

Safety Data Sheet (SDS)

Established Date: 16/Feb/2017

Revised Date: 19/Mar/2025

1. Identification of the Substance and of the Company

Product Identifier:

High-Speed Tool Steel (including coated or surface-treated High-Speed Tool Steel)

Supplier Information:

Company Name:	KANEFUSA CORPORATION
Address:	1-1 Nakaoguchi Ohguchi-cho Niwa-gun Aichi-ken 480-0192 Japan
Phone Number:	+81-587-95-7221
FAX Number:	+81-587-95-7226
Emergency Phone Number:	+81-587-95-7221

Recommended Use of the High-Speed Tool Steel:

Cutting and drilling tools for metallic materials

Restrictions on Use of the High-Speed Tool Steel:

Do not use for other than the specified purpose.

Attention to the Phase/State of the High-Speed Tool Steel:

- High-Speed Tool Steel as a solid state is chemically stable and safe from explosives, flammable, combustible, pyrophoric, water reactive, and oxidizable in a normal environment.
- High-Speed Tool Steel is safe for use as cutting tools (grinding, machining, rolling for metals) under normal conditions.
- This SDS informs about the dust, fumes or vapors which occur from High-Speed Tool Steel producing process such as raw material powder handling and grinding.

2. Hazard Statements

The GHS Classification

Some data (such as the burning rate test data, etc.) for the dust, fumes or vapors which occur from High-Speed Tool Steel producing process are unavailable. Therefore, they are not classified by GHS.

The hazards of the individual metal ingredients (cobalt, chromium, manganese, and molybdenum) that make up the High-Speed Tool Steel are classified as follows. In addition, other hazards and harmful effects (health, environmental, physical and chemical) that are not listed are not applicable or classifiable under GHS.

- GHS classification for the hazards of cobalt alone in below.

(When cobalt is included as a metal ingredient of High-Speed Tool Steel)

Health Hazard:	<ul style="list-style-type: none">• Acute toxicity (oral)• Acute toxicity (inhalation: dust, mist)• Serious eye damage/Eye irritation• Respiratory sensitization• Skin sensitization• Carcinogenicity• Reproductive toxicity• Specific target organ toxicity (single exposure)• Specific target organ toxicity (repeated exposure)	<ul style="list-style-type: none">Category 4Category 1Category 2BCategory 1ACategory 1ACategory 2Category 1BCategory 1 (respiratory system)Category 1 (respiratory system,
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		heart, thyroid, blood system, reproductive system (male))
Environmental Hazard:	<ul style="list-style-type: none"> • Hazardous to the aquatic environment – short-term (acute) • Hazardous to the aquatic environment – long-term (chronic) 	Category 1 Category 1

- GHS classification for the hazards of chromium alone in below.
(When chromium is included as a metal ingredient of High-Speed Tool Steel)

Health Hazard:	<ul style="list-style-type: none"> • Serious eye damage/Eye irritation • Respiratory sensitization • Skin sensitization • Specific target organ toxicity (single exposure) 	Category 2 Category 1A Category 1A Category 3 (respiratory tract irritation)
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- GHS classification for the hazards of manganese alone in below.
(When manganese is included as a metal ingredient of High-Speed Tool Steel)





Health Hazard:	<ul style="list-style-type: none"> • Reproductive toxicity • Specific target organ toxicity (repeated exposure) 	Category 1B Category 1 (nervous system, respiratory system)
Environmental Hazard:	<ul style="list-style-type: none"> • Hazardous to the aquatic environment – short-term (acute) • Hazardous to the aquatic environment – long-term (chronic) 	Category 2 Category 2

- GHS classification for the hazards of molybdenum alone in below.
(When molybdenum is included as a metal ingredient of High-Speed Tool Steel)

Health Hazard:	<ul style="list-style-type: none"> • Skin Corrosion/Irritation • Serious eye damage/Eye irritation • Specific target organ toxicity (single exposure) 	Category 2 Category 2 Category 3 (respiratory tract irritation)
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GHS Label Elements

GHS label elements for the individual metal ingredients (cobalt, chromium, manganese, and molybdenum) that make up the High-Speed Tool Steel are as follows.

