

SAFETY DATA SHEET

SECTION 1 - IDENTIFICATION

Print Date : 08/05/2015
Trade Names : Silver Brazing Paste with Flux
Synonyms : Silver Solder Paste with Flux
Product Codes Covered By This Material Safety Data Sheet:
 This MSDS covers any product codes containing the information listed below:

HIAF - 50-5 - I - 4

ANY FLUX-BINDER	ANY ALLOY CODE			METAL %	SIZE
AQC, AVA, CVA, OKC B505, CB505 B510, CB510 B511, B511C IAF, CIAF HIAF, CHIAF HLAF CHLAF	20-2 30-3 33 34 35-6 38 40-2 40-4 45-0 45-1	45-2 45-3 50-5 55 55-2 56 56-1 56-2 60 60-1	63-6 65 67-1 67-2 67-3 70 72 75 80 80-LM	Any Letter	Any Number or Letter combination

Product Description : Silver-based brazing paste for use in joining metals. Contains a fluxing agent for use in open-air brazing.
Product Use : Product is applied to metal parts. Parts are heated to a temperature above the melting point of the filler metal in the paste (>1200°F) until the Filler metal melts and flows and joins the components.
Supplier: ProTech Professional Products, Inc. Boynton Beach, FL 33426
Supplier Phone : 1-800-872-8898 **Emergency Contact:** INFOTRAC 1-800-535-5053

SECTION 2 - HAZARD IDENTIFICATION

"T" - Toxic, Xn - Harmful
 R20/22: Harmful by inhalation and if swallowed.
 R36/38: Irritating to eyes and skin.
 R40: Limited evidence of a carcinogenic effect.
 R43: May cause sensitization by skin contact.
 R48/23: Toxic: danger of serious damage to health by prolonged exposure through inhalation.
 R60: May impair fertility.
 R61: May cause harm to the unborn child.



SAFETY DATA SHEET

Emergency Overview:

IMMEDIATE CONCERNS: **Warning!** Product contains fluorides: In use above 500°C [930°F] in the presence of water vapor, hydrogen fluoride gas is evolved. Hydrogen fluoride gas can cause irritation to the respiratory tract, and delayed burns to the eyes and skin. It can also cause fluid in the lungs [pulmonary edema], and death. Avoid contact with skin, eyes, and inhalation of vapors. Fumes from the soldering/brazing process are irritating to the eyes and respiratory system. Hot metal can cause eye and skin burns. Avoid breathing fumes from the soldering/brazing process. Use only with adequate ventilation. **Warning!** This product contains Nickel which is classified as a potential carcinogen. Hot metal can cause eye and skin burns. Avoid breathing fumes from the soldering/brazing process. Use only with adequate ventilation.

Potential Health Effects:

- Eyes:** Can cause severe irritation and abrasion. [Contains metal powder and fluoride salts].
- Skin:** Skin contact may cause: severe irritation, burns. Prolonged skin contact may lead to symptoms similar to ingestion. May cause skin irritation. Hot molten metal may cause burns to the skin. Wear protective equipment when working with molten metal. Dermal contact with nickel or nickel compounds can lead to sensitisation and the development of contact dermatitis.
- Ingestion:** **Flux ingredient(s):** Fluorides: Can severely irritate and burn the mouth, throat and stomach. Toxic and possibly may be fatal if swallowed. Symptoms include: salivation, nausea, vomiting, diarrhea, abdominal pain, and coma. Ingestion may cause systemic poisoning.
Binder: Harmful if swallowed.
Silver: Prolonged ingestion of silver compounds may cause a permanent bluish discoloration of the skin, eyes, and mucous membranes.
Copper: Ingestion may cause nausea, vomiting, diarrhea.
Zinc: Ingestion of soluble salts of this material may cause abdominal irritation resulting in nausea and vomiting.
Tin: Ingestion may be slightly hazardous.
Nickel: Acute ingestion of nickel compounds can cause nausea, vomiting, diarrhoea and headache
- Inhalation:** **Flux ingredient(s):** Fluoride fume can cause respiratory irritation and pulmonary edema.
Binder: Excessive vapor inhalation will lead to central nervous system depression.
Silver: Prolonged inhalation of silver compounds may cause a permanent bluish discoloration of the skin, eyes, and mucous membranes.
Copper: If inhaled, may cause sneezing, nausea, weakness, fever. Fumes from heating may cause metal fume fever.
Zinc: This material is relatively non-toxic to humans by inhalation. However, acute overexposure to zinc oxide fume may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea and vomiting.
Tin: Inhalation may be slightly hazardous.
Nickel: Hazardous in case of inhalation.

Signs & Symptoms of Overexposure:

Acute Toxicity:

Boric Acid: Symptoms of over-exposure include nausea, vomiting and diarrhea. Acute overexposure to zinc oxide fume evolved from heating this product may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea and vomiting.

