



Code: ALS-FLUX
Date: 06 FEB 1998
Revised: 08 AUG 2011
Printed: 08 AUG 2011

WOLVERINE JOINING TECHNOLOGIES, LLC.

MATERIAL SAFETY DATA SHEET

Product: ALUMINUM SOLDERING FLUX

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Common Name : ALUMINUM SOLDERING FLUX
Chemical Name : CHEMICAL MIXTURE
Formula : CHEMICAL MIXTURE
Product CAS No.: CHEMICAL MIXTURE
Product Use : Welding/Brazing/Soldering

Supplier : WOLVERINE JOINING TECHNOLOGIES, LLC.
Address : 235 KILVERT STREET
City, St, Zip : WARWICK, RI 02886
Phone : 1-401-739-9550

FOR CHEMICAL EMERGENCY CALL CHEMTREC (24 HOURS):
1-800-424-9300 (US, Canada, Puerto Rico, Virgin Islands)
1-703-527-3887 (Outside Above Area)

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

| INGREDIENT | CAS NO. | % Wt. |
|------------------------|------------|-------|
| AMINOETHYLETHANOLAMINE | 111-41-1 | 25-35 |
| AMMONIUM FLUOBORATE | 13826-83-0 | 10-20 |
| TRIETHANOLAMINE | 102-71-6 | 5-15 |
| ZINC OXIDE | 1314-13-2 | < 10 |
| TIN | 7440-31-5 | < 5 |
| ZINC | 7440-66-6 | < 5 |

INGREDIENT NOTES

NOTE: The percentage by weight values reported for the ingredients in this product represent approximate formulation values.

NOTE: See Section 8 for Exposure Limits and Section 11 for Toxicological Information.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Amber viscous liquid

Ammonia odor

Flash Point: 135 °C

Prolonged or repeated exposure may cause lung, liver and kidney damage. Long term exposure to fluorides may cause damage to teeth and bones. Causes severe eye, skin and respiratory tract irritation.

May cause burns.

Harmful if swallowed. Causes severe irritation and may cause burns, abdominal pain, vomiting and diarrhea.

Not a fire or explosion hazard. However, toxic emissions are possible in a fire situation.

ROUTES OF ENTRY

Eyes? YES

Skin? YES

Inhalation? YES

Ingestion? YES

POTENTIAL HEALTH EFFECTS

EYE CONTACT causes severe irritation and may cause burns and corneal injury.

SKIN CONTACT causes severe irritation. Prolonged contact may cause burns, dermatitis and allergic reactions.

INHALATION can cause severe irritation of mouth, nose, throat and respiratory system. Overexposure may cause pulmonary edema, nausea, vomiting and diarrhea.

INGESTION causes severe burns and extensive tissue perforation of mucous membranes of the mouth, throat, esophagus, and stomach. Symptoms include pain, nausea, vomiting and diarrhea, leading to convulsions, shock and circulatory collapse. May cause damage to the kidneys and liver.

NOTE: Inhalation of fumes may cause a flu-like illness called metal fume fever. Typically metal fume fever begins four to twelve hours after sufficient exposure to freshly formed fumes. The first symptoms are a metallic taste, dryness and irritation of the throat. Cough and shortness of breath may occur along with headache, fatigue, nausea, vomiting, muscle and joint pain, fever and chills. The syndrome runs its course in 24-48 hours.

CARCINOGENICITY

NTP? NO

IARC? NO

OSHA? NO

CHRONIC HEALTH HAZARDS

Prolonged or repeated overexposure may cause lung, liver and kidney damage.

Exposure to FLUORIDES over years may produce mottling of tooth enamel, embrittlement and calcification of bones, and increased calcification of ligaments and vertebrae resulting in spinal stiffness (fluorosis).

Prolonged absorption of BORON COMPOUNDS may cause mild gastrointestinal irritation, loss of appetite, nausea and erythematous rash. Dryness of the skin and mucous membranes, loss of hair, conjunctivitis and kidney injury have also been observed. Reproductive effects have been observed in laboratory animals.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

May adversely affect existing medical conditions such as eye, skin, respiratory, liver and/or kidney ailments, and central nervous system disorders.

NOTE: See Section 8 for Exposure Limits, Section 11 for Toxicological Information and Section 12 for Ecological Information.

SECTION 4: FIRST AID MEASURES

EYE CONTACT: Immediately flush eyes with plenty of water for at least 30 minutes. Additional flushing with water may be necessary. Call a physician (preferably an ophthalmologist) as soon as possible.

SKIN CONTACT: Flush area with water while removing contaminated clothing and shoes. Follow by washing with soap and water. Do not reuse clothing or shoes until cleaned. If irritation persists, get medical attention. Do not apply oils or ointments unless ordered by the physician.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician.

INGESTION: If swallowed, "DO NOT INDUCE VOMITING", give 3-4 glasses of water. Do not give anything by mouth to an unconscious or convulsing person. Get immediate medical attention.