	Cobalt	Chromium	Manganese	Molybdenum
Hazard Pictograms:				
Signal Words:	Danger			
Hazard Statements:	<ul style="list-style-type: none"> • Harmful if swallowed • Life threatening if inhaled • Eye irritation 	<ul style="list-style-type: none"> • Risk of causing allergies, asthma or breathing difficulties if inhaled 	<ul style="list-style-type: none"> • Mild skin irritation • Eye irritation • Respiratory Disorder • May cause 	<ul style="list-style-type: none"> • Skin irritation • Severe eye irritation • Risk of respiratory irritation

	<ul style="list-style-type: none"> • Risk of causing allergies, asthma or breathing difficulties if inhaled • Risk of causing an allergic skin reaction • May cause cancer • May cause adverse effects on fertility or the unborn child • Organ disorder (respiratory system) • Organ disorder due to long-term or repeated exposure (respiratory system, heart, thyroid, blood system, reproductive system (male)) • Very toxic to aquatic life due to long-lasting effects 	<ul style="list-style-type: none"> • Risk of causing an allergic skin reaction • Risk of genetic disorder • Risk of systemic toxicity disorder • Risk of respiratory irritation 	<p>adverse effects on fertility or the unborn child</p> <ul style="list-style-type: none"> • Respiratory disorder • Respiratory disorder due to long-term or repeated exposure • Harmful to aquatic life due to long-lasting effects 	(respiratory tract irritation)
Precautionary Statements:	<p>【Prevention】</p> <ul style="list-style-type: none"> • Obtain safety instructions* before use. • Do not handle until all safety precautions have been read and understood. • Use appropriate personal protection and ventilation system keeping away from exposure. • Wear suitable protective gloves. • If ventilation is inadequate, wear a suitable respirator. • Do not breathe dust, fumes or vapors. • Do not eat, drink or smoke in handling area. • Wash skin thoroughly after handling. • Do not release into the environment. <p>【Responses】</p> <ul style="list-style-type: none"> • If inhaled, move to fresh air and take a rest with posture easy to breathe. • If respiratory symptoms occurs, contact a doctor. • When feeling ill, get medical advice/attention. • Take off contaminated clothing and wash before reuse. • If on skin, rinse away immediately with a large amount of water and soap. • If skin irritation occurs, contact a doctor and get medical advice/attention. • If exposed or concerned, get medical advice/attention. 			

<ul style="list-style-type: none"> • If dust is in eyes, immediately wash away with clean water (remove the contact lenses if possible). If irritation persists, get medical advice/attention. • If a large amount of dust is swallowed, get medical advice/attention after ingesting plenty of water to dilute. <p>【Storage】</p> <ul style="list-style-type: none"> • Avoid sudden changes of temperature and high humidity for storage. <p>【Disposal】</p> <ul style="list-style-type: none"> • Contact a specialized waste disposal company licensed by the governor.
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* For safety instructions, refer to the Japan Cutting & Wear-resistant Tool Association website (<http://www.jta-tool.jp/>).

3. Composition/Information on Ingredient

- Distinction between substance and mixture: Mixture (alloy)
- Chemical name or general name: High-Speed Tool Steel
- High-Speed Tool Steel may be coated or surface treated with the following substances.
Coating materials: CrN, TiAlN, TiC, TiCN, TiN, AlCrN, TiSiN
Surface treatment: Steam treatment (Fe₃O₄), Nitriding treatment (Fe₄N, Fe₂N), etc.
- Ingredients and concentration or concentration range (composition) of the High-Speed Tool Steel

Ingredient	Chemical Formula	CAS No	PRTR Law No	Official Number of Industrial Safety and Health Law	Composition mass%
Iron	Fe	7439-89-6		N/A	Remaining amount
Silicon	Si	7440-21-3		N/A	0-0.7
Manganese	Mn	7439-96-5	412	Appendix 9-550	0-0.5
Chromium	Cr	7440-47-3	87	Appendix 9-142	3-5
Molybdenum	Mo	7439-98-7	453	Appendix 9-603	0-10
Tungsten	W	7440-33-7		Appendix 9-337	1-15
Vanadium	V	7440-62-2		N/A	1-8
Cobalt	Co	7440-48-4	132	Appendix 9-172	0-12

* For the details regarding the content of the designated chemical material (effective digit: 2) such as cobalt, chromium, manganese and molybdenum, please contact the responsible department.

* Even if the High-Speed Tool Steel does not contain cobalt, chromium, manganese, and molybdenum as an active ingredient it may contain cobalt, chromium, manganese, and molybdenum as an impurity.

