

SAFETY DATA SHEET

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

COMPANY NAME : Hakko Corporation
ADDRESS : 4-5, Shiokusa 2-chome, Naniwa-ku, Osaka, 556-0024
 Japan
SECTION IN CHARGE : Research & Development Center
EMERGENCY TELEPHONE NUMBER/ : 81-6-6561-3225 (FAX: 06-6568-0821)
REFERENCE : Customer Service Center

PRODUCT NAME: Paste
Model: FS120-01, -02, -03

2. HAZARDS IDENTIFICATION

GHS Classification

Physical and chemical hazards	Explosives	N/A for classification
	Combustible, inflammable gas	N/A for classification
	Combustible, inflammable aerosol	N/A for classification
	oxidizing gas	N/A for classification
	High-pressure gas	N/A for classification
	Flammable liquid	N/A for classification
	Flammable solid	Cannot be classified
	Self-reactive substance	Cannot be classified
	Pyrophoric liquid	N/A for classification
	Pyrophoric solid	Non-category
	Self-heating substance	Non-category
	Substance which, in contact With Water, emits flammable gases	Non-category
	Oxidizing liquid	N/A for classification
	Oxidizing solid	Cannot be classified
	Organic peroxide	N/A for classification
	Corrosive to metal	Cannot be classified
Health hazards	Acute toxicity (oral)	Category 4
	Acute toxicity (percutaneous)	Category 3
	Acute toxicity (inhalation: gas)	N/A for classification
	Acute toxicity (inhalation: steam)	Cannot be classified
	Acute toxicity (inhalation: dust)	Cannot be classified
	Acute toxicity (inhalation: mist)	Cannot be classified
	Skin corrosion and Skin irritation	Category 1

	Serious damage to eyes; ocular irritancy	Category 1
	Irritancy	
	Respiratory sensitization	Cannot be classified
	Skin sensitization	Cannot be classified
	Germline mutagenicity	Category 2
	Carcinogenicity	Cannot be classified
	Reproductive toxicit	Category 2
	Particular target organ; systemic toxicity	Category 1 (respiratory system, liver, and pancreas)
	(Single exposure)	Category 3 (airway irritation)
	Particular target organ; systemic toxicity	Category 1 (lung and liver)
	(Repetitive exposure)	
	Aspirating respiratory hazard	Cannot be classified
Ecological hazards	Acute hazard to water environment	Category 1
	Chronic hazard to water environment	Category 1

Label elements

Icons or symbols:



Cautionary word : Danger

Hazardous information :

- Swallowing hazard (oral)
- Skin contact hazard (percutaneous)
- Life-threatening inhalation hazard (dust and mist)
- Serious chemical skin damage; ocular damage
- Serious ocular damage
- Suspicious hereditary disorder
- Suspicious adverse effect on reproductive competence or fetus
- Disorder in respiratory system, liver, or pancreas; skin irritation
- Disorder in lung and liver due to long-term or repetitive exposure; systemic toxicity
- Very severe toxicity to aquatic organisms
- Very severe toxicity to aquatic organisms due to long-term effect

Precautionary instructions :

【Safety measures】

- When using this product, do not eat, drink, or smoke.
- Use personal protective gear and ventilation device and avoid exposure.
- Wear protective gear for respiration.

Wear protective gloves, wear, goggles, and mask.
 Use the product outdoors or in a well ventilated zone.
 Do not let the product adhere to your eyes, skin, or wear.
 Do not inhale dust or fume.
 After handling, well wash your hands.
 Avoid release to your environment.

【First-aid measures】

If inhaled: Move the victim to a place with fresh air and let him rest in an easy-to-breath posture.

If ingested: Rinse the mouth. Immediately see a physician for medical attention.

If in eyes: Immediately rise the eyes and see an ophthalmologist for medical attention.