SAFETY DATA SHEET

Chronic Effects:

Flux ingredients: Repeated exposure to fluoride containing dust can result in embrittlement and decalcification of bones and increased calcification of ligaments and vertebrae [fluorosis], stiffness and limitation of motion can result. Symptoms of fluorosis include brittle bones, weight loss, anemia, calcified ligaments, general ill health, joint stiffness, mottling of teeth, and bone damage [osteosclerosis].

Binder: Material may defat the skin on repeated exposure leading to dermatitis.

Silver: Chronic exposure may produce argyria, a permanent blue-gray discoloration of the skin, eyes, mucous membranes and respiratory tract. Skin contact with silver powder produces localized irritation and/or argyria.

Copper: Prolonged or repeated exposure to the metal may cause: skin and hair discoloration, skin irritation, dermatitis, runny nose, irritation of the mucous membranes. Repeated ingestion may cause: damage to liver, kidneys. Repeated inhalation may cause chronic respiratory disease.

Zinc: No evidence of adverse effects due to chronic exposure has been reported.

Tin: No evidence of adverse effects due to chronic exposure has been reported.

Nickel: Chronic inhalation of nickel or nickel compounds can cause rhinitis, sinusitis, anosmia and in extreme cases perforation of the nasal septum The International Agency for Research on Cancer (IARC) classified nickel compounds as carcinogenic to humans (Group 1) The IARC classified elemental nickel as possibly carcinogenic to humans (Group 2B). The substance is toxic to skin.

The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage

Carcinogenicity: This product contains nickel. The International Agency for Research on Cancer (IARC) classified nickel compounds as carcinogenic to humans (Group 1) The IARC classified elemental nickel as possibly carcinogenic to humans (Group 2B).

Reproductive Toxicity: Reproductive Effects: Animal ingestion studies in several species, at high doses, indicate that borates cause reproductive and developmental effects. A human study of occupational exposure to borate dust showed no adverse effect on reproduction.

Medical Conditions Aggravated: Persons with pre-existing disorders of the liver, kidney, pulmonary function or having Wilson's disease may be more susceptible to the effects of this material.

Routes Of Entry: Potential routes of entry include: eye contact, skin contact, inhalation of metallic fume and decomposition products from heating this material during the soldering/brazing process.

Target Organ Statement: Affected target organs: eyes, skin, central nervous system, respiratory system, reproductive system, bones (fluorosis), calcification of ligaments and vertebrae, teeth, liver, kidneys, mucous membranes, conjunctiva.

Health Hazards: Fluorides can cause eye, skin, and respiratory tract irritation. Overexposure to fluoride dust over prolonged periods can result in fluoride deposition in bones and cartilage as evidenced by X-ray changes [fluorosis] which may be accompanied by stiffness of joints. In use above 500°C [930°F] in the presence of water vapor, hydrogen fluoride gas is evolved. Hydrogen fluoride gas can cause irritation to the respiratory tract, and delayed burns to the eyes and skin. It can also cause fluid in the lungs [pulmonary edema], and death. An uptake of too large quantities of nickel has the following consequences:

- Higher chances of development of lung cancer, nose cancer, larynx cancer and prostate cancer
- Sickness and dizziness after exposure to nickel gas
- Lung embolism, Respiratory failure, Asthma and chronic bronchitis
- Birth defects, Heart disorders
- Allergic reactions such as skin rashes, mainly from jewelry

Nickel fumes are respiratory irritants and may cause pneumonitis. Exposure to nickel and its compounds may result in the development of a dermatitis known as "nickel itch" in sensitized individuals. The first symptom is usually itching, which occurs up to 7 days before skin eruption occurs. The primary skin eruption is erythematous, or follicular, which may be followed by skin ulceration. Nickel sensitivity, once

SAFETY DATA SHEET

acquired, appears to persist indefinitely. Carcinogenicity- Nickel and certain nickel compounds have been listed by the National Toxicology Program (NTP) as being reasonably anticipated to be carcinogens. The International Agency for Research on Cancer (IARC) has listed nickel compounds within group 1 (there is sufficient evidence for carcinogenicity in humans) and nickel within group 2B (agents which are possibly carcinogenic to humans). OSHA does not regulate nickel as a carcinogen. Nickel is on the ACGIH Notice of Intended Changes as a Category A1, confirmed human carcinogen.

SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS Number	EINECS	Classification	R and S Phrases	Symbol	Wt. %
Petrolatum	8009-03-8		--	R45	S24/25,S45, S53	0-20
Distillates (petroleum) hydrotreated, light	64742-47-8	265-149-8	Xn:R65	R38, R65, R51/53: S2, S23, S24, S62	+Xn	0-20
Boric Acid	10043-35-3	233-139-2	C; R34 Xn; R22 N; R50-53	R60, R61: S53, S45	C: Corrosive N: Dangerous for the environment	3-10
Potassium Bifluoride	7789-29-9	232-156-2	T; R25 C; R34	R25, R34: S1/2, S22, S26, S37, S45	+T: +C:	3-10
Potassium Fluoborate	14075-53-7	237-928-2	--	--	--	3-10
Silver	7440-22-4	231-131-3	--	--	--	8-30
Copper	7440-50-8	231-159-6	--	--	--	8-20
Zinc	7440-66-6	231-175-3	--	--	--	2-20
Tin	7440-31-5	231-141-8	--	--	--	0-2
Nickel	7440-02-0	231-111-4	Carc. Cat. 3; R40-T; R48/23 -R43	R40, R43, R48/23, S2, S36/37/39, S45	+ T:	0-5

For the text of the Risk Phrases, Safety Phrases and Classification Codes (GHS/CLP), see Section 16.

SECTION 4 - FIRST AID MEASURES

- Eyes:** Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get medical attention if irritation persists.
- Skin:** Immediately remove contaminated clothing. Do not attempt to remove any material bonded to the skin. Flush area of skin contact immediately with large amounts of water for at least 15 minutes. If irritation persists after flushing, get medical attention promptly. Launder contaminated clothing before reuse.
- Ingestion:** If swallowed: Do not induce vomiting unless instructed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Inhalation:** Remove victim to fresh air. If not breathing, trained personnel may give artificial respiration. If breathing is difficult, give oxygen by trained personnel. Seek medical attention.
- Notes To Physician:** Fluorides can reduce serum calcium levels resulting in potentially fatal

SAFETY DATA SHEET

hypocalcemia. Potassium can reduce blood pressure and cause coma. Boric Acid: Observation only is required for adult ingestion in the range of 4-8 grams of this material. For ingestion of larger amounts, maintain adequate kidney function and force fluids. Gastric lavage is recommended for symptomatic patients only. Hemodialysis should be reserved for massive acute ingestion or patients with renal failure. Boron analyses of urine or blood are useful only for documenting exposure and should not be used to evaluate severity of poisoning or to guide treatment.

SECTION 5 - FIREFIGHTING MEASURES

Flammable Class: Non-flammable solid

Extinguishing Media: For fires involving this product, use dry chemical, carbon dioxide, foam, water spray. Do not use water if metal is molten.

Explosion Hazards: Emits toxic and corrosive fumes under fire conditions.

Fire Fighting Procedures: Move container from fire area if it can be done without risk. Avoid inhalation of vapors or mists.

Fire Fighting Equipment: Exposure to decomposition products may be a hazard to health. Do not breathe smoke, gases or vapors generated. Wear goggles if eye protection is not provided. Wash away any material that comes into contact with the body, clothing or equipment. When fighting fires involving this product, wear full protective gear. For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

Hazardous Decomposition Products: Decomposition products may include: carbon monoxide, carbon dioxide, smoke. When heated to decomposition temperatures [$>225^{\circ}\text{C}$ / 437°F], highly corrosive and toxic hydrofluoric acid fumes may be generated. Metallic decomposition products may include: metal oxide fumes, copper fume, zinc oxide fumes.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

General Procedures: Waste disposal method: Scoop up excess material and wash affected areas with soap and water. Mineral spirits or a similar solvent may be used for persistent stains. Avoid contact with skin and eyes.

Special Protective Equipment: Avoid inhaling vapor and/or mists. Do not get spilled material on skin, clothing, or in eyes. Wear full protective clothing. See Section 8. Remove all contaminated clothing.

SECTION 7 - HANDLING AND STORAGE

Handling: Keep away from sources of ignition.

Storage: Keep lid tightly closed except when removing product and store at ambient temperatures of $5-25^{\circ}\text{C}$ [$41-77^{\circ}\text{F}$] [to maximise shelf life of product].

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	CAS Number	EINECS Number	OSHA PEL	ACGIH TLV
Petrolatum	8009-03-8	232-315-6	None Found	None Found
Distillates (petroleum) hydrotreated, light	64742-47-8	265-149-8	None Found	1200 mg/m ³

SAFETY DATA SHEET

Boric Acid	10043-35-3	233-139-2	None Found	2.00 mg/m ³
Potassium Bifluoride	7789-29-9	232-156-2	2.50 mg/m ³	2.50 mg/m ³
Potassium Fluoborate	14075-53-7	237-928-2	2.50 mg/m ³	2.50 mg/m ³
Silver	7440-22-4	231-131-3	0.10 mg/m ³	0.10 mg/m ³
Copper	7440-50-8	231-159-6	1.00 mg/m ³	1.00 mg/m ³
Tin	7440-31-5	231-141-8	2.00 mg/m ³	2.00 mg/m ³
Nickel	7440-02-0	231-111-4	1.00 mg/m ³	1.00 mg/m ³

Engineering Controls: The use of local ventilation is required to maintain the concentration of fumes evolved from the soldering/brazing process to well below the occupational exposure limits, within the operator's breathing zone and the general vicinity. Use of process enclosures, exhaust systems, and other engineering/administrative controls should be designed in accordance with local conditions. Please refer to the ACGIH document, Industrial Ventilation, A Manual of Recommended Practices [most recent edition], for details.

