JSA Sales Inc.

MATERIAL SAFETY DATA SHEET

This Material Safety Data Sheet complies with the Canadian Controlled Product Regulations

1. Product and Supplier Identification

Product: S-39 Universal

Product Use: Soldering Flux

Manufacturer: **Bison International**
Dr. A.F. Philipsstraat 9,
NL-4462 EW Goes
Netherlands

Telephone: +31 113 235700
Facsimile: +31 113 232077

Supplier: **JSA Sales,**
75A Clipper Street,
Coquitlam, B.C.
Canada, V3K 6X2

Telephone: **(604) 525-4774**

2. Composition

Component	% (w/w)	Exposure Limits (ACGIH)*	LD_{50}	LC_{50}
Zinc Chloride CAS No. 7646-85-7	25 - 50	TLV-TWA: 1 mg/m^3 (zinc fume)	350 mg/kg (oral/rat)	~2000 mg/m^3 (inhalation/rat, 10 minute exposure, aerosol)
Ethylene Glycol CAS No 107-21-1	10 - 25	TLV-C: 100 mg/m^3 Basis: Upper respiratory tract irritation, eye irritation	4000 mg/kg (oral/female rat) 9530 mg/kg (dermal/rabbit)	2725 mg/m^3 (inhalation/ 4hr)
Ammonium Chloride CAS No. 12125-02-9	10 - 25	TLV-TWA: 10 mg/m^3 (fume) TLV-STEL: 20 mg/m^3 (fume) Basis: irritation	1650 mg/kg (oral/rat)	No data
Non-hazardous ingredients and ingredients below disclosure requirements	65 - 88	Not applicable	Not applicable	Not applicable

* Exposure limits may vary from time to time and from one jurisdiction to another. Check with local regulatory agency for the exposure limits in your area.

ACGIH , American Conference of Governmental Industrial Hygienists.

3. Hazards Identification

Primary Routes of Entry:

Skin Contact:	Yes
Skin Absorption:	Yes
Eye Contact:	Yes
Ingestion:	Yes
Inhalation:	Yes

Emergency Overview: Corrosive to the eyes and skin! Fumes may cause irritation of the nose, throat and lungs. Irritation may produce phlegm and initiate coughing. May cause skin irritation and/or a mild burning sensation upon contact. Eye contact will produce redness, pain and a burning sensation, and failure to treat eyes immediately may lead to scarring of the cornea resulting in impaired vision, or blindness.

Effects of Short-Term (Acute) Exposure:

Inhalation: As supplied this product will not produce irritating vapours. Irritating vapours occur upon use of the product, or when heated sufficiently. These vapours/ fumes are irritating to the nose, throat and lungs. Inhalation of these fumes are sufficiently irritating to cause the production of phlegm and initiate coughing. Metal fume fever is unlikely at the heat ranges the product is exposed to during recommended use.

Skin Contact: Contact with skin may produce varying degrees of irritation ranging from moderate to severe. Moderate effects may include itching and mild rash, while a more severe effect may produce sores. Persons with existing skin problems are more likely to experience the rashes. Contact with broken skin will cause stinging. Unlikely to cause sensitization.

Eye Contact: This product can cause severe eye burns. Treatment should be immediate to eleviate chances of permanent eye damage. Severe contact may cause scarring of the cornea causing impaired vision or in severe cases, blindness.

Ingestion: Although an unlikely route of entry, ingestion may cause burns to the mouth and throat. Ingestion of large amounts can cause anemia and stomach symptoms (including nausea, vomiting, abdominal pain, diarrhea and, in severe cases, vomiting of blood), based on human and animal information.

Effects of Long-Term (Chronic) Exposure: Prolonged contact with skin may cause severe skin problems such as exema, and other forms of dermatitis.

Medical Conditions Aggravated By Exposure: Persons susceptable to skin problems may find that the use of this product will cause increased symptoms of existing skin problems.

4. First Aid Measures

Overview: This is a corrosive paste. Extremely corrosive to the eyes and skin. Ingestion may cause corrosion of the mouth, esophagus and cause gastro-intestinal tract upset.

Eye Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 15 minutes or until the chemical is removed, while holding the eyelid(s) open. Obtain medical attention immediately or transport to a medical facility and continue to flush the eyes en route if irritation persists.

Skin Contact: Remove contaminated clothing. Wash gently and thoroughly with water and non-abrasive soap until all traces of the flux have been removed. If signs of irritation occur, obtain medical advice. Completely decontaminate clothing, shoes and leather goods before re-use or discard.

Inhalation: If inhalation of fume occurs, remove to fresh air immediately. If breathing is difficult, oxygen may be beneficial if administered by trained personnel, preferably on a doctor's advice. DO NOT allow the victim to move about unnecessarily.

