘84
Chloromethyl methyl ether (for industry) [107-30-2]	CH_3OCH_2Cl	no value			2A			‘92
Mineral oil mist			3		1			77
Phosphorus pentachloride[10026-13-8]	PCl_5	-0.1	0.85					‘89
Cobalt and cobalt compounds (as Co) [7440-68-4]	Co	-	0.06		2B	1 1	1	‘92
Acetic acid[64-19-7]	CH_3COOH	10	25					‘78
Isopentyl acetate[123-92-2]	$CH_3COO(CH_2)_2CH(CH_3)_2$	100	530					‘70
Ethyl acetate[141-78-6]	$CH_3COOC_2H_5$	200	720					‘95
Butyl acetate[123-60-4]	$CH_3COO(CH_2)_3CH_3$	100	475					‘94
Propyl acetate[109-60-4]	$CH_3COO(CH_2)_2CH_3$	200	830					‘70

Pentyl acetate[628-63-7]	$CH_3COO(CH_2)_4CH_3$	100	530					‘70
Methyl acetate[79-20-9]	CH_3COOCH_3	200	610					‘63
Phosphorus trichloride [7719-12-2]	PCl_3	0.2	1.1					‘89
Zinc oxide fume[1314-13-2]	ZnO	-	5					‘69
Arsenic trioxide (as As)[1327-53-3]	As_2O_3	under study			1			‘63
Boron trifluoride [7637-07-2]	BF_3	0.3	0.83					‘79
Hydrogen cyanide[74-90-8]	HCN	5	5.5	skin				‘90
Diethylamine[109-89-7]	$(C_2H_5)_2NH$	10	30					‘89
Carbon tetrachloride [56-23-5]	CCl_4	5	31	skin	2B			‘91
1,4-Dioxane [123-91-1]	$C_4H_8O_2$	10	36	skin	2B			‘84
Cyclohexanol[108-93-0]	$C_6H_{11}OH$	25	102					‘70
Cyclohexanone[108-94-1]	$C_6H_{10}O$	25	100					‘70
Cyclohexane[110-82-7]	C_6H_{12}	150	520					‘70
1,1-Dichloroethane [75-34-3]	Cl_2CHCH_3	100	400					‘93
1,2-Dichloroethane [107-06-2]	$ClCH_2CH_2Cl$	10	40		2B			‘84
2,2-Dichloroethyl ether[111-44-4]	$(ClCH_2CH_2)_2O$	15	88	skin				‘67
1,2-dichloro- ethylene[540-59-0]	ClCH=CHCl	150	590					‘70
Dichlorodifluoromethane [75-71-8]	CCl_2F_2	500	2500					‘87
o-Dichlorobenzene [95-50-1]	$C_6H_4Cl_2$	25	150					‘94
p-Dichlorobenzene [106-46-7]	$C_6H_4Cl_2$	10	60		2B			‘98
Dichloromethane[75-09-2]	CH_2Cl_2	(tentative value)						‘94
3,3’-Dichloro-4,4’-di-aminodiphenyl-methane(MBOCA) [101-14-4]	$CH_2 (C_6H_4NH_2Cl)_2$	-	0.005	skin	2A			‘93
Diphenylmethane-4,4’diisocyanate (MDI)[101-68-8]	$CH_2 (C_6H_4NCO)_2$	-	0.05			1		‘93
1,2-Dinitrobenzene [528-29-0]	$C_6H_4(NO_2)_2$	0.15	1	skin				‘94
1,3-Dinitrobenzene	$C_6H_4(NO_2)_2$	0.15	1	skin				‘94