Eyes and Face: Wear safety glasses with side shields as a minimum level of protection. Consult ANSI Z87.1 for more information.

Skin: Wear chemical resistant gloves. When material is heated, wear thermal-insulated gloves to protect against burns.

Respiratory: When exposure limits (listed above) are exceeded or ventilation is inadequate, wear a NIOSH or European Standard approved respirator, in accordance with OSHA respirator regulations [29 CFR 1910.134] or European Standards [EN149]. Consult ANSI Z88.2 *American National Standard for Respiratory Protection* for guidance on proper selection, use and care of respirators.

Protective Clothing: Avoid skin contact. Wear chemical resistant clothing (long-sleeved shirt buttoned at the wrist) as necessary to prevent contact. For soldering/brazing operations where hot metallic parts are handled and molten metal may be present, wear heat-resistant gloves and clothing to protect from burns.

Work Hygienic Practices: Minimize exposure in accordance with good hygiene practice. Good general hygienic practices include: Eating, drinking, and smoking should not be permitted in work areas. Wash thoroughly after handling, and before eating, drinking, using tobacco, applying cosmetics, or using the toilet. Keep area clean. Remove contaminated clothing promptly. Launder contaminated clothing before reuse. Avoid contact with eyes, skin, and clothing. Avoid breathing dust, vapor or mist.

Other Precautions: Educate and train employees in the safe use and handling of this product.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Flashpoint and Method	:	Not Applicable
Odor	:	Slight petroleum odor
Appearance	:	Viscous paste
Colour	:	Paste may be gold, brown or grey.
Vapor Pressure	:	0.093 mm Hg at 68°F/20°C
Vapor Density	:	>1 [air=1]
Boiling Point	:	530-623°F [277-328°C]
Solubility In Water	:	Negligible
Evaporation Rate	:	No data available
Specific Gravity	:	> 2.000 (water=1)

SAFETY DATA SHEET

Melting Point : Not applicable in paste form. All filler metals covered by this MSDS have a melting point greater than 1200°F.

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable under normal conditions of use.

Polymerization: Will not occur.

Conditions To Avoid: Avoid contact with incompatible materials. Avoid extreme heat. Avoid prolonged exposure to air and moisture.

Incompatible Materials: Materials to avoid: strong oxidizers, acids [produces HF gas], reaction with strong reducing agents [metal hydrides or alkali metals] will generate hydrogen gas, halogens, strong alkalies, chlorine, peroxides, strong acids, strong bases, acetylene, ammonia, halogenated hydrocarbons, magnesium, bromates, chlorates, iodates.

SECTION 11 - TOXICOLOGICAL INFORMATION

Eye Effects: Can cause severe irritation and abrasion. [Contains metal powder and fluoride salts.]

Skin Effects: Short and moderate term skin contact is usually not harmful. However, in sensitized individuals, or in contact with damaged skin, it may cause severe irritation.

Possible Effects of Chronic Exposure: The fluoride ion can reduce serum calcium levels, possibly causing fatal decalcification of the bones.

Metal fume fever: is an acute self-limited illness induced most commonly by inhalation of zinc oxide fumes. The affected individual characteristically experiences the rapid onset of intense shaking chills, fever, and body aches a few hours after exposure, and symptoms dissipate spontaneously. While the occurrence of metal fume fever appears to be widespread and the current TLV/PEL of 5 mg/m³ and STEL of 10 mg/m³ may not be fully protective, no chronic health sequelae have been documented to date. Nonetheless, as any worker who has experienced a full-blown case will likely testify, metal fume fever remains one of the more noxious short-term illnesses contracted in the workplace, and its prevention deserves serious attention.

Carcinogenicity: This product was not tested as supplied. However, this product contains nickel. The International Agency for Research on Cancer (IARC) classified nickel compounds as carcinogenic to humans (Group 1) The IARC classified elemental nickel as possibly carcinogenic to humans (Group 2B).

This product, as supplied, has not been tested. Information is provided on the components of this product.

Component Information

Petrolatum

Routes of Entry : Eye contact. Inhalation. Ingestion.
Toxicity to Animals : Not available.
Chronic Effects on Humans : Not available.
Other Toxic Effects on Humans : Slightly hazardous in case of ingestion, of inhalation.
Special Remarks on Toxicity to Animals : Not available.
Special Remarks on Chronic Effects on Humans: Not available.
Special Remarks on other Toxic Effects on Humans: Not available.