Ingestion: If swallowed, get immediate medical attention! Never give anything by mouth if victim is rapidly losing consciousness. Have victim rinse mouth thoroughly with water. **Do not induce vomiting**. Dilute contents of stomach with 240 to 300 ml of water. If vomiting occurs naturally have victim lean forward to reduce risk of aspiration. Seek immediate medical attention.

First Aid Comments: Provide general supportive measures (comfort, warmth, rest). Consult a doctor and/or the nearest Poison Control Centre for all exposures except minor instances of inhalation or skin contact. Some first aid procedures recommended above require advanced first aid training. Protocols for undertaking advanced procedures must be developed in consultation with a doctor and routinely reviewed. All first aid procedures should be periodically reviewed by a doctor familiar with the material and its conditions of use in the workplace.

5. Fire Fighting Measures

Flash point: > 100^{o}C
Autoignition temperature: Not determined
Lower Explosive Limit: 3.2% (volume)
Upper Explosion Limit: 53.0% (volume)
Sensitivity to Impact: No
Sensitivity to Static Discharge: No

Hazardous Combustion Products: Hydrogen chloride, oxides of carbon and nitrogen may be liberated during the soldering operations. Ammonia may be liberated below 500 ^{o}C, but ammonia decomposes above 500 ^{o}C to produce hydrogen and nitrogen. Carbon dioxide, carbon monoxide, and undetermined organic compounds in acrid smoke.

Extinguishing Media: Use means appropriate for controlling surrounding fire. Cool containers if possible.

Fire Fighting Instructions: Evacuate area and fight fire from a safe distance or protected location. Approach the fire from upwind to avoid contact with hazardous vapours and decomposition products. Do not enter fire area without proper protection. Containers, when heated, may explode. Use of water to cool none fire exposed containers. Isolate material not yet involved in the fire and protect personnel. Move containers away from fire, if safe to do so.

HMIS HAZARD INDEX:

HEALTH: 3

FLAMMABILITY: 0

REACTIVITY: 1

PROTECTION: D

6. Accidental Release Measures

Overview: Restrict access to spill area until completion of cleanup. Ensure cleanup is conducted by trained personnel only. Wear protective equipment before attempting clean up.

Personal Protection: See Section 8

Environmental Precautions: Prevent from entering waterways and sewers. If entry occurs, contact appropriate authorities. A spill of product should be handled with urgency to prevent excape into the environment.

Remedial Measures: Do not touch spilled material and prevent material from entering sewers, waterways. Stop or reduce leak, if safe to do so. For small spills, contain spill with absorbent material which does not react with the product (vermiculite, sand, sawdust). Place in suitable, covered, labeled containers. Contaminated absorbent may exhibit the same hazards as the spilled product.

7. Handling and Storage

Handling Procedures: Ensure that the product is used where there is good ventilation or exhaust. People working with this product should be trained regarding the hazards and safe handling.

Do not use with incompatible materials such as mixtures of potassium and zinc chloride, which is sensitive to mechanical shock and produces a strong explosion on impact. STRONG BASES (e.g. alkali hydroxides) - react vigorously or violently, with the evolution of heat. Wear proper protective equipment when handling this material.

Storage: This product may be stored in ambient temperatures up to 50^{o}C. Do not freeze. Store away from ignition sources, and away from incompatibles, such as strong oxidizers. Keep containers closed when not in use to prevent accidental contamination.

8. Exposure Controls, Personal Protection

Engineering Controls: When using indoors, ensure adequate ventilation by using local exhaust.

Respiratory Protection:

UP TO 10 mg/m3: Dust, mist, and fume respirator*; or SAR*.
UP TO 25 mg/m3: Powered air-purifying respirator with dust, mist, and fume filter(s)*; or SAR operated in a continuous-flow mode*.
UP TO 50 mg/m3: Full-facepiece respirator with high-efficiency particulate filter(s); or powered air-purifying respirator with tight-fitting facepiece and high-efficiency particulate filter(s)*; or full-facepiece SCBA; or full-facepiece SAR.
EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.
ESCAPE: Full-facepiece respirator with high-efficiency particulate filter(s); or escape-type SCBA.

*NOTE: Substance reported to cause eye irritation or damage; may require eye protection.

NOTE: The IDLH concentration for zinc chloride fume is 50 mg/m3.
The purpose of establishing and IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protective equipment every effort should be made to exit immediately.

The respirator use limitations specified by the approving agency and the manufacturer must be observed. Recommendations apply only to NIOSH approved respirators. Air-purifying respirators do not protect against oxygen-deficient atmospheres.