4. First-Aid Measures

If Inhaled

- If the high concentration of dust is inhaled or respiratory symptoms (coughs, gasping, shortness of breath, etc.) are experienced, move to fresh air and take a rest with posture easy to breathe. If breathing difficulties occur, administer oxygen inhalation. If breathing has stopped, immediately administer artificial respiration and get medical advice/attention.
- If irritation or rash persists, get medical advice/attention.

If on Skin

- If dust is contacted with skin, take off contaminated clothing and rinse the affected area with soapy water thoroughly. If irritation or rash persists, get medical advice/attention.

If in Eyes

- If dust is in eyes, immediately wash away with clean water (remove the contact lenses if possible). If irritation persists, get medical advice/attention.

If Swallowed

- If a large amount of dust is swallowed, get medical advice/attention after ingesting plenty of water to dilute.

5. Fire-Fighting Measures

Suitable Extinguishing Media and Unsuitable Extinguishing Media

- To extinguish dust fire, use dry sand, expanded vermiculite, dilatable perlite, ABC type (general, oil, electric fire) powder extinguishers or water (no water allowed for the dust containing cut powders of light metal such as magnesium and aluminum).

Special Protective Equipment and Emergency Procedures for Fire-Fighters

- In fighting a fire, wear a protective clothing, dust-proof respirator or respiratory protective equipment.

6. Accidental Release Measures

Personal Precautions, Protective Equipment, and Emergency Procedures

- It is recommended that someone who cleans dust should wear clothing and respiratory protective equipment to minimize exposure.

Environmental Precautions

- Dispose of dust as industrial waste and prevent release in water systems.

Containment and Cleanup Methods and Equipment

- If there is dust which occur from High-Speed Tool Steel producing process, isolate the area and remove the dust with a cleaner equipped with a filter which can take up fine particles very efficiently. If appropriate removing methods are not available, wet with water mist or wet floor mop to remove dust.

7. Handling and Storage

Handling

■ Technical Measures

- If the disperse of dust containing cobalt or manganese is concerned, provide local exhaust ventilation and use personal protective equipment to minimize exposure to human body.

■ Precautions for Safe Handling

- Obtain safety instructions before use.
- Do not handle until all safety precautions have been read and understood.

■ Contact Avoidance

- Take measures described in "Exposure Controls/Personal Protection."
- Do not breathe dust, fumes or vapors.
- Do not eat, drink or smoke in handling area.

■ Hygiene Measures

- Wash skin thoroughly after handling.
- Do not release into the environment.

Storage

■ Conditions for Safe Storage

- Avoid sudden changes of temperature and high humidity for storage.
- If storing fine powder, dust, and swarf generated by cutting or polishing, cover them with a cover to prevent dispersal.

■ Materials for Safe Container

- Use materials meeting the specific gravity of High-Speed Tool Steel.

8. Exposure Controls/Personal Protection

Exposure Prevention

- Permissible concentration in working environment (reference value)

Ingredient	Chemical Formula	OSHA* PEL* mg/m ³	ACGIH* TLV* mg/m ³	Japan Society for Occupational Health Exposure Limit* mg/m ³
Iron	Fe	N/A	N/A	N/A
Silicon	Si	15	10	N/A
Manganese	Mn	5	0.2	0.1 (total dust)
Chromium	Cr	0.5	0.5	0.5
Molybdenum	Mo	15	10	N/A
Tungsten	W	5	5	N/A
Vanadium	V	N/A	N/A	N/A
Cobalt	Co	0.1	0.02	0.05

*OSHA: Occupational Safety & Health Administration U.S. Department
*PEL: Permissible Exposure Limit
*ACGIH: American Conference of Governmental Industrial Hygienists Inc.
*TLV: Threshold Limit Value
*Exposure Limit: If processing such as polishing and cutting that generates dust, for ingredients with no indicated value, refer to the exposure limit of the Japan Society for Occupational Health.
N/A: Not Applicable

- Facility measures

Provide local exhaust ventilation so that dust in the air may not exceed the exposure limits in the above table.

It is to be noted that the management concentration of cobalt (and its inorganic compounds) and manganese (and its compounds) are to be 0.02 mg/m³ and 0.2 mg/m³ respectively in accordance with the working environment assessment standard by Japanese Minister of Health, Labour and Welfare under paragraph (2), Article 65-2 of the Industrial Safety and Health Act in Japan.

