Zaclon Galvanizing Fluxes (A;AF;AB;A Special;Kleanrol)
Safety Data Sheet

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Product name: Zaclon Galvanizing Fluxes (A;AF;AB;A Special;Kleanrol)

1.2. Relevant identified uses of the substance or mixture and uses advised against
Use of the substance/mixture: Manufacturing

1.3. Details of the supplier of the safety data sheet
Zaclon LLC
2981 Independence Road
Cleveland, OH 44115
T 216-271-1569 or 800-356-7327

1.4. Emergency telephone number
Emergency number: Chemtrec 1 800 424 9300

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
GHS-US classification
Acute Tox. 4 (Oral) H302
Skin Corr. 1B H314
STOT SE 3 H335
Aquatic Acute 1 H400
Aquatic Chronic 1 H410

2.2. Label elements
GHS-US labelling
Hazard pictograms (GHS-US):
- GHS05
- GHS07
- GHS09

Signal word (GHS-US): Danger
Hazard statements (GHS-US):
- H302 - Harmful if swallowed
- H314 - Causes severe skin burns and eye damage
- H335 - May cause respiratory irritation
- H400 - Very toxic to aquatic life
- H410 - Very toxic to aquatic life with long lasting effects

Precautionary statements (GHS-US):
- P260 - Do not breathe dust/fume/gas/mist/vapours/spray
- P264 - Wash thoroughly after handling
- P270 - Do not eat, drink or smoke when using this product
- P271 - Use only outdoors or in a well-ventilated area
- P273 - Avoid release to the environment
- P280 - Wear protective gloves/protective clothing/eye protection/face protection
- P301+P312 - IF SWALLOWED: call a POISON CENTER or doctor/physician if you feel unwell
- P301+P330+P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
- P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
- P304+P340 - IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing
- P305+P351+P338 - IF in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
- P310 - Immediately call a POISON CENTER or doctor/physician
- P321 - Specific treatment (see label)
- P363 - Wash contaminated clothing before reuse
- P391 - Collect spillage
- P403+P233 - Store in a well-ventilated place. Keep container tightly closed
- P405 - Store locked up
- P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.
2.3. Other hazards
No additional information available

2.4. Unknown acute toxicity (GHS-US)
No data available

SECTION 3: Composition/information on ingredients

3.1. Substances
Not applicable
Full text of H-phrases: see section 16

3.2. Mixture

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc chloride</td>
<td>(CAS No) 7646-85-7</td>
<td>50 - 70</td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Skin Corr. 1B, H314</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aquatic Acute 1, H400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aquatic Chronic 1, H410</td>
</tr>
<tr>
<td>Ammonium chloride</td>
<td>(CAS No) 12125-02-9</td>
<td>1 - 30</td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
</tbody>
</table>

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation: If inhaled, remove to fresh air immediately. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

First-aid measures after skin contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash contaminated clothing before reuse and discard shoes.

First-aid measures after eye contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician.

First-aid measures after ingestion: If swallowed, do not induce vomiting. Give large quantities of water. Call a physician immediately. Never give anything by mouth to an unconscious person.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation: Causes irritation of lungs and upper respiratory passages.

Symptoms/injuries after skin contact: Causes severe skin burns.

Symptoms/injuries after eye contact: Causes eye damage.

Symptoms/injuries after ingestion: Not a likely route of exposure during normal product use. May be fatal from significant ingestion.

4.3. Indication of any immediate medical attention and special treatment needed
No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: As appropriate for combustibles in area.

Unsuitable extinguishing media: None.

5.2. Special hazards arising from the substance or mixture

Fire hazard: May release ammonium chloride fumes, zinc oxide fumes, zinc chloride fumes, and ammonia and hydrogen chloride gases in a fire.

Explosion hazard: None known.

5.3. Advice for firefighters

Protection during firefighting: Firefighters should wear full protective gear.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel
No additional information available

6.1.2. For emergency responders
No additional information available

6.2. Environmental precautions
Avoid release to the environment.
6.3. Methods and material for containment and cleaning up

For containment: Stop the flow of material, if this is without risk.