If on skin: Immediately rinse off the product with water or hot water.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Single-ingredient product or mixture: mixture

Chemical Name	Petrolatum	Zinc chloride	Ammonium chloride	Solid paraffin	Water
Content	65-75	20-25	>5	>5	>5
Chemical formula	$C_nH_{2n+2}(n=15-20)$	$ZnCl_2$	NH_4Cl	C_mH_{2m+2}	H_2O
CAS No.	8009-03-8	7646-85-7	12125-02-9	8002-74-2	7732-18-5
Reference Number in Gazetted List in Japan	9-1693	(1)-264	1-218	8-414	-
UN Classification	N/A	Class 8	N/A	N/A	N/A
UN No.	-	1840	-	-	-
PRTR Law	-	1-1	-	-	-

4. FIRST-AID MEASURES

IF INHALED : Move the victim to a place with fresh air and let him rest in an easy-to-breath posture.
 See a physician for medical attention.

IF ON SKIN : Immediately rinse the skin.
 See a physician for medical attention.
 Take off the contaminated wear and clean it before re-use.

IF IN EYES : Carefully rinse the eyes with water for several minutes. If contact lenses are used and easily to remove, remove them.
 Subsequently, continue cleaning.
 If eye irritation continues, see an ophthalmologist for medical attention.

IF INGESTED	: See a physician for medical attention. Rinse the mouth. Do not force the victim to vomit.
Expected acute and late symptoms	: The product cause emphysema. The emphysema symptom appears late and worsens unless the victim keeps rest.
	If inhaled : Cough, pharyngeal pain, burning sensation, feeling of smothering, and shortness of breath symptoms may appear late.
	If on skin : Pain, reddening, and severe burn
	If in eyes : Pain, reddening, and severe burn
	If ingested : Abdominal pain, burning sensation in throat and chest, pharyngeal pain, nausea, vomiting, shock, or collapse
Most important sign and symptom	:
Protection of person who takes first-aid measures	: The rescuer must wear protective gear including chemical protection gloves and gas mask depending on the situation.
Special precautionary instructions for doctors	: The emphysema symptom often does not appear until 2 or 3 hours elapse and worsens unless the victim keeps rest. Therefore, rest and follow-up are essential.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA	: Minor fire: Soil, sand, foam, dry chemical, or carbon dioxide gas Major fire: Fire-extinguishing powder, carbon dioxide, or alcohol-resistant fire-extinguishing foam
CONDEMNED EXTINGUISHING MEDIA	: Straight water injection
SPECIFIC DANGER AND HAZARD	: A fire can cause generation of irritating, toxic, or corrosive gas.
SPECIFIC EXTINGUISHING METHOD	: Do not use rod-like water pouring to extinguish a fire. If not dangerous, move the container from the fire area. If the container cannot be moved, sprinkle water over the container or the surrounding area to cool it.
PROTECTION OF EXTINGUISHER	: In extinguishing a fire, wear an appropriate self-contained-compressed air breathing apparatus and protective wear (heat-resistant).

6. ACCIDENTAL RELEASE MEASURES

- Precautionary instructions for human body** : Immediately isolate the release zone by taking appropriate distance in all the directions.
- Protective gear and first-aid measures** : Prohibit any unauthorized personnel from accessing the zone.
The workers shall wear appropriate protective gear (see "8. Prevention of exposure and protective measures") and avoid contact with their eyes and skin and inhalation of gas.
Do not touch any broken container or released material without wearing appropriate protective wear.
Stay on the windward side.
Keep away from low land.
- Precautionary instructions for environment** : Take care to ensure that no released material is discharged to a river, affecting the environment. Do not release the material to the environment.
- Recovery and neutralization : Collect the released material by sweeping it and then put it in an empty container.
- Method and equipment for containment and cleaning : Stop leakage if not dangerous.
- Preventive measures for secondary disaster : If released material remaining on the floor is dangerous, dispose of it as frequently as possible.