[99-65-0]								
1,4-Dinitrobenzene [100-25-4]	$C_6H_4(NO_2)_2$	0.15	1	skin				‘94
Diborane[19287-45-7]	B_2H_6	0.01	0.012					‘96
N,N-Dimethylacetamide [127-19-5]	$(CH_3)_2NCOCH_3$	10	36	skin				‘90
N,N-Dimethylaniline [121-69-7]	$C_6H_5N(CH_3)_2$	5	25	skin	2B			‘93
Dimethylamine[124-40-3]	$(CH_3)_2NH$	10	18					‘79
N,N-Dimethyl- formaldehyde (DMF)[68-12-2]	$(CH_3)_2N$ CHO	10	30	skin	2B			‘74
Bromine[7726-95-6]	Br_2	0.1	0.65					‘64
Nitric acid [7697-37-2]	HNO_3	2	5.2					‘82
Silane[7803-62-5]	SiH_4	100*	130*					‘93
Mercury vapor[7439-97-6]	Hg	-	0.025					‘98
Potassium hydroxide [1310-58-3]	KOH	-	2*					‘78
Sodium hydroxide [1310-58-3]	NaOH	-	2*					‘78
Lithium hydroxide [1310-73-2]	LiOH	-	1					‘95
Styrene[100-42-5]	$C_6H_5CH=CH_2$	(tentative value)		skin	2B			‘99
Selenium and selenium compounds (as Se, inorganic compounds excluding SeH_2)[7782-49-2]	Se	-	0.1					‘63
Hydrogen selenide [7783-07-5]	SeH_2	0.05	0.17					‘63
Diazinon# [333-41-5]	$C_{12}H_{21}N_2O_3PS$	-	0.1	skin				‘89
Tetraethyllead (as Pb)[78-00-2]	$Pb(C_2H_5)_4$	-	0.075	skin				‘65
Tetraethoxysilane [78-10-4]	$Si(OC_2H_5)_4$	10	85					‘91
1,1,2,2-Tetrachloro-ethane[79-34-5]	$Cl_2CHCHCl_2$	1	6.9	skin				‘84
Tetrachloroethylene [127-18-4]	$Cl_2C=CCl_2$	(under study)		skin	2B			‘72
Tetrahydrofuran[109-99-9]	C_4H_8O	200	590		2B			‘78
Tetramethoxysilane [681-84-5]	$Si(OCH_3)_4$	1	6					‘91
Turpentine#		50	280				2	‘91
1,1,1-Trichloroethane	Cl_3CCH_3	200	1100					‘74

[71-55-6]								
1,1,2-Trichloroethane [79-00-5]	Cl_2CHCH_2Cl	10	55	skin				(‘78)
Trichloroethylene[79-01-6]	$Cl_2C=CHCl$	25	135		2B			‘97
1,1,2-Trichloro-1,2,2-trifluoroethane[76-13-1]	$Cl_2FCCClF_2$	500	3800					‘87
Trichlorofluoromethane [75-69-4]	CCl_3F	1000*	5600*					‘87
Tricyclazole# [41814-78-2]	$C_9H_7N_3S$	-	3					‘90
Trinitrotoluene (all isomers)	$C_6H_2CH_3(NO_2)_3$	-	0.1	skin				‘93
1,2,3-Trimethylbenzene [526-73-8]	$C_6H_3(CH_3)_3$	25	120					‘84
1,2,4-Trimethylbenzene [95-63-6]	$C_6H_3(CH_3)_3$	25	120					‘84
1,3,5-Trimethylbenzene [108-67-8]	$C_6H_3(CH_3)_3$	25	120					‘84
o-Toluidine[95-53-4]	$CH_3C_6H_4NH_2$	1	4.4	skin	2B			‘91
Toluene[108-88-3]	$C_6H_5CH_3$	50	188	skin				‘94
Toluenediisocyanates(TDI)	$C_6H_3CH_3(NCO)_2$	0.005 0.02*	0.035 0.14*		2B	1	2	‘92
Lead and lead compounds (as Pb, excluding alkyllead compounds)[7493-92-1]	Pb	-	0.1	2B				‘82
Disulfur dichloride [10025-67-9]	S_2Cl_2	1*	5.5*					‘76
Sulfur dioxide[7446-09-5]	SO_2	(under study)						‘61
Carbon dioxide[124-38-9]	CO_2	5000	9000					‘74
Nitrogen dioxide	NO_2	(under study)						
Nickel[7440-02-0]	Ni	-	1		2B	2	1	‘61
Nickel carbonyl [13463-39-3]	$Ni(CO)_5$	0.001	0.0070					‘66
p-Nitroaniline[100-01-6]	$H_2NC_6H_4NO_2$	-	3	skin				‘95
Nitroglycol[628-96-6]	$O_2NOCH_2CH_2ONO_2$	0.05	0.31	skin				‘86
Nitroglycerin[55-63-0]	$(O_2NOCH_2)_2CHONO_2$	0.05*	0.46*	skin				‘86
p-Nitrochlorobenzene [100-00-5]	$C_6H_4ClNO_2$	0.1	0.64	skin				‘89
Nitrobenezene[98-95-3]	$C_6H_5NO_2$	1	5	skin				‘88）
Carbon disulfide[75-15-0]	CS_2	10	31	skin				‘74
Nonane[111-84-2]	$CH_3(CH_2)_7CH_3$	200	1050					‘89