Methods for cleaning up: Confine spill and soak up with absorbent. Place in an approved container and dispose in accordance with local, state and federal regulations.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling: Do not get in eyes, on skin, on clothing. Avoid breathing dusts, mists, or fumes. Wash thoroughly after handling.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in a tightly closed container in a dry place. Do not store with cyanides or sulfides.

7.3. Specific end use(s)

Manufacturing

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Ammonium chloride (12125-02-9)</th>
<th>USA ACGIH</th>
<th>ACGIH TWA (mg/m³)</th>
<th>10 mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA ACGIH</td>
<td>ACGIH STEL (mg/m³)</td>
<td>20 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zinc chloride (7646-85-7)</th>
<th>USA ACGIH</th>
<th>ACGIH TWA (mg/m³)</th>
<th>1 mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA ACGIH</td>
<td>ACGIH STEL (mg/m³)</td>
<td>2 mg/m³</td>
<td></td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>1 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Appropriate engineering controls: Provide adequate local exhaust ventilation to maintain worker exposure below exposure limits.

Hand protection: Use neoprene or PVC rubber gloves, apron, boots; long sleeve shirt and pants. If considerable contact is likely, wear impervious (rubber) clothing or acid suit.

Eye protection: Use chemical splash goggles.

Skin and body protection: Wear suitable working clothes.

Respiratory protection: If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Physical state</th>
<th>Solid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Granular or fine particle</td>
</tr>
<tr>
<td>Color</td>
<td>White to off-white</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless.</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>2.5 - 3.5 (2 lb/gal solution)</td>
</tr>
<tr>
<td>Relative evaporation rate (butylacetate=1)</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>204 - 232 °C (400-450°F)</td>
</tr>
<tr>
<td>Freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td>Decomposes</td>
</tr>
<tr>
<td>Flash point</td>
<td>No data available</td>
</tr>
<tr>
<td>Self ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td>No data available</td>
</tr>
</tbody>
</table>
Zaclon Galvanizing Fluxes (A;AF;AB;A Special;Kleanrol)
Safety Data Sheet

Relative density : No data available
Solubility : No data available
Log Pow : No data available
Log Kow : No data available
Viscosity, kinematic : No data available
Viscosity, dynamic : No data available
Explosive properties : No data available
Oxidizing properties : No data available
Explosive limits : No data available

9.2. Other information
No additional information available

SECTION 10: Stability and reactivity
10.1. Reactivity
No additional information available

10.2. Chemical stability
The product is stable at normal handling and storage conditions.

10.3. Possibility of hazardous reactions
Will not occur.

10.4. Conditions to avoid
None.

10.5. Incompatible materials
Incompatible with cyanides and sulfides (may release toxic gases).

10.6. Hazardous decomposition products
At high temperatures, (~343°C; ~650°F) as in intended use, ammonium chloride fumes, zinc oxide fumes, zinc chloride fumes, and ammonia and hydrogen chloride gases may be released.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Harmful if swallowed.

Zaclon Galvanizing Fluxes (A;AF;AB;A Special;Kleanrol)
ATE (oral) 500.000 mg/kg bodyweight

Ammonium chloride (12125-02-9)
LD50 oral rat 1410 mg/kg

Zinc chloride (7646-85-7)
LD50 oral rat 350 mg/kg

Skin corrosion/irritation : Causes severe skin burns and eye damage.
  pH: 2.5 - 3.56 (2 lb/gal solution)
Serious eye damage/irritation : Not classified
  pH: 2.5 - 3.56 (2 lb/gal solution)
Respiratory or skin sensitisation : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified

Tests in bacterial or mammalian cell cultures demonstrate mutagenic activity. Tests in some animals indicate that the compound may have embryotoxic activity.
Specific target organ toxicity (single exposure): May cause respiratory irritation. 

Toxic effects described in animals from short exposures include corrosion of mucosal surfaces, liver effects, and kidney effects. Toxic effects in animals occurring only with inhalation exposures are lower respiratory infection with pulmonary edema.

