

Classification of Health Hazard Levels from Occupational Exposure to Toxic Substances (GB 5044-1985)

This standard applies to the classification of health hazard levels from occupational exposure to toxic substances.

1 Basic Definition

Toxic substances occupational exposure to refers to the health hazard substances that may enter into human body through respiratory tract, skin or mouth during workers' production operation, and that exist in the forms of raw material, finished products, semi-finished products, intermediate, by-product of reaction, impurity, etc..

2 Classification Principle

2.1 Classification of health hazard levels from occupational exposure to toxic substances is performed by the following grading criterion based on the six indices of acute toxicity, pathogenic condition of acute poisoning, illness condition of chronic poisoning, chronic poisoning consequence, carcinogenicity and maximum allowed concentration.

2.2 The classification principle shall be determined on the basis of comprehensive analysis and all-round weighing of the above mentioned six indices and the grading results of the majority of them. As for some special toxic substances, classification may be conducted in accordance with the level of major health hazard like acuteness, chronicity and carcinogenicity.

3 Classification Basis

3.1 Acute Toxicity

Acute toxicity is determined in accordance with the data of median lethal concentration (LC_{50}) by intake through the respiratory tract or median lethal dose (LD_{50}) attained through mouth or skin in animal test among which the lowest value of LC_{50} or LD_{50} shall be selected as the figure of acute toxicity.

3.2 Pathogenic Condition of Acute Poisoning

It's a qualitative index to be determined on the basis of the incidence of acute poisoning and consequences of the same. It may be divided into four grades i.e. easy to occur, possible to occur, occasionally occurred, never occurred. The toxic substances that are susceptible to lethal poisoning or disablement shall be considered as having serious consequences of poisoning and those the sufferers of which are easy to get recovered shall be considered as having favorable prognosis.

3.3 Illness Condition of Chronic Poisoning

Normally the incidence of poisoning of operators of major industries the workers of which may be exposed to toxic substances is taken as the base for grading of this index. In case no such data are available the incidence rate of the poisoning symptoms or indices may be considered as the grading basis.

3.4 Chronic Poisoning Consequence

In accordance with the results of chronic poisoning, this index may be divided into four grades i.e. further progressive or impossible to be cured, possible to be basically cured, recoverable and self-recoverable after exposure is eliminated. Chronic poisoning consequence may also be determined in accordance with the character of pathologic change due to injuries (progressive, irreversible or reversible) and the pathophysiological character of the target organ (power of repair, regeneration and function storage) as

shown by the results of animal tests.

3.5 Carcinogenicity

Toxic substances shall be determined to be carcinogenic substances to human body, susceptible carcinogenic substances to human body, carcinogenic substances to animal or non-carcinogenic in accordance with the data of carcinogenicity of the substances published by International Research Institute of Oncology or other generally recognized similar data.

3.6 Maximum Allowed Concentration

It mainly takes the figures of the maximum allowable concentration of the toxic substances in shop air specified in Table 4 of TJ36-79 "Hygienic Standard for Design of Industrial Enterprises" as the criteria.

3.7 The basis for classification of health hazard levels from occupational exposure to toxic substances is shown in Table 1 according to which they are classified into four levels i.e. extremely hazardous, highly hazardous, intermediately hazardous and slightly hazardous.

4 Classifications of Health Hazard Levels from Occupational Exposure to Toxic Substances and Example Occupations

4.1 The health hazard levels of 56 common toxic substances of China that the workers may be exposed to are classified in accordance with this standard for classification. Refer to Table 2.

4.2 The health hazard level from exposure to the same toxic substance in other industries (not covered in Table 2) shall be classified in accordance with the concentration of the toxic substance in the air of the workshop, incidence of poisoning and exposure time. In case the concentration of the toxic substance in the air of the workshop is up to the maximum allowable concentration figure specified in TJ 36-79 the "Hygienic Standard for Design of Industrial Enterprises" and the incidence rate or incidence rate of symptoms are lower than the corresponding figures covered in this standard, the level may be determined one grade lower.

4.3 When multiple toxic substances are exposed to, the level of the toxic substance that is of the highest health hazard level shall prevail.

**Table 1 Basis for Classification of Health Hazard Levels from Occupational Exposure
to Toxic Substances**

		Grade			
Index		I (Extremely Hazardous)	II (Highly Hazardous)	III (Intermediately Hazardous)	IV (Slightly Hazardous)
Acute Toxicity	Aspiratory LC ₅₀ , mg/m ³	<200	200-	2000-	>20000
	Peroral LD ₅₀ , mg/m ³	<100	100-	500-	>2500
	Percutaneous LD ₅₀ , mg/m ³	<25	25-	500-	>5000
Pathogenic Conditions of Acute Poisoning		Easy to Cause Poisoning During Production, Having Serious Consequences	Possible to Cause Poisoning During Production, Having Good Prognosis	Occasionally Causing Poisoning	So far Having not Caused Poisoning, but Having Acute Influence
Pathogenic Conditions of Chronic Poisoning		High Incidence (≥5%)	Fairly High Incidence (<5%) or High Incidence of Symptoms (≥20%)	Occasional Cases of Poisoning Occur or Fairly High Incidence of Symptoms (≥10%)	Causing No Chronic Poisoning but Having Chronic Influence
Consequences of Chronic Poisoning		Further Progressive or Impossible to Be Cured after Exposure Is Eliminated	Possible to Be Basically Cured after Exposure Is Eliminated	Recoverable and No Serious Consequences Will Be Left Behind after Exposure Is Eliminated	Self-Recoverable and No Unfavorable Consequences Will Be Left Behind after Exposure Is Eliminated
Carcinogenicity		Carcinogenic Substances to Human Body	Suspectable Concinogenic Substances to Human Body	Carcinogenic Substances to Experiment Animal	No Carcinogenicity
Max. Allowed Concentration mg/m ³		<0.1	0.1-	1.0-	>10