Vanadium compounds [1314-62-1] Vanadium oxide fume Vanadium oxide dust Ferovanadium dust [12604-58-9]	 V_2O_5 fume V_2O_5 dust FeV dust	 - - -	 0.1 0.5 1					 ‘68 ‘68 ‘68
Parathion# [56-38-2]	$(C_2H_5O)_2PSOC_6H_4NO_2$	-	0.1	skin				(‘80)
Pyridafenthion# [119-12-0]	$C_{14}H_{17}N_2O_4PS$	-	0.2	skin				‘89
Fenitrothion# [122-14-5]	$C_2H_{12}NO_5PS$	-	1	skin				‘81
o-Phenylenediamine [95-54-5]	$C_6H_4(NH_2)_2$	(tentative value)						‘99
p-Phenylenediamine [108-45-2]	$C_6H_4(NH_2)_2$	(tentative value)						‘99
p-Phenylenediamine [160-50-3]	$C_6H_4(NH_2)_2$	-	0.1				1	‘97
Fenobucarb# [3766-81-2]	$C_{12}H_{17}NO_2$	-	5	skin				‘89
Phenol[108-95-2]	C_6H_5OH	5	19	skin				‘78
Fenthion# [55-38-9]	$C_{10}H_{15}O_3PS_2$	-	0.2	skin				‘89
Fthalide# [27355-22-2]	$C_2H_2Cl_4O_2$	-	10					‘90
1-Butanol[71-36-3]	$CH_3(CH_2)_3OH$	50*	100*	skin				‘87
2-Butanol[78-92-2]	$CH_3CH(OH)CH_2CH_3$	100	300					‘87
Diethyl phthalate[84-66-2]	$C_6H_4(COOC_2H_5)_2$	-	5					‘95
Di(2-ethyl)hexyl phthalate[117-81-7]	$C_{24}H_{28}O_2$	-	5					‘95
Dibutyl phthalate[84-74-2]	$C_6H_4(COOC_4H_9)_2$	-	5				2	‘96
Butane (all isomers)	C_4H_{10}	500	1200					‘88
Butylamine[109-73-9]	$CH_3(CH_2)_3NH_2$	5*	15*	skin				(‘94)
t-Butyl alcohol[75-65-0]	$(CH_3)_3COH$	50	150					‘87
Hydrogen fluoride [7664-39-3]	HF	8	2.5					‘90
Buprofezin# [69327-76-0]	$C_{16}H_{23}N_3OS$	-	2					‘90
Flutolanil# [66332-96-5]	$C_{17}H_{16}F_3NO_2$	-	10					‘90
Furfural [98-01-1]	$C_5H_4O_2$	2.5	9.8	skin				‘89)
Furfuryl alcohol [98-00-0]	$C_4H_3OCH_2OH$	5	20					‘78
Propyleneimine [75-55-8]	C_3H_7N	2	4.7	skin				‘97
Bromoform [75-25-2]	$CHBr_3$	1	10.3					‘97
Hexane[110-54-3]	$CH_3(CH_2)_4CH_3$	40	140	skin				‘80