Distillates (petroleum) Hydrotreated, light

Likely Routes of Exposure : Exposure may occur via inhalation, ingestion, skin absorption, skin or eye contact, and accidental ingestion.

SAFETY DATA SHEET

Acute Oral Toxicity : Low toxicity: LD50 > 5000 mg/kg Rat
Acute Dermal Toxicity : Low toxicity: LD50 >2000 mg/kg, Rabbit
Acute Inhalation Toxicity : Low toxicity: LC50 >5 mg/l/4 h, Rat
Skin corrosion/irritation : Irritating to skin.
Serious eye damage/irritation: Expected to be slightly irritating.
Respiratory Irritation : Vapours/mists may cause irritation to respiratory system.
Respiratory or skin sensitisation: Not a skin sensitiser.
Germ cell mutagenicity : Not considered a mutagenic hazard.
Carcinogenicity : Not classified as a carcinogen.
Reproductive/Developmental Toxicity: Not expected to impair fertility. Not classified as a developmental toxicant.

Boric Acid

Routes of Entry : Absorbed through skin. Inhalation. Ingestion.
Toxicity to Animals : Acute oral toxicity (LD50): 2660 mg/kg [Rat].
Chronic Effects on Humans : MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [POSSIBLE].
May cause damage to the following organs: kidneys, cardiovascular system, central nervous system.
Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Slightly hazardous in skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects (fertility, fetotoxicity) based on animal studies. May affect genetic material. May cause teratogenic effects based on animal studies.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause skin irritation. May be absorbed through damaged or abraded skin in harmful amounts. If absorbed through skin it may affect behavior, sense organs, metabolism, the gastrointestinal tract, and the respiratory tract (respiratory depression) Eyes: Dust causes eye irritation. Inhalation: Dust causes respiratory tract irritation. Ingestion: Causes digestive (gastrointestinal) tract irritation with nausea, vomiting and diarrhea. May also affect behavior, brain, Central Nervous System (depression, headache, dizziness, drowsiness, collapse, unconsciousness, coma), Peripheral Nervous System, cardiovascular system, blood, liver, urinary system (kidney, ureter, bladder) and endocrine system . Chronic Potential Health Effects: Boric acid can accumulate in the body (brain, bone) with repeated exposure. Prolonged or repeated skin contact may cause dermatitis. May cause borism characterized by dry skin, skin eruptions, and gastric disturbances.

Potassium Bifluoride

Routes of Entry : Absorbed through skin. Eye contact. Inhalation. Ingestion.
Toxicity to Animals : LD50: Not available. LC50: Not available.
Chronic Effects on Humans : The substance is toxic to lungs, mucous membranes.
Other Toxic Effects on Humans : Extremely hazardous in case of skin contact (corrosive, irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals : Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans : Not available.

Potassium Fluoborate

SAFETY DATA SHEET

Routes of Entry : Absorbed through skin. Eye contact. Inhalation. Ingestion.
Toxicity to Animals : LD50: Not available. LC50: Not available.
Chronic Effects on Humans : The substance is toxic to lungs, mucous membranes.
Other Toxic Effects on Humans : Extremely hazardous in case of skin contact (corrosive, irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator).
Special Remarks on Toxicity to Animals : Not available.
Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human.
Special Remarks on other Toxic Effects on Humans : Not available.

Silver

Routes of Entry : Absorbed through skin. Eye contact. Inhalation. Ingestion.
Toxicity to Animals : Acute oral toxicity (LD50): 100 mg/kg [Mouse].
Chronic Effects on Humans : Not available.
Other Toxic Effects on Humans : Very hazardous in case of ingestion, of inhalation.
Special Remarks on Toxicity to Animals : Not available.
Special Remarks on Chronic Effects on Humans: Not available.
Special Remarks on other Toxic Effects on Humans: Not available.

Copper

Routes of Entry : Absorbed through skin. Eye contact. Inhalation. Ingestion.
Toxicity to Animals : LD50: Not available. LC50: Not available.
Chronic Effects on Humans : Not available.
Other Toxic Effects on Humans : Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant).
Special Remarks on Toxicity to Animals : Not available. Special
Remarks on Chronic Effects on Humans: Not available. Special
Remarks on other Toxic Effects on Humans: Not available.