7. HANDLING & STORAGE

HANDLING

- Technical measurements : Take equipment measures specified in "8. Prevention of exposure and protective measures" and wear protective gear.
- Local ventilation and overall ventilation : Carry out local ventilation and overall ventilation specified in "8. Prevention of exposure and protective measures."
- Precautionary instructions : Do not inhale dust and fume.
Do not get your eyes and skin exposed to the product.
Avoid contact, inhalation, and ingestion.
When using this product, do not eat, drink, or smoke.
After handling, well wash your hands.
Use the product outdoors or in a well ventilated zone only.
- Avoidance of contact : See "10. Safety and reactivity."

STORAGE

- Technical measures : Store the dangerous material in the storage location and provide the necessary equipment for natural and electric illumination and ventilation. equipment.
- Storage conditions : Seal up the container and store it in a well ventilated location.

Dangerous material for mixed : See "10. Safety and reactivity."
contact

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

CONTROL CONCENTRATION : Not specified

ALLOWABLE CONCENTRATION (Exposure limit, Biological exposure index)

The Japanese Society for
Hygiene (year 2005 edition) : Not specified

ACGIH (year 2005 edition)
TLV-TWA : 1 mg/m³ (as zinc chloride)

TLV-STEL : 1 mg/m³ (as zinc chloride)

FACILITIES AND EQUIPMENT : In an work area to store or handle this material, install a eye wash station and safety showers.

In order to maintain the concentration in air at a level lower than exposure, carry out ventilation for exhaust.

If dust and fume are generated in a high-heating process, install a ventilation system to maintain the air pollutant level lower than the control concentration.

Do not handle the material without using closed equipment or device, or local ventilation equipment.

In order to maintain the aerial concentration lower than the recommended control concentration, close the relevant processes, use local ventilation, and take other equipment measures.

PROTECTIVE GEAR

Protective gear for respiratory : Dust-protective mask

Protective gear for hands : Wear appropriate protective gloves.

Nitrile rubber and PVC are not appropriate protective materials. Neoprene is recommended.

If you might be exposed to splashed material, wear protective wear for the entire body against chemicals (e.g., acid-resistant suits).

Protective gear for eyes : Wear appropriate protective gear for eyes.

Wear goggles for splashed chemicals and other appropriate facial protective gear. Wear safety glasses.

If your eyes and face might be exposed to splashed or sprayed material, wear comprehensive chemical splash goggles and a facial shield.

- Protective gear for skin and body : Wear appropriate protective gear for your face.
To avoid all contacts, wear neoprene gloves, an apron, boots, suits for the entire body, or any other impermeable protective gear as appropriate.
- Hygiene measures : After handling, well wash the hands.

9. PHYSICAL & CHEMICAL PROPERTIES

- Physical state, form, color, etc. : White to yellow; paste
- Odor : None
- pH : Mild acidity
- Melting /solidifying point : 40°C min.
- Boiling point/Initial boiling point/boiling range : 100°C min.
- Flash point : 180°C min.
- Explosive range : Data not available
- Vapor pressure : Data not available
- Vapor density (air=1) : Data not available
- Specific gravity/density : Data not available
- Water solubility : Data not available
- Octanol/water partition coefficient as log Pow : Data not available
- Spontaneous ignition temperature : 300°C min.
- Decomposition temperature : Data not available
- Odor threshold : Data not available
- Evaporation rate (butyl acetate = 1) : Data not available
- Combustion characteristics (solid and gas) : Data not available
- Viscosity : Data not available

10. STABILITY & REACTIVITY

- STABILITY** : The product deliquesces when exposed to air.
- POSSIBILITY OF HAZARDOUS REACTION** : The aqueous solution is intermediately strong acid, vigorously reacting with base.
- CONDITIONS TO BE AVOIDED** : Heat source, air, and water
- HAZARDOUS SUBSTANCE FOR MIXING** : Base
- HAZARDOUS DECOMPOSITION PRODUCT** : The product decomposes when heated, generating hazardous fume (hydrogen chloride and zinc oxide).