In addition, for cobalt (and its inorganic compounds) and manganese (and its compounds) in storage or handling, take the necessary action conforming to the Ordinance on Prevention of Hazards due to Specified Chemical Substances.

Protection Measures

Respiratory Protection:	Dust-proof respirators and respiratory protective equipment are recommended.
Hand Protection:	Protective gloves for dust are recommended.
Eye/Face Protection:	Eye/Face protections for dust are recommended.
Skin/Body Protection:	Avoid direct skin contact. Clean up deposited dust on clothing, rags, etc. by washing or absorbing it with suitable filters, but not by whisking it off. exposed to dust should be replaced with new clothing.

9. Physical and Chemical Properties

Physical State:	Solid state
Color :	Shiny silver color (surface grinding) (In case of the coated or surface treated High-Speed Tool Steel, the appearance color is often different.)
Odor:	Odorless
pH:	No data available

Melting/Freezing Point:	1,200 – 1,400 °C
Boiling or Initial Boiling Point and Boiling Range:	No data available
Flammability, Explosion Limits, Flammability Limit, Flash Point, Spontaneous Ignition Temperature, Resolution Temperature:	No data available
pH:	No data available
Kinematic Viscosity:	No data available
Solubility:	Insoluble
Vapor Pressure:	No data available
Density and/or Relative Density:	7 – 9
Relative Gas Density:	No data available
Particle Properties:	No data available

10. Stability and Reactivity

A grain of dust which occur from High-Speed Tool Steel producing process is very fine and under the specific conditions in which the dust is mixed with grinding oil with low flash point, it is possible to become pyrophoric. If dust under very flammable conditions is dispersed in the air, it is possible to explode.

The individual metal ingredients (cobalt, chromium, manganese, and molybdenum) for composing the High-Speed Tool Steel have the following information about stability and reactivity under specific conditions.

- Stability and reactivity of cobalt alone in below.

(When cobalt is included as a metal ingredient of High-Speed Tool Steel)

Reactivity, chemical stability:	<ul style="list-style-type: none"> Stable to heat and contact with water. Ignites spontaneously in air.
Hazardous reactions:	<ul style="list-style-type: none"> Reacts with strong oxidizing agents. Reacts violently with oxygen, posing a risk of fire or explosion. Reacts violently with acid to generate hydrogen.
Conditions to avoid:	<ul style="list-style-type: none"> Contact with incompatible materials.
Incompatible materials:	<ul style="list-style-type: none"> Strong oxidizing agents, acid.
Hazardous decomposition products:	<ul style="list-style-type: none"> By combustion, cobalt oxide and fumes of cobalt oxide may occur.

- Stability and reactivity of chromium alone in below.

(When chromium is included as a metal ingredient of High-Speed Tool Steel)

Reactivity, chemical stability:	<ul style="list-style-type: none"> Stable under normal handling conditions.
Hazardous reactions:	<ul style="list-style-type: none"> Reacts violently with strong oxidizing agents such as hydrogen peroxide, posing a risk of fire or explosion. Reacts with dilute hydrochloric acid and dilute sulfuric acid. Incompatible with alkalis and alkaline carbonates. When mixed with air in powder or granular form, there is a possibility of dust explosion.
Conditions to avoid:	<ul style="list-style-type: none"> No data available
Incompatible materials:	<ul style="list-style-type: none"> Strong oxidizing agents, dilute hydrochloric acid, dilute sulfuric acid, alkali, alkali carbonate.
Hazardous decomposition products:	<ul style="list-style-type: none"> During combustion, there can be irritating or toxic fumes and gases.

- Stability and reactivity of manganese alone in below.

(When manganese is included as a metal ingredient of High-Speed Tool Steel)

Reactivity, chemical stability:	<ul style="list-style-type: none"> • Relatively stable under normal handling conditions. • Upon heating, toxic fumes are generated.
Hazardous reactions:	<ul style="list-style-type: none"> • Reacts violently with nonmetals (chlorine, fluorine, oxygen, etc.) at high temperatures, posing a risk of fire and explosion. • Reacts violently with hydrogen peroxide, bromine pentafluoride, nitrogen dioxide, aluminum dust, posing a risk of fire or explosion. • Reacts with boron, carbon, silicon, phosphorus, sulfur, oxidant. • Reacts explosively with nitric acid and ammonium nitrate. • In the case of powder, it reacts with water or steam to generate hydrogen. • When mixed with air in powder or granular form, there is a possibility of dust explosion.
Conditions to avoid:	<ul style="list-style-type: none"> • High temperature heating, mixing and contact with incompatible hazardous substances.
Incompatible materials:	<ul style="list-style-type: none"> • Strong oxidants, strong acids, hydrogen peroxide, bromine pentafluoride, nitrogen dioxide, nonmetals, aluminum dust, etc.
Hazardous decomposition products:	<ul style="list-style-type: none"> • Upon heating, irritating, corrosive, toxic gases and fumes are generated.