SECTION 5: FIRE-FIGHTING MEASURES

Flash Point: 135 °C

Auto-Ignition: Not Determined

LEL: 1.6 %

UEL: 10.0 %

NFPA HAZARD CLASSIFICATION

Health: 2

Flammable: 1

Reactivity: 0

HMIS HAZARD CLASSIFICATION

Health: 3* Flammable: 1 Reactivity: 0 Special: C

* Indicates the possibility of chronic health effects. See Chronic Health Hazards in Section 3 for more information.

EXTINGUISHING MEDIA

Use water, carbon dioxide or foam.

SPECIAL FIRE FIGHTING PROCEDURES

Wear NIOSH/MSHA approved positive-pressure self-contained breathing apparatus and protective clothing as specified in 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Not a fire or explosion hazard. However, toxic emissions are possible in a fire situation.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Contain spillage, soak up with inert absorbent and scoop into container for disposal. Notification of the National Response Center (800/424-8802) may be required. Refer to EPA, DOT and applicable state and local regulations for current response information.

It is recommended that each user establish a spill prevention, control and countermeasure plan (SPCC). Such plan should include procedures applicable to proper storage, control and clean-up of spills, including reuse or disposal as appropriate (see Section 13: Disposal Considerations).

****NOTE**** In the event of an accidental release of this material, the above procedures should be followed. Additionally, proper exposure controls and personal protection equipment should be used (see Section 8: Exposure Control/Personal Protection), and disposal of the material should be in accordance with Section 13: Disposal Considerations.

SECTION 7: HANDLING AND STORAGE

Keep away from food and feed products.
Store in tightly closed container.
Store in a cool, dry location away from incompatible materials.

Avoid contact with any dusts, mists or fumes resulting from the use of this product.

Wash contaminated clothing before reuse. Destroy contaminated shoes.

Do not eat, drink, or smoke in work area.

Provide a safety shower and eye wash close to where this material is being used.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS

| INGREDIENT | PEL-OSHA | TLV-ACGIH |
|---|--|---|
| AMINOETHYLETHANOLAMINE CAS NO.: 111-41-1 | None Established | None Established |
| AMMONIUM FLUOBORATE CAS NO.: 13826-83-0 | 2.5 mg/m ³ (as F) 35 mg/m ³ (as ammonia) | 2.5 mg/m ³ (as F) 17 mg/m ³ (as ammonia) 24 mg/m ³ (as ammonia) STEL |
| TRIETHANOLAMINE CAS NO.: 102-71-6 | None Established | 5 mg/m ³ |
| ZINC OXIDE CAS NO.: 1314-13-2 | 15 mg/m ³ (Total dust) 5 mg/m ³ (Respirable fraction) 5 mg/m ³ (Fume) | 5 mg/m ³ (Fume) 10 mg/m ³ (Fume) STEL 10 mg/m ³ (Total dust) |
| TIN CAS NO.: 7440-31-5 | 2 mg/m ³ | 2 mg/m ³ |
| ZINC CAS NO.: 7440-66-6 | None Established | None Established |

NOTE: Both OSHA and the ACGIH list welding fumes as having an exposure limit of 5 mg/m³ (total particulate not otherwise classified). However, the ACGIH states that welding fumes must be tested frequently for individual components which are likely to be present to determine whether specific exposure limits are exceeded. Unless otherwise noted, all values are reported as 8-hour Time-Weighted Averages (TWAs) and total dust (particulates only). All ACGIH TLVs refer to the 1998 Standards. All OSHA PELs refer to 29 CFR Part 1910 Air Contaminants: Final Rule, January 19, 1989.

RESPIRATORY PROTECTION

A NIOSH/MSHA-approved respirator as necessary.

VENTILATION

General; local exhaust ventilation as necessary to control any air contaminants to within their PELs or TLVs during the use of this product.

PROTECTIVE EQUIPMENT

Safety glasses (with side shields).

Gloves.

Body protection as necessary to prevent skin contact.

Refer to ANSI/ASC Z49.1-94 (Safety in Welding, Cutting and Allied Processes), published by the American Welding Society, for further information on the selection of personal protective equipment.

PERSONNEL SAMPLING PROCEDURE

For FLUORIDE COMPOUNDS: Refer to NIOSH Manual of Analytical Methods (NMAM), 4th Edition, Methods 7902, 7906.

For METALLIC COMPOUNDS: Air sampling: Refer to NIOSH Manual of Analytical Methods (NMAM), 4th Edition, Method 7300.

For Ammonia: Refer to NIOSH Manual of Analytical Methods (NMAM), 4th Edition, Methods 6015 and 6016.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Amber viscous liquid

Odor: Ammonia odor

Boiling Point: 133.9 °C

Specific Gravity (H₂O=1): 1.245

Melting Point: Not Applicable

Vapor Pressure (mm Hg): Not Determined

Vapor Density (Air=1): Not Determined

Evaporation Rate: Not Determined

% Solubility In Water: 100 %

pH: Not Determined

SECTION 10: STABILITY AND REACTIVITY

Stability: Generally considered stable.

Avoid: None expected.

INCOMPATIBILITY (Materials to Avoid)

Strong acids and oxidizers.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS

Thermal decomposition will produce ammonia, oxides of carbon, oxides of nitrogen and metal oxide fumes.