Specific target organ toxicity (repeated exposure): Not classified

Human health effects of overexposure by inhalation, ingestion, or skin or eye contact may initially include: eye irritation with discomfort, tearing, or blurring of vision, skin irritation with discomfort or rash; or irritation of the upper respiratory passages. Higher exposures may lead to these effects; skin and eye burns or ulceration; temporary lung irritation effects with cough, discomfort, difficulty breathing, or shortness of breath; possibly modest initial symptoms, followed in hours by severe shortness of breath, requiring prompt medical attention; fatality from gross overexposure by fume inhalation or by significant ingestion. There are inconclusive or unverified reports of human sensitization. Individuals with pre-existing diseases of the lungs may have increased susceptibility to the toxicity of excessive exposures.

When the Zaclon® products are heated to high temperatures as those encountered in the galvanizing process, irritating zinc chloride fumes and gaseous hydrogen chloride may be released. Severe exposures may cause pulmonary edema. Heating may also release zinc oxide fumes which may cause metal fume fever.

Aspiration hazard: Not classified

SECTION 12: Ecological information

12.1. Toxicity
Ecology - general: Very toxic to aquatic life with long lasting effects.

<table>
<thead>
<tr>
<th>Ammonium chloride (12125-02-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 fishes 1</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability
No additional information available

12.3. Bioaccumulative potential

<table>
<thead>
<tr>
<th>Zinc chloride (7646-85-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCF fish 1</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil
No additional information available

12.5. Other adverse effects
No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Waste disposal recommendations: Dispose of contents/container in accordance with local/regional/national/international regulations.

SECTION 14: Transport information
In accordance with DOT

| Transport document description: UN2331 Zinc chloride, anhydrous, mixture, 8, III |
| UN-No.(DOT): 2331 |
| DOT NA no.: UN2331 |
| DOT Proper Shipping Name: Zinc chloride, anhydrous, mixture |
| Department of Transportation (DOT) Hazard Classes: 8 - Class 8 - Corrosive material 49 CFR 173.136 |
Hazard labels (DOT) : 8 - Corrosive

Packing group (DOT) : III - Minor Danger

DOT Special Provisions (49 CFR 172.102) : IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2).
IP3 - Flexible IBCs must be sift-proof and water-resistant or must be fitted with a sift-proof and water-resistant liner.
T1 - 1.5 \(-\) 178.274(d)(2) Normal............. 178.275(d)(2)
TP3 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter.

DOT Packaging Exceptions (49 CFR 173.xxx) : None
DOT Packaging Non Bulk (49 CFR 173.xxx) : 213
DOT Packaging Bulk (49 CFR 173.xxx) : 240
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 25 kg
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 100 kg
DOT Vessel Stowage Location : A - The material may be stowed “on deck” or “under deck” on a cargo vessel and on a passenger vessel.

SECTION 15: Regulatory information

15.1. US Federal regulations
Ammonium chloride (12125-02-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Zinc chloride (7646-85-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. US State regulations
Ammonium chloride (12125-02-9)
U.S. - Massachusetts - Right To Know List
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List
Zinc chloride (7646-85-7)
U.S. - Massachusetts - Right To Know List
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information
Full text of H-phrases:

<table>
<thead>
<tr>
<th>H-phrase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Tox. 4 (Oral)</td>
<td>Acute toxicity (oral), Category 4</td>
</tr>
<tr>
<td>Aquatic Acute 1</td>
<td>Hazardous to the aquatic environment — AcuteHazard, Category 1</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Aquatic Chronic 1</td>
<td>Hazardous to the aquatic environment — Chronic Hazard, Category 1</td>
</tr>
<tr>
<td>Skin Corr. 1B</td>
<td>Skin corrosion/irritation, Category 1B</td>
</tr>
<tr>
<td>STOT SE 3</td>
<td>Specific target organ toxicity — Single exposure, Category 3, Respiratory tract irritation</td>
</tr>
<tr>
<td>H302</td>
<td>Harmful if swallowed</td>
</tr>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage</td>
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<tr>
<td>H335</td>
<td>May cause respiratory irritation</td>
</tr>
<tr>
<td>H400</td>
<td>Very toxic to aquatic life</td>
</tr>
<tr>
<td>H410</td>
<td>Very toxic to aquatic life with long lasting effects</td>
</tr>
</tbody>
</table>

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.