Zinc

Routes of Entry : Absorbed through skin. Eye contact. Inhalation. Ingestion.
Toxicity to Animals : LD50: Not available. LC50: Not available.
Chronic Effects on Humans : Not available.
Other Toxic Effects on Humans : Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Special Remarks on Toxicity to Animals : Not available.
Special Remarks on Chronic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. Dermal exposure to zinc may produce leg pains, fatigue, anorexia and weight loss. Eyes: May cause eye irritation. Ingestion: May be harmful if swallowed. May cause digestive tract irritation with tightness in throat, nausea, vomiting, diarrhea, loss of appetite, malaise, abdominal pain. fever, and chills. May affect behavior/central nervous system and autonomic nervous system with ataxia, lethargy, staggering gait, mild derangement in cerebellar function, lightheadedness, dizziness, irritability, muscular stiffness, and pain. May also affect blood. Inhalation: Inhalation of zinc dust or fumes may cause respiratory tract and mucous membrane irritation with cough and chest pain. It can also cause "metal fume fever", a flu-like condition characterized appearance of chills, headache fever, malaise, fatigue, sweating, extreme thirst, aches in the legs and chest, and difficulty in breathing. A sweet taste may also be present in metal fume fever, as well as a dry throat, aches, nausea, and vomiting, and pale grey cyanosis. The toxicological properties of this substance have not been fully investigated.

SAFETY DATA SHEET

Tin

Routes of Entry : Absorbed through skin. Eye contact. Inhalation. Ingestion.
Toxicity to Animals : LD50: Not available. LC50: Not available.
Chronic Effects on Humans : Not available.
Other Toxic Effects on Humans : Slightly hazardous in case of ingestion, of inhalation.
Special Remarks on Toxicity to Animals : Not available.
Special Remarks on Chronic Effects on Humans: Not available.
Special Remarks on other Toxic Effects on Humans : Not available.

Nickel

Routes of Entry : Inhalation. Ingestion.
Toxicity to Animals : LD50: Not available. LC50: Not available.
Chronic Effects on Humans : CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. Causes damage to the following organs: skin. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.
Other Toxic Effects on Humans : Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.
Special Remarks on Toxicity to Animals : Lowest Published Lethal Dose/Conc: LDL [Rat] - Route: Oral; Dose: 5000 mg/kg LDL [Guinea Pig]-Route:Oral;5000mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Nickel dust and fume can irritate skin. Eyes: Nickel dust and fume can irritate eyes. Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis. Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased coronary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venous dilation). Chronic Potential Health Effects: Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis. Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count). Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy. Chronic ingestion of Nickel may also affect respiration and cause pneumoconiosis or fibrosis. Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

SECTION 12 - ECOLOGICAL INFORMATION

This product, as supplied, has not been tested for ecological impact. Information is provided below for

SAFETY DATA SHEET

components of this product.

Distillates (petroleum) Hydrotreated, light

Toxicity

Acute Toxicity : Toxic: LL/EL/IL50 > 1 <= 10 mg/l LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract.

Fish : Toxic: LL/EL/IL50 > 1 <= 10 mg/l Aquatic

crustacea : Toxic: LL/EL/IL50 > 1 <= 10 mg/l Algae/aquatic

plants : Toxic: LL/EL/IL50 > 1 <= 10 mg/l Microorganisms :

Practically non toxic: LL/EL/IL50 > 100 mg/l

Chronic Toxicity

Fish : NOEC/NOEL expected to be > 0.01- <= 0.1 mg/l

Aquatic crustacea : NOEC/NOEL expected to be > 0.1-<= 1.0 mg/l

Persistence and degradability: Expected to be inherently biodegradable. The volatile constituents will oxidize rapidly by photochemical reactions in air.

Bioaccumulative Potential : Contains constituents with the potential to bioaccumulate.

Mobility : Floats on water. Contains volatile constituents. Evaporates within a day from water or soil surfaces. Large volumes may penetrate soil

and

could contaminate groundwater.

Result of PBT and vPvB Assessment: The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and is not considered to be PBT or vPvB.

Other Adverse Effects : Films formed on water may affect oxygen transfer and damage organisms

Boric Acid

Ecotoxicity : Not available.

BOD5 and COD : Not available.

Products of Biodegradation : Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Potassium Bifluoride, Potassium Fluoborate (data valid for both ingredients)

Ecotoxicity : Not available.

BOD5 and COD : Not available.

Products of Biodegradation : Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Petrolatum, Silver, Copper, Zinc, Tin, Nickel (data valid for all four ingredients)

Ecotoxicity : Not available.

BOD5 and COD : Not available.

Products of Biodegradation : Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original.

Special Remarks on the Products of Biodegradation: Not available.

SAFETY DATA SHEET

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal Method: Dispose of in accordance with EC, national and local regulations, or sell to a refiner.

Product Disposal: Disposal of waste material from the use of this product may be subject to federal, state and local regulations. Waste characterizations and compliance with applicable laws are the sole responsibility of the waste generator. Reclaimed scrap metal has monetary value. Contact a commercial reclaimer for information on recycling scrap metals. All recovered material should be packaged, labeled, transported and disposed or reclaimed in conformance with applicable laws and regulations and in conformance with good engineering practices.