11. TOXICOLOGICAL INFORMATION

- Acute toxicity** : Oral LD₅₀ (rat) 1100 mg/kg (zinc chloride), 1650 mg/kg (ammonium chloride), >5000 mg/kg (paraffin), and >2000 mg/kg (Petrolatum) were used to classify the product into category 4 with an addition equation (toxicity was unknown about 5% of the components of the mixture was of unknown toxicity).
The product is hazardous if ingested (category 4).
Percutaneous LD₅₀ (guinea pig), 173 mg/kg (zinc chloride), (rat) >3600 mg/kg (paraffin), >2000 mg/kg (Petrolatum) were used to classify the product into category 2 with an addition equation (toxicity was unknown about 5% of the components of the mixture was of unknown toxicity).
The product is dangerous to life if it comes into contact with the skin (category 2).
The product falls in category 1-5 of inhalation (dust) zinc chloride, but is determined as cannot be classified because it is paste.
- Skin causticity and irritation** : In a skin causticity test using rabbits, zinc chloride induced inflammatory changes and ulcers in a new epidermal layer. In a human patch test, formation of blains and vesicles was reported (category 1A-1C). The product was classified into category 1 based on the limit value for concentration control.
Serious chemical damage to the skin and damage to eyes (category 1)
- Serious damage and irritation to eyes** : There are two cases where a human was exposed to condensed zinc chloride at an accident with zinc chloride. The victims suffered from edema and then permanent corneal cicatrization and reportedly required 6 to 28 weeks for recovery (category 1). Based on the limit for concentration, the product was classified into category 1.
Series damage to eyes (category 1)
- Respiratory sensitization or skin sensitization** : Respiratory sensitization: Occupational asthma in a human due to adhesive was reported, but the cause was unknown because the victim was also exposed to ammonium chloride.
Therefore, the product cannot be classified.
Skin sensitization: No data is available.
- Germline mutagenicity** : A chromosome abnormality test (in vivo mutagenicity test using body cells) using rats and mice with zinc chloride showed a positive result (category 2). Accordingly, the product was classified into category 2 based on the limit value for concentration.
Suspected hereditary disease (category 2)

Carcinogenicity	: No organization currently establishes a classification category for carcinogenicity of zinc chloride. All the existing long-term animal experiments have insufficiency in their protocols as carcinogenicity studies. In addition, available data on carcinogenicity of zinc itself is limited. EU and the U.S. conclude that available information is insufficient to assess carcinogenicity. Accordingly, the product was determined as cannot be classified.
Reproductive toxicity	: With zinc chloride, the number of litters decreased at a dose that induced general toxicity of a maternal animal. Therefore, the product was classified into category 2 based on the limit value for concentration. Suspected adverse effect on productive competence or fetus (category 2)
Specific target organ and systemic toxicity (single exposure)	: The reported cases include arterial occlusion and fibrosing in the lungs, cyanosis, and ARDS syndrome after inhalation exposure to zinc chloride in a human. Hepatic disorder and exocrine pancreatic insufficiency due to oral ingestion were also reported. Since ammonium chloride has airway stimulation (category 3), the product was classified into category 1 (respiratory system and liver) based on the limit value for concentration and category 3 (airway irritation). Disorder in the respiratory system, liver, and pancreas (category 1); airway irritation (category 3).
Specific target organ and systemic toxicity (repetitive exposure)	: Inhalation exposure of mice to zinc chloride resulted in lymphocyte moistening in the lungs, fatty degeneration in the liver, and an increased death rate related to concentration. The toxic effect concentrations noted in the lungs and livers of mice were compared with the guidance values and category 1 (lungs and liver) was determined as appropriate. Accordingly, the product was classified into category 1 based on the limit value for concentration. Disorder in the lungs and liver due to long-term or repetitive exposure (category 1)
Aspirating respiratory hazard	: No data is available.