Polymerization: Polymerization is not expected to occur.

Avoid: Not applicable.

SECTION 11: TOXICOLOGICAL INFORMATION

| CHEMICAL NAME | % Wt. | LD50 | LC50 |
|------------------------|-------|-------------------------|----------------------------|
| AMINOETHYLETHANOLAMINE | | | |
| CAS NO.: 111-41-1 | 25-35 | 2250 mg/kg RAT, skin | Not Available |
| AMMONIUM FLUOBORATE | | | |
| CAS NO.: 13826-83-0 | 10-20 | Not Available | 185 ppm/1 hr (as F) RAT |

| | | | |
|--------------------------------------|------|----------------------------|----------------------|
| TRIETHANOLAMINE CAS NO.: 102-71-6 | 5-15 | 8,000 mg/kg RAT, oral | Not Available |
| ZINC OXIDE CAS NO.: 1314-13-2 | < 10 | 7,950 mg/kg MOUSE, oral | 2,500 mg/kg MOUSE |
| TIN CAS NO.: 7440-31-5 | < 5 | Not Available | Not Available |
| ZINC CAS NO.: 7440-66-6 | < 5 | Not Available | Not Available |

NOTE: See Sections 3, 8 and 12 for additional information.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY

No data available.

ENVIRONMENTAL FATE

No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

US EPA Waste Number: Not Regulated

Federal, state and local disposal laws and regulations will determine the proper waste disposal/recycling/reclamation procedure. All waste materials should be reviewed to determine the applicable hazards (testing may be necessary). Disposal requirements are dependent on the hazard classification and will vary by location and the type of disposal selected.

****NOTE**** Chemical additions, processing or otherwise altering this material may make the waste management information presented above incomplete, inaccurate or otherwise inappropriate.

As local regulations may vary; all waste must be disposed/recycled/reclaimed in accordance with federal, state, and local environmental control regulations.

SECTION 14: TRANSPORT INFORMATION

INTERNATIONAL

UN Number: UN1760

UNITED STATES

EPA Waste Number: Not Regulated

DOT Classification: 8 Corrosive Material

DOT Proper Shipping Name: Corrosive liquids, n.o.s. (Contains
Aminoethylethanolamine)

Packing Group: III

CANADA

PIN Number: UN1760

TDG Class: 8 Corrosive Material

EC

DGL: Corrosive substance

SECTION 15: REGULATORY INFORMATION

US FEDERAL REGULATIONS

TSCA: IN TSCA

SARA 311 AND 312 HAZARD CATEGORIES

IMMEDIATE (Acute) Health Hazard: YES

DELAYED (Chronic) Health Hazard: YES

FIRE Hazard: NO

REACTIVITY Hazard: NO

Sudden Release of PRESSURE: NO

SARA SECTION 313 NOTIFICATION

This product contains a toxic chemical (or chemicals) subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

| CHEMICAL NAME | CAS Number | % Wt. |
|---------------------|------------|-------|
| AMMONIUM FLUOBORATE | 13826-83-0 | 10-20 |
| ZINC OXIDE | 1314-13-2 | < 10 |
| ZINC | 7440-66-6 | < 5 |

OZONE DEPLETING SUBSTANCES (ODS)

This product neither contains nor is manufactured with an ozone depleting substance subject to the labeling requirements of the Clean Air Act Amendments 1990 and 40 CFR Part 82.

VOLATILE ORGANIC COMPOUNDS (VOC)

Not Determined

US STATE REGULATIONS

VOLATILE ORGANIC COMPOUND (CARB): Not Determined

CANADIAN REGULATIONS

"This product has been classified in accordance with the hazard criteria of the **Controlled Products Regulations** and the MSDS contains all the information required by the **Controlled Products Regulations**."

DSL/NDSL: DSL

WHMIS Classification: Class D Division 2 Subdivision B
ClassE

EUROPEAN REGULATIONS

EINECS: Yes

OTHER REGULATIONS

MITI (Japan): Yes

AICS (Australia): Yes

SECTION 16: OTHER INFORMATION

REVISIONS

Revision Number: 10

PREPARATION INFORMATION

Prepared By: Wolverine Joining Technologies, and Wolverine Tube Inc.
Corporate Environmental, Health and Safety Group.
Phone Number/Address: See Section 1

This Material Data Sheet is offered pursuant to OSHA's Hazard Communication Standard (29 CFR 1910.1200). Other government regulations must be reviewed for applicability to these products. The information in this Material Safety Data Sheet should be provided to all who will use, handle, store, transport, or otherwise be exposed to this product. This information has been prepared for the guidance of plant engineering, operations, and management and for persons working with or handling these products. The information presented in the MSDS is premised upon proper handling and anticipated uses and is for the material without chemical additions/alterations. We believe this information to be reliable and up-to-date as of the date of publication, but make no warranty that it is. Additionally, if this Material Safety Data Sheet is more than three years old, please contact the supplier at the phone number listed in Section 1 to make certain that this sheet is the most current. Copyright Wolverine Joining Technologies, LLC. License granted to make unlimited copies for internal use only.