Empty Container: Do not reuse empty containers. Dispose of empty container in accordance with EC, national and local regulations. Empty containers may be refined or recycled.

SECTION 14 - TRANSPORT INFORMATION

UN Number	: n.a.
Transport by road/rail	
Transport hazard class/packing group	: n.a.
Classification code	: n.a.
LQ(ADR 2011)	: n.a.
LQ(ADR 2009)	: n.a.
Tunnel restriction code	: n.a.
Transport by sea (IMDG-code)	
IMDG-code	: n.a. (transport hazard class/packing group)
Marine Pollutant	: n.a.
Transport by air (IATA)	
IATA	: n.a.
Additional information Non-dangerous material according to Transport Regulations	

SECTION 15 - REGULATORY INFORMATION

General Compliance

Compliance with the Dodd-Frank Act - Conflict Minerals Rule

Okai Corporation has carried out due diligence to ensure that our suppliers of Gold and Tin, which may be added to Okai product(s) that you purchase, and may be necessary to the functionality of those product(s), are sourced from 100% recycled sources that have provided documented compliance to us.

European Chemicals Agency (ECHA) REACH Compliance

This product contains Boric Acid which is listed on the SVHC List under the requirements of REACH. This material is NOT REACH compliant. However, when using this product, Boric Acid, as a part of the flux, will be used up and removed from the final assembly in the washing process. Completed parts that use this product should not contain any Boric Acid. Determination of compliance with REACH is the user's responsibility.

California Proposition 65 (List Published 01/31/2004): No ingredients in this product listed.

Restriction of Hazardous Substances Directive 2002/95/EC, RoHS: This product complies.

EEC CLASSIFICATION [overall preparation]

"T" - Toxic, Xn - Harmful

R20/22: Harmful by inhalation and if swallowed.

R36/38: Irritating to eyes and skin.

R40: Limited evidence of a carcinogenic effect.

SAFETY DATA SHEET

R43: May cause sensitization by skin contact.

R48/23: Toxic: danger of serious damage to health by prolonged exposure through inhalation.

R60: May impair fertility.

R61: May cause harm to the unborn child.

S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S36/37: Wear suitable protective clothing and gloves.

S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label).

S51: Use only in well-ventilated areas.

S53: Avoid exposure — obtain special instructions before use.

Label Requirements:



Hazardous Materials Identification System

HEALTH	2
FLAMMABILITY	1
REACTIVITY	0
PERSONAL PROTECTION	H

This product, as supplied, has not been evaluated for inclusion on regulatory lists. Reporting requirements are provided for the components of this material for reference only. It is the user's responsibility to verify actual reporting requirements in accordance with local regulations.

Petrolatum

TSCA 8(b) inventory: Petrolatum, white

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): This product is not classified according to the EU regulations. S24/25- Avoid contact with skin and eyes. S28- After contact with skin, wash immediately with plenty of water S37- Wear suitable gloves. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Distillates (petroleum) hydrotreated, light

OSHA Hazards: Combustible liquid

TSCA 8(b) inventory: Distillates, petroleum, hydrotreated light CAS# 64742-47-8

California Proposition 65: Not listed

SARA 302 Status: No

SAFETY DATA SHEET

SARA 311/312 Classification: "Fire hazard"

SARA 313 Chemical: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US. EPA CERCLA Hazardous Substances (40 CFR 302): None

WHMIS Classification: Class B, Division 3: Combustible liquid.

European Union: Xn:Harmful, R65 Harmful: may cause lung damage if swallowed., R66 Repeated exposure may cause skin dryness or cracking.

Australian Inventory of Chemical Substances (AICS) Listing: Listed

Japanese Minister of International Trade and Industry (MITI) Inventory Listing: Listed

Canadian Domestic Substance List (DSL) Inventory Listing: Listed

Canadian Non-Domestic Substance Listing (NDSL): Not listed

European Inventory of Existing Commercial Chemical Substances (EINECS) Listing: Listed

Philippines Inventory List (PICCS): Listed

Korean Inventory List: Listed

China Inventory List: Listed

Boric Acid

TSCA 8(b) inventory: Boric acid

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36/38- Irritating to eyes and skin. R40- Possible risks of irreversible effects. R62- Possible risk of impaired fertility. S24/25-Avoid contact with skin and eyes.

European Community: SVHC (SUBSTANCES OF VERY HIGH CONCERN): Boric Acid

Potassium Bifluoride

TSCA 8(b) inventory: Potassium bifluoride

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

WHMIS (Canada): CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).

CLASS E: Corrosive solid.

DSCL (EEC): R35- Causes severe burns.

Potassium Fluoborate:

TSCA 8(b) inventory: Potassium fluoborate

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R38- Irritating to skin. R41- Risk of serious damage to eyes.