Hexane-1,6-diisocyanate [822-06-0]	$OCN(CH_2)_4NCO$	0.005	0.034			1		‘95
Heptane[142-82-5]	$CH_3(CH_2)_5CH_3$	200	820					‘88
Beryllium and beryllium compounds (as Be) [7440-41-7]	Be	-	0.002		2A	1	2	‘63
Benzene [71-43-2]	C_6H_6	10	32	skin	1			‘97
Pentachlorophenol[87-86-5]	C_6Cl_5OH	-	0.5	skin				(‘89)
Pentane[109-66-0]	$CH_3(CH_2)_3CH_3$	300	880					‘87
Phosgene [75-44-5]	$COCl_2$	0.1	0.4					‘69
Phosphine [7803-51-2]	PH_3	0.3*						‘98
Polychlorinated biphenyls	$C_{12}H_{(10-n)}Cl_n$	-	0.1	skin	2A			‘76
Formaldehyde [50-00-0]	HCHO	0.5	0.61		2A	2	1	‘88
Malathion# [121-75-5]	$C_{10}H_{19}O_6PS_2$	-	10	skin				‘89
Manganese and manganese compounds (as Mn, excluding organomanganese compounds) [7439-96-5]	Mn	-	0.3					‘85
Acetic anhydride [108-24-7]	$(CH_3CO)_2O$	5*	21*					‘90
Trimellitic anhydride# [552-30-7]	$C_9H_4O_5$	-	0.01			1		‘98
Anhydrous hydrazine and hydrazine monohydrate [302-01-2 and 7803-57-8]	H_2NNH_2 and $H_4N_2•H_2O$	0.1	0.13 and 0.21	skin	2B	1	2	‘98
Phthalic anhydride [85-44-9]	$C_8H_4O_3$	0.33	2*					‘98
Methanol[67-56-1]	CH_3OH	200	260	skin				‘63
Methylamine [74-89-5]	CH_3NH_2	10	13					‘79
Methyl isobutyl ketone [108-10-1]	$CH_3COCH_2C(CH_3)_2$	50	200					‘84
Methyl ethy1ketone[78-933]	$CH_3COC_2H_5$	200	590					‘84
Methylcyclohexanol [25639-42-3]	$CH_3C_6H_{10}OH$	50	230					‘80
Methylcyclohexanone [583-60-8]	$CH_3C_6H_9O$	50	230	skin				‘87
Methylcyclohexane [108-87-2]	$CH_3C_6H_{11}$	400	1600					‘86
Methyl n-butyl ketone [591-78-6]	$CH_3CO(CH_2)_3CH_3$	5	20	skin				‘84
4,4’Methylenedianiline [101-77-9]	$CH_2(C_6H_4NH_2)_2$	-	0.4	skin	2B			‘95
Mepronil# [55814-41-0]	$C_{17}H_{19}NO_2$	-	5					‘90
Iodine[7553-56-2]	I_2	0.1	1				2	‘68

Hydrogen sulfide[7783-06-4]	H_2S	10	14					‘63
Sulfuric acid[7664-93-9]	H_2SO_4	-	1					‘63
Dimethyl sulfate[77-81-1]	$(CH_3)_2SO_4$	0.1	0.52	skin	2A			‘80
Phosphoric acid[7664-38-2]	H_3PO_4	-	1					(’90)

Footnotes

1.Gas volume as shown in units of ppm obtained at under 25 ˚C and at 1 atmosphere pressure. Conversion of ppm to mg/m3 was calculated using a three-digit number and the number was rounded off.
2. Parenthesis in the column of proposed year shows the year in which reexamination was carried out, but consequently there was no change in the value.
3. Explanation of the symbols:
   * Maximum threshold limit value. Must always be less than the value.
   † Tentative carcinogen substances
   a. 2.5 ppm is used as tentative value, but the value must be less than the detectable value.
   b. For gasoline, the threshold limit value of 300 mg/m^3 was decided, and conversion of mg/m^3 to ppm was carried out assuming that the average molecular weight for gasoline is 72.5
4. “1” in the column sensitization class means substances apparently causing sensitization in human beings and “2” means substances close to category 1 although the effect is not clear epidemiologically.
5. “1” in the column carcinogen class means carcinogen substances and “2” shows substances that may be carcinogens. “A” indicates a case with more evidence than “B”.
6. For the structures, CAS and IUPAC names of the compounds are shown by their trivial names (#).

Appendix Table 2. Threshold Limit Volume (Tentative Value)

Substance [CAS No.]	Chemical Formula	TLV		Absorp. via skin	Car-cino-gen Class	Sensitiza-tion Class		Proposed Year
		ppm	mg/m^2			Wind-pipe	skin	
Chlorine[7782-50-5]	Cl_2	0.5*	1.5*					‘99
Dichloromethane[75-09-2]	CH_2Cl_2	50 100*	170 340*					‘99
Styrene[100-42-5]	$C_6H_5CH=CH_2$	20	85	skin				
o-Phenylenediamine [95-54-5]	$C_6H_4(NH_2)_2$	-	0.1				1	‘99
m-Phenylenediamine [108-45-2]	$C_6H_4(NH_2)_2$	-	0.1				1	‘99
2-Bromopropane[75-26-3]	$CH_3CHBrCH_3$	1	5	skin				‘99