- Stability and reactivity of molybdenum alone is below.

(When molybdenum is included as a metal ingredient of High-Speed Tool Steel)

Stability:	<ul style="list-style-type: none"> • Stable under normal handling conditions.
Reactivity:	<ul style="list-style-type: none"> • Chemically inert and very resistant to oxidation. • When mixed with air in powder or granular form, there is a Possibility of dust explosion. • In the case of powder, when exposed to heat and flame, it flares up and burns rapidly. • Especially in powder form, it reacts violently with BrF₃, ClF₃, F₂, and PbO₂. • May react with strong oxidizing agents. • Reacts with phosphorus, arsenic, carbon, silicon, and boron under red-hot conditions. • Reacts with chlorine, bromine, and iodine under red-hot conditions.
Conditions to avoid:	<ul style="list-style-type: none"> • Material: Sunlight, heat, red-hot conditions, strong oxidizing agents, BrF₃, ClF₃, F₂, PbO₂.
Hazardous decomposition products:	<ul style="list-style-type: none"> • No data available.

11. Toxicological Information

Acute Toxicity:	No data available on High-Speed Tool Steel
Skin Corrosion/Irritation:	No data available on High-Speed Tool Steel
Serious eye damage/Eye irritation:	No data available on High-Speed Tool Steel
Respiratory or Skin Sensitization:	No data available on High-Speed Tool Steel
Germ Cell Mutagenicity:	No data available on High-Speed Tool Steel

Carcinogenicity:	Cobalt powder coexisting with tungsten carbide is IARC Group 2A. Suspected to be a human carcinogen. (Ref.1)
Reproductive Toxicity:	No data available on High-Speed Tool Steel
Specific Target Organ /Systemic Toxicity (Single Exposure):	No data available on High-Speed Tool Steel
Specific Target Organ /Systemic Toxicity (Repeated exposure):	No data available on High-Speed Tool Steel
Respirator Hazard:	No data available on High-Speed Tool Steel
Aspiration Hazard:	No data available on High-Speed Tool Steel

12. Ecological Information

Ecotoxicity, Persistence/Degradability, Bioaccumulation, Mobility in soil, Hazardous to the ozone layer

- No data available on High-Speed Tool Steel

13. Disposal Considerations

Safe and environmentally desirable disposal or recycle method

- The main ingredients such as tungsten carbide and cobalt are rare metals, so is desirable to collect and recycle them.
- For disposal, comply with the applicable laws and regulations regarding industrial waste.

14. Transport Information

International Regulations

UN Number:	Not applicable
Proper Shipping Name:	Not applicable
UN Hazard Class:	Not applicable
Packing Group:	Not applicable
Marine Pollutant:	Not applicable

- * When transporting a powder of metal ingredients (cobalt, manganese) for composing the High-Speed Tool Steel, there is a possibility that it is necessary to take appropriate action in accordance with the relevant provisions established by IMO (International Maritime Organization), ICAO (International Civil Aviation Organization), IATA (International Air Transport Association).

Domestic Regulations

Land Regulatory Information:	In accordance with the Fire Service Act/ the Road Act
Marine Transportation Information:	In accordance with the Ship Safety Act/ the Act on Port Regulations
Marine Pollutant:	Not applicable
Aviation transportation Information:	In accordance with the Civil Aeronautics Act

- * When transporting a powder of metal ingredients (cobalt, manganese) for composing the High-Speed Tool Steel, there is a possibility that it is necessary to take appropriate action in accordance with the relevant provisions of the Ship Safety Act and the Civil Aeronautics Act.

Special Safety Measures for Transportation and Transportation Method

When transporting the dust which occur from High-Speed Tool Steel producing process, make sure that there is no damage or corrosion or leakage of the container, to ensure implementation of the prevention of collapse of cargo.