Silver

Rhode Island RTK hazardous substances: Silver

Pennsylvania RTK: Silver

Minnesota: Silver

Massachusetts RTK: Silver New

Jersey: Silver

TSCA 8(b) inventory: Silver

TSCA 8(a) PAIR: Silver

TSCA 8(d) H and S data reporting: Silver

SARA 313 toxic chemical notification and release reporting: Silver: 1%

CERCLA: Hazardous substances.: Silver: 1000 lbs. (453.6 kg)

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

SAFETY DATA SHEET

Copper

Pennsylvania RTK: Copper

Massachusetts RTK: Copper

TSCA 8(b) inventory: Copper

CERCLA: Hazardous substances.: Copper

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

Zinc

New York release reporting list: Zinc Metal

Rhode Island RTK hazardous substances: Zinc Metal

Pennsylvania RTK: Zinc Metal

Florida: Zinc Metal

Michigan critical material: Zinc

Metal Massachusetts RTK: Zinc Metal

New Jersey: Zinc Metal

California Director's List of Hazardous Substances: Zinc Metal

TSCA 8(b) inventory: Zinc Metal

TSCA 12(b) one time export: Zinc Metal

SARA 313 toxic chemical notification and release reporting: Zinc Metal

CERCLA: Hazardous substances.: Zinc Metal: 1000 lbs. (453.6 kg)

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

WHMIS (Canada): Not Available

DSCL (EEC): R15- Contact with water liberates extremely flammable gases. R17- Spontaneously flammable in air. S7/8- Keep container tightly closed and dry. (not applicable to this material as supplied in paste form)

Tin

Rhode Island RTK hazardous substances: Tin

Pennsylvania RTK: Tin

Massachusetts RTK: Tin

New Jersey: Tin

California Director's List of Hazardous Substances: Tin

TSCA 8(b) inventory: Tin

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): This product is not classified according to the EU regulations. Not applicable.

Nickel

California prop. 65: Nickel metal

Connecticut hazardous material survey.: Nickel metal

Illinois toxic substances disclosure to employee act: Nickel metal

Illinois chemical safety act: Nickel metal

New York release reporting list: Nickel metal

Rhode Island RTK hazardous substances: Nickel metal

Pennsylvania RTK: Nickel metal

Michigan critical material: Nickel metal

Massachusetts RTK: Nickel metal

SAFETY DATA SHEET

Massachusetts spill list: Nickel metal

New Jersey: Nickel metal

New Jersey spill list: Nickel metal

Louisiana spill reporting: Nickel metal

California Director's List of Hazardous Substances: Nickel metal

TSCA 8(b) inventory: Nickel metal

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R40- Possible risks of irreversible effects. R43- May cause sensitization by skin contact. S22-

Do not breathe dust. S36- Wear suitable protective clothing.

SECTION 16 - OTHER INFORMATION

Text of Risk Phrases in this MSDS:

R20/22	:	Harmful by inhalation and if swallowed.
R25	:	Toxic if swallowed
R34	:	Causes burns
R36/38	:	Irritating to eyes and skin.
R38	:	Irritating to skin
R40	:	Limited evidence of a carcinogenic effect.
R43	:	May cause sensitization by skin contact.
R45	:	May cause cancer
R48/23	:	Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R51/53	:	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R60	:	May impair fertility
R61	:	May cause harm to the unborn child
R65	:	Harmful: may cause lung damage if swallowed

Text of Safety Phrases in this MSDS:

S1/2	:	Keep locked up and out of the reach of children
S22	:	Do not breathe dust
S23	:	Do not breathe dust or fumes
S24	:	Avoid contact with skin
S26	:	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S37	:	Wear suitable gloves
S45	:	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)
S53	:	Avoid exposure - obtain special instructions before use
S62	:	If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label where possible

Revision Summary:

Original Document 02/20/2015

SAFETY DATA SHEET

Last Review 05/04/2015

Manufacturer Disclaimer:

This Material Safety Data Sheet is prepared in accordance with U.S. OSHA, Canadian WHMIS, and European Community Safety Data Sheet directives. This document is offered pursuant to OSHA's Hazard Communication Standard 29 CFR 1910.1200. The information and recommendations contained in this Safety Data Sheet have been compiled from sources believed to be reliable and to represent the most reasonable current opinion on the subject when the SDS was prepared, and are offered in good faith. However, no warranty, guaranty or representation is expressed or implied as to the correctness or sufficiency of the information. The user of this product must decide what safety measures are necessary to safely use this product, either alone or in combination with other products, and determine its environmental regulatory compliance obligations under any applicable EC, national or state laws. ProTech Professional Products, Inc. assumes no responsibility for injury to the end user caused by the material even if proper safety procedures are followed. The end user should determine the suitability of the information for their particular usage. The end user assumes the risk in the use of this material. The information in this document may be changed periodically.