Table 2 Classification of Health Hazard Levels from Occupational Exposure to Toxic Substances and Example Occupations

Grade	Name of Toxic Substance	Example Occupation
Grade I (Extremely Hazardous)	Mercury and Mercury Compounds	Mercury Smelting, Production of Chlorine and Base by Amalgam Process
	Benzene	Production and Application of Bonding Agent Containing Benzene (Leather Shoe Making)
	Arsenic and Its Inorganic Compounds*	Arsenic Mining and Smelting, Extracting and Smelting of Arsenic-Containing Metallic Mine (Copper, Tin)
	Chloroethylene	Production of PVC Resin
	Chromates, Bichromates	Production of Chromates and Bichromates
	Yellow Phosphorus	Production of Yellow Phosphorus
	Beryllium and Its Compounds	Beryllium Smelting and Production of Beryllium Compounds
	Parathion	Production and Storage and Transport of Parathion
	Nickle Hydroxylate	Production of Nickle Hydroxylate
	Octo, chloroisobutene	Splitting of Difluoromonomethane and Raffinate Treatment
	Chloromethyl ether	Production of Dichloromethyl ether-Chloromethyl ether, Resin Production through Ion Exchange
	Manganese and Its Inorganic Compounds	Manganese Mine Exploiting and Manganese Smelting, Smelting of Ferromanganese and Manganese Steel, Production of High Manganese Welding Rods.
Cyanide	Production of Cymag, Production of Plexiglas	
Grade II (Highly Hazardous)	T.N.T.	Production of T.N.T. and Munitions Processing and Manufacturing
	Lead and Its	Lead Smelting, Production of Battery cells

Compounds	
Carbon Disulfide	Production of Carbon Disulfide, Production of Viscose Staple Fibre and Viscose Filament
Chlorine	Production of Liquid Chlorine and Caustic Soda
Vinyl Cyanide	Production of Vinyl Cyanide, Production of Polyacrylonitrile
Carbon Tetrachloride	Production of Carbon Tetrachloride
Hydrogen Sulfide	Production of Sulfide Dye
Formaldehyde	Production of Phenolic Resin and Pollopas
Aniline	Production of Aniline
Hydrogen Fluoride	Production of Electrolytic Aluminium, Hydrofluoric Acid
Pentachlorophenol and Sodium Pentachlorophenate	Production of Pentachlorophenol and Sodium Pentachlorophenate
Cadmium and Its Compounds	Cadmium Smelting, Production of Cadmium Compounds
Dipterex	Production, Storage and Transport of Dipterex
Chloropropene	Production of Epoxychloropropane, Production of Sodium Propene Sulfonate
Vanadium and Its Compounds	Heyite Mining and Smelting
Methy Brom	Production of Methy Brom
Dimethyl Sulfate	Production, Storage and Transport of Dimethyl Sulfate
Nickle	Nickle Mine Exploiting and Smelting
Toluenevulcabond	Production of Polyurethane Plastics
Epoxychloropropane	Production of Epoxychloropropane
Arsenic Hydride	Smelting of Nonferrous Metal Mine Containing Arsenic
DDVP	Production, Storage and Transport of DDVP
Carbonyl Chloride	Production of Carbonyl Chloride
Chlorobutadiene	Production and Polymerization of

		Chlorobutadiene
	Carbon Monoxide	Production of Gas, Blast Furnace Ironmaking, Coking
	Nitrobenzene	Production of Nitrobenzene
Grade III (Intermediately Hazardous)	Styrene	Production of Styrene, Plexiglas Manufacturing
	Methyl Alcohol	Production of Methyl Alcohol
	Nitric Acid	Production, Storage and Transport of Nitric Acid
	Sulphuric Acid	Production, Storage and Transport of Sulphuric Acid
	Hydrochloric Acid	Production, Storage and Transport of Hydrochloric Acid
	Toluene	Production of Toluene
	Dimethylbenzene	Paint Spraying
	Triclene	Production of Triclene, Metal Cleaning
	Dimethylformamide	Production of Dimethylformamide, Synthesis of Butadiene Rubber
	Hexachloropropene	Production of Hexachloropropene
	Phenol	Production of Phenol, Production of Phenolic Aldehyde Resin
	Nitrogen Oxide	Production of Nitric Acid
Grade IV (Slightly Hazardous)	Solvent Gasoline	Manufacturing of Rubber Products (Tyres, Rubber Overshoes)
	Acetone	Production of Acetone
	Sodium Hydroxide	Production of Caustic Soda, Paper-Making
	Tetrafluoroethylene	Production of Polytetrafluoroethylene
	Ammonia	Production of Ammonia, Production of Nitrogenous Fertilizer

This Standard was initiated by the Administration of Labor Protection of the Ministry of Labor and Personnel.

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