15. Regulatory Information

Name and Information of Applicable Regulatory

- Law for Pollutant Release and Transfer Register (PRTR)

Manganese:	Class 1 designated chemical substance No.465
Chromium:	Class 1 designated chemical substance No.111
Molybdenum:	Class 1 designated chemical substance No.505
Cobalt:	Class 1 designated chemical substance No.156

- Industrial Safety and Health Law, Ordinance on Prevention of Hazards due to Specified Chemical Substances

Manganese:	The substance is defined in Article 57-2 of the Act, and is listed as No.550 in Appended Table 9 in Article 18-2 of the Enforcement Order as Dangerous or Harmful Substances to be notified of their names, etc. Article 2, Paragraph 1, Items 2 and 5 of Ordinance on Prevention of Hazards due to Specified Chemical Substance, Specified chemical substance class 2, Management class 2.
Chromium:	The substance is defined in Article 57-2 of the Act, and is listed as No.142 in Appended Table9 in Article 18-2 of the Enforcement Order as Dangerous or Harmful Substances to be notified of their names, etc.
Molybdenum:	The substance is defined in Article 57-2 of the Act, and is listed as No.603 in Appended Table9 in Article 18-2 of the Enforcement Order as Dangerous or Harmful Substances to be notified of their names, etc.
Tungsten:	The substance is defined in Article 57-2 of the Act, and is listed as No.337 in Appended Table9 in Article 18-2 of the Enforcement Order as Dangerous or Harmful Substances to be notified of their names, etc.
Cobalt:	The substance is defined in Article 57-2 of the Act, and is listed as No.172 in Appended Table9 in Article 18-2 of the Enforcement Order as Dangerous or Harmful Substances to be notified of their names, etc. Article 2, Paragraph 1, Items 2 and 5 of Ordinance on Prevention of Hazards due to Specified Chemical Substance, Specified chemical substance class 2, Management class 2.

16. Other Information

Other Hazardous Information

- If a large amount of dust containing cobalt is inhaled, blood, heart, thyroid gland, and spleen disorders may result. (Ref.2)
- It is reported that repeated or prolonged contact with cobalt or chromium may affect skin, respiratory organs, heart, etc. (Ref.3 - 6)
- Molybdenum is irritating to skin and eyes and may be harmful if inhaled or swallowed. (Ref.7)
- The carcinogenicity of the metal ingredients is as follows.

Cobalt metal:	ACGIH	A3: Confirmed to be carcinogenic to animals, but relevance to humans is unknown.
	IARC	2B: Possibly carcinogenic to humans.
	Japan Society for	2B: The substance has been determined to be

	Occupational Health	possibly carcinogenic to humans (with relatively insufficient evidence).
Chromium metal:	IARC	3: Not classifiable as to its carcinogenicity to humans.
*ACGIH:	American Conference of Governmental Industrial Hygienists Inc.	
*IARC:	International Agency for Research on Cancer.	

Disclaimer

The contents of this SDS are based on material and information available as of today and may be revised due to knowledge newly obtained. The values of concentration, physical/chemical properties are not guaranteed. In addition, the precautions described herein apply only to normal uses, and thus safety cannot be guaranteed.

Reference URL

Ministry of Economy, Trade and Industry:	http://www.meti.go.jp/
Ministry of the Environment:	http://www.env.go.jp/
Ministry of Health, Labour and Welfare:	http://www.mhlw.go.jp/
Japan Industrial Safety and Health Association:	http://www.jaish.gr.jp/
International Agency for Research on Cancer:	http://monographs.iarc.fr/
International Chemical Safety Cards:	http://www.nihs.go.jp/ICSC/
National Institute of Technology and Evaluation:	http://www.safe.nite.go.jp/ghs/list.html

Reference Documents

- (1) IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, vol.86 (2006).
- (2) Food & Drug Research Laboratories, study No.8005B (4.11.84).
- (3) T. Shirakawa et al., Chest. 95, 29 (1989).
- (4) International Chemical Safety Cards (cobalt, chromium, nickel).
- (5) The Guide to Chemical Hazards (edited by Japan Industrial Safety & Health Association)
- (6) A. O. Bech et al., Brit. J. Ind., 19, 239 (1962).
- (7) Data Book for Safety Management of Chemicals (The Chemical Daily Co., Ltd.)

Revision History

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