*ABBREVIATIONS: SAR = supplied-air respirator; SCBA = self- contained breathing apparatus. IDLH = Immediately Dangerous to Life or Health.

When cartridge type respirators are used, ensure that the cartridges are changed frequently according to the manufacturer's recommendations. Respirator selection must be done by a qualified person and be based upon a risk assessment of the work activities and exposure levels. Respirators must be fit tested and users must be clean shaven where the respirator seals to face. Exposure must be kept at or below the applicable exposure limits and the maximum use concentration of the respirator must not be exceeded.

Skin protection: Depending upon the conditions of use, protective gloves made from chemical resistant nitrile rubber, PVC, PE or neoprene. Neoprene aprons or suitable clothing to prevent skin contact.

Eye and Face Protection: Tightly sealed goggles and/or face shield must be worn when a possibility exists for eye contact. Contact lenses should not be worn.

Footwear: No specific recommendation.

Other: Emergency eyes wash fountains should be available in vicinity of use.

9. Physical and Chemical Properties

Appearance: Fluid, coloured to specification
Odour: Characteristic
Odour Threshold: Not available
pH: 3.0
Vapour Pressure: 23 hPa @ 20^{o}C
Solubility: Fully miscible
Vapour Density: >1 (air =1),
Evaporation Rate: Not determined

Freezing Point: Not determined
Critical Temperature: Not determined
Relative Density: 1.44 @ 20^{o}C
Partition Coefficient: Not determined
Solvent Solubility: Not determined
Percent Solids: 51.6
Viscosity: 200 mPas
Boiling Point: 100^{o}C

10. Stability and Reactivity

Chemical Stability: Stable as supplied.

Incompatibility: Yes. Mixtures of potassium and zinc chloride are sensitive to mechanical shock and produces a strong explosion on impact. STRONG BASES (e.g. alkali hydroxides) - react vigorously or violently, with the evolution of heat.

Hazardous Decomposition Products: None known.

Hazardous Polymerization: Will not occur.

11. Toxicological Information

Acute Exposure: See Section 3
Chronic Exposure: See Section 3.
Exposure Limits: See Section 2.
Irritancy: See Section 3.
Sensitization: See Section 3.
Carcinogenicity: No human or animal data is available. IARC has designated this material A4, not classifiable as a human carcinogen.

Teratogenicity: No human information available
Reproductive toxicity: No human information available.
Mutagenicity: No human information available.
Synergistic products: None known

12. Ecological Information

Overview: None

Environmental toxicity:

For Zinc Chloride:

- LC50 Daphnia magna (Water flea) 861.06 ug/L/36 hr; flow through
- LC50 Daphnia magna (Water flea) 798.94 ug/L/48 hr; flow through
- LC50 Daphnia magna (Water flea) 420.25 ug/L/60 hr; flow through
- LC50 Daphnia magna (Water flea) 126.10 ug/L/72 hr; flow through

For Ethylene glycol:

- LD50 Carassius auratus (goldfish) >5,000 mg/l/24 hr modified ASTM D 1345
- LC50 Guppies (Poecilia reticulata) 49,300 ppm/7 days /Conditions of bioassay not specified
- LC50 Rainbow trout 18500 mg/l/96 hr /Conditions of bioassay not specified
- LC50 Rainbow trout 41000 mg/l/96 hr at 20 deg C /Conditions of bioassay not specified

Biodegradability: Not known

13. Disposal Considerations

Review federal, provincial or state, and local government requirements prior to disposal. Store material for disposal as indicated in Storage Conditions. Disposal by controlled incineration may be acceptable.

14. Transport Information

Transport of Dangerous Goods (TDG and CLR): UN 1760, CORROSIVE LIQUID, N.O.S. (Zinc Chloride), Class 8, P.G. III

United States Department of Transport (49CFR): UN 1760, CORROSIVE LIQUID, N.O.S. (Zinc Chloride), Class 8, P.G. III

International Air Transport Association (IATA): UN 1760, CORROSIVE LIQUID, N.O.S. (Zinc Chloride), Class 8, P.G. III

International Maritime Organization (IMO): UN 1760, CORROSIVE LIQUID, N.O.S. (Zinc Chloride), Class 8, P.G. III, EmS No. F-A, S-B, Stowage category “A”, Clear of living quarters. This is NOT a Maine Pollutant.

15. Regulatory Information

CANADIAN FEDERAL REGULATIONS:

CEPA, DOMESTIC SUBSTANCES LIST: Listed

WHMIS CLASSIFICATION: D1B, D2A**,** E

16. Other Information

Preparation Date: September 3, 2008

Prepared by: Kel-Ex Agencies Ltd., 319 Lynn Avenue, North Vancouver, B.C. V7J 2C4

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