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WOLVERINE JOINING TECHNOLOGIES, LLC.

MATERIAL SAFETY DATA SHEET

Product: ELECTROMOTIVE BRAZING FLUX

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Common Name : BRAZING 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.
POTASSIUM TETRABORATE	1332-77-0	30-40
BORIC ACID	10043-35-3	20-30
POTASSIUM PENTABORATE	11128-29-3	1-5
POTASSIUM BIFLUORIDE	7789-29-9	20-30
SODIUM DODECYL SULFATE	151-21-3	0-0.5
WATER	7732-18-5	10-20

INGREDIENT NOTES

NOTE: The percentage by weight values reported for the ingredients in this product represent approximate formulation values. See Section 8 for Exposure Limits and Section 11 for Toxicological Information.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

White paste

Odorless

Flash Point: Not Applicable

Prolonged or repeated exposure may cause gastrointestinal and neuromuscular effects, as well as injury to the kidneys and reproductive system.

May cause eye, skin and respiratory tract irritation.

Causes burns which are not immediately visible or painful.

Harmful if inhaled, swallowed or absorbed through skin. May cause abdominal pain, diarrhea, vomiting, excess salivation, thirst, perspiration and spasms. Large amounts may be fatal.

Inhalation may cause nasal discharge, nosebleed, cough, sore throat, labored breathing, bronchospasm, pulmonary edema and systemic toxicity.

Not a fire or explosion hazard. However, toxic and corrosive fluoride compounds may be released in a fire situation.

ROUTES OF ENTRY

Eyes? YES

Skin? YES

Inhalation? YES

Ingestion? YES

POTENTIAL HEALTH EFFECTS

EYE CONTACT causes irritation and may cause burns.

SKIN CONTACT may cause fluoride burns which may not be immediately painful or evident, especially on prolonged contact. This material may be absorbed through the skin resulting in systemic poisoning. Symptoms of poisoning are similar to those that occur with ingestion.

INHALATION may cause respiratory tract and mucous membrane irritation. Symptoms include nasal discharge and nosebleeds, coughing, sore throat and labored breathing. Severe exposure may cause bronchospasm and pulmonary edema. Absorption may cause systemic poisoning similar to that which occurs with ingestion.

INGESTION may cause abdominal pain, diarrhea, vomiting, excess salivation, thirst, perspiration and painful spasms of the limbs. Large amounts may be fatal.

CARCINOGENICITY

NTP? NO

IARC? NO

OSHA? NO

CHRONIC HEALTH HAZARDS

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. Hold eyelids open during this flushing with water. Call a physician immediately.

SKIN CONTACT: Flush area with water while removing contaminated clothing and shoes. Follow by washing with soap and large amounts of water until no evidence of chemical remains (15-20 minutes). Get medical attention if needed.

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: Not Applicable
Auto-Ignition: Not Applicable
LEL: Not Applicable
UEL: Not Applicable

NFPA HAZARD CLASSIFICATION

Health: 3 Flammable: 0 Reactivity: 0

HMIS HAZARD CLASSIFICATION

Health: 3* Flammable: 0 Reactivity: 0

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

EXTINGUISHING MEDIA

Use water spray, dry chemical, alcohol foam, or carbon dioxide. Use water to keep fire-exposed containers cool.

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 and corrosive fluoride compounds may be released in a fire situation.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Wearing full protective clothing, control spill source, contain by diking and ventilate area. Soak up spill using an absorbent. Scoop into container. 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

Wash thoroughly after handling.
Keep container closed.
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.

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

Use with adequate ventilation.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS

INGREDIENT	PEL-OSHA	TLV-ACGIH
POTASSIUM TETRABORATE CAS NO.: 1332-77-0	None Established	None Established
BORIC ACID CAS NO.: 10043-35-3	None Established	None Established
POTASSIUM PENTABORATE CAS NO.: 11128-29-3	None Established	None Established
POTASSIUM BIFLUORIDE CAS NO.: 7789-29-9	2.5 mg/m3 (as F)	2.5 mg/m3 (as F)
SODIUM DODECYL SULFATE CAS NO.: 151-21-3	None Established	None Established
WATER CAS NO.: 7732-18-5	None Established	None Established

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 1999 Standards. All OSHA PELs refer to 29 CFR Part 1910 Air Contaminants: Final Rule, January 19, 1989.

RESPIRATORY PROTECTION

If there is a potential to exceed the TLV, NIOSH/MSHA approved respiratory protection is required. For airborne levels up to 10 times the appropriate TLV's, an air purifying acid gas cartridge respirator would be suitable. If used in a manner that generates a mist, a dust/mist cartridge as well as the acid gas cartridge would be necessary. Above 10 times the TLV, an air supplied full facepiece respirator would be required. If respiratory protection is used, follow all the requirements for respirator programs set forth in the OSHA regulations (29 CFR 1910.139).

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

Chemical goggles.
Rubber or neoprene 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.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: White paste
Odor: Odorless
Boiling Point: Not Applicable
Specific Gravity (H2O=1): 1.49
Melting Point: 422.4 °C
Vapor Pressure (mm Hg): Not Applicable
Vapor Density (Air=1): Not Applicable
Evaporation Rate: Not Applicable
% Solubility In Water: 100 %
pH: 8 to 9

SECTION 10: STABILITY AND REACTIVITY

Stability: Generally considered stable.
Avoid: Temperatures at or above 225°C.

INCOMPATIBILITY (Materials to Avoid)

Strong acids, combustibles and alkalies.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS

Emits toxic and corrosive fluoride compounds. May also emit oxides of boron and potassium when heated to decomposition.

Polymerization: Polymerization is not expected to occur.
Avoid: Not applicable.

SECTION 11: TOXICOLOGICAL INFORMATION

CHEMICAL NAME	% Wt.	LD50	LC50
POTASSIUM TETRABORATE CAS NO.: 1332-77-0	30-40	Not Available	Not Available
BORIC ACID CAS NO.: 10043-35-3	20-30	3,450 mg/kg MOUSE, oral	9,600 ug/m3/4 hr RAT
POTASSIUM PENTABORATE CAS NO.: 11128-29-3	1-5	Not Available	Not Available
POTASSIUM BIFLUORIDE CAS NO.: 7789-29-9	20-30	Not Available	Not Available

SODIUM DODECYL SULFATE

CAS NO.: 151-21-3

0-0.5 1,288 mg/m3 RAT, Not Available
oral

WATER

CAS NO.: 7732-18-5

10-20 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: UN3266

UNITED STATES

EPA Waste Number: Not Regulated

DOT Classification: 8 Corrosive material

DOT Proper Shipping Name: Corrosive liquid, basic, inorganic, n.o.s.
(Contains Potassium Bifluoride) Consumer
quantity, ORM-D, in inner packagings not over
4L (1 gal) net capacity each for liquids,
packed in strong outer packagings.)

Packing Group: III

CANADA

PIN Number: UN3266

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 does not contain toxic 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.

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)

None

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

EUROPEAN REGULATIONS

EINECS: Yes

OTHER REGULATIONS

MITI (Japan): No

AICS (Australia): Yes

SECTION 16: OTHER INFORMATION

REVISIONS

Revision Number: 13

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.