12. ECOLOGICAL INFORMATION

Acute hazard in water environment	: When Crustacea (large water fleas) were used with zinc chloride, EC50 was 0.1 mg/L for 48 hours. When fish was used with ammonium chloride, LC ₅₀ was 0.696 mg/L for 96 hours. Accordingly, the product was classified into category 1 by the simple addition method (information on hazards in water environment was unavailable for 75% of the components). Very severe toxicity to aquatic organisms (category 1)
Chronic hazard in	: Acute toxicity was classified into category 1 with zinc chloride. Although

water environment

bioaccumulation was low (BCF = 178), the product was a metal compound and its behavior in water was unknown (category 1). Therefore, the product was classified into category 1 by the simple addition method (no information on hazards in water environment was available about 75% of the components).

Very severe toxicity to water organisms due to long-term effects (category 1)

13. DISPOSAL CONSIDERATIONS

- Waste Disposal Methods** : Dispose of waste in accordance with the related regulations and the local government's regulations.
Entrust the disposal of waste to a industrial waste disposer licensed by the prefecture or to a local public organization that disposes of waste.
To entrust the disposal of waste, previously make the disposer or the like well ware of the danger and hazard of that waste.
- Contaminated Container/Package** : Clean the containers for recycling or properly dispose of them in accordance with the related regulations and the local government's regulations.
To dispose of empty containers, completely remove the content.

14. TRANSPORTATION INFORMATION

International regulations

- Marine regulations information As per IMO regulations
UN No. : 1840
Proper Shipping name : Zinc chloride, hydrous
Class : 8
Packing Group : III
Marine Pollutant : Not applicable
- Aviation regulations information As per ICAO/IATA regulations
UN No. : 1840
Proper Shipping name : Zinc chloride, hydrous
Class : 8
Packing Group : III

Domestic regulations

- Land regulations information
- Marine regulations information As per Ship Safety Law
UN No. : 1840
Item name : Zinc chloride (aqueous solution)
Class : 8
Container grade : III

Marine pollutant	: N/A
Aviation regulations information	As per Aviation Law
UN No.	: 1840
item name	: Zinc chloride (aqueous solution)
Class	: 8
Grade	: III
Special safety measures	For transportation, avoid direct sunlight, load the container so that breakage, corrosion, and leakage will not occur in the container, and properly prevent collapse of cargo. Do not place any heavy cargo on the container. Do not place the container on any dangerous or combustible material. Do not place the container near any other dangerous material. During transportation, an yellow card must be carried.

15. REGULATORY INFORMATION (in Japan)

Industrial Safety and Health Law	: Hazardous substance of which name and other information shall be notified (Article 57-2 of Law; Article 18-2 of Enforcement Regulations; Annex 9) (Government ordinance Nos. 94, 96, and 170)
Labor Standards Law	: Chemical substance for disease (Article 75-2 of Law; Article 35 of Enforcement Regulations; Annex 1-2-4)
Chemical Release Monitoring and Control Promotion Law (PRTR Law)	: Class 1 designated chemical substance (Article 2-2 of Law; Article 35 of Enforcement Regulations; Annex 1-2-4) (Government ordinance No. 1)
Ship Safety Law	: Corrosive substance (Articles 2 and 3 of Dangerous Objects Regulation; Annex 1 for notification of hazardous materials)
Aviation Law	: Corrosive substance (Article 194 of Enforcement Regulations; Annex 1 for notification of hazardous materials)

Fire Defense Law : Designated combustible material; flammable solid
(Article 9-4 of Law; Article 1-12 of Dangerous Objects
Regulation; Annex 4)

16. OTHER INFORMATION

- Reference:
MSDS of material manufacturer

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This document has been prepared based on the information and data that are available as of this date. Therefore, it may be revised when new information or data has been obtained. The information and data contained herein are subject to the normal use. The evaluation of dangerousness and toxicity is, therefore, not always applicable. For this reason, the safety precautions suitable for your purpose and usage must be taken prior to the use.