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## Stability

Liquid Sodium Aluminate is manufactured by carefully controlling the chemical balance, thereby assuring good stability in the finished product. If the balance is disturbed, product stability is affected, causing formation of precipitates, which settle to the bottom of storage tanks and plug transfer lines. Excessive solids loss will also affect product activity. For these reasons, feeding systems should be designed and operated with careful consideration given to the following factors influencing stability:

- **The Introduction of Carbon Dioxide:** Carbon Dioxide in the air reacts with free caustic present in the Liquid Sodium Aluminate, lowers pH and disturbs the stability. All mixing of air and Sodium Aluminate solutions should be avoided.
- **Dilution with Water:** Dilution changes the product concentration and may affect stability. Furthermore, dilution water normally contains carbon dioxide and dissolved solids. Since Sodium Aluminate is an excellent softening agent, it will react with dissolved calcium and magnesium. This will create precipitate, which may show up as scale on tank or pipe walls.
- **Dirty Tanks and Lines:** Cleanliness minimizes the chance of product contamination.
- **Excessive Agitation:** The mechanical effect of high shear while exposed to the atmosphere, may contribute to instability. Examples would include turbulent mixing with a propeller in an open tank or a leaking centrifugal pump seal / pump suction piping.
- **Prolonged Storage Time:** The recommended maximum storage time is three months for 38% Liquid Sodium Aluminate and one month for 45% Liquid Sodium Aluminate. Longer storage time is possible with optimum storage systems.
- **Excessive Heating:** Avoid hot spots exceeding 120°F.
- **Loss of Moisture:** Loss of moisture due to prolonged storage at elevated temperatures in open top tanks will lead to instability.

## Shipments

Liquid Sodium Aluminate is shipped in stainless steel, fiberglass or rubber lined tank trucks which conform to D.O.T. specifications as well as the laws of the states in which they operate.

The average shipment is approximately 47,000 pounds.

The Liquid Sodium Aluminate is unloaded through a 2 inch reinforced rubber hose. The fittings are 2-inch cam & groove quick connect couplers.

Liquid Sodium Aluminate is also available in railcars.

# Sodium Aluminate STORAGE AND HANDLING (USALCO 38, 45)

Liquid Sodium Aluminate

CAS # 1302-42-7

Active Strength	45.0%
Na <sub>2</sub> Al <sub>2</sub> O <sub>4</sub>	41%
Color	Amber
Density	13 Lb./Gal.
Al <sub>2</sub> O <sub>3</sub>	25.5%
Na <sub>2</sub> O	19.5%
pH	14.0
Viscosity	770 cps @ 68°F

Active Strength	38%
Na <sub>2</sub> Al <sub>2</sub> O <sub>4</sub>	32%
Color	Amber
Density	12.1 Lb./Gal.
Al <sub>2</sub> O <sub>3</sub>	19.9%
Na <sub>2</sub> O	18.1%
pH	14.0
Viscosity	260 cps @ 68°F

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## Bulk Storage and Feeding System

A bulk storage and feeding system includes:

- 1) bulk delivery point
- 2) transfer line to storage
- 3) storage tanks
- 4) metering pump to transfer the Liquid Sodium Aluminate to the process

The layout of the system should be designed to minimize all transfer distances. If there is latitude in placing the storage tank, the distances between the tank and the application point should be minimized. Because of line pressure losses and potential scale problems, transfer distances should be kept short (less than 100 feet). All transfer lines exposed to cold weather should be single-pass steam traced or electrically heated to prevent in-line temperatures below 60°F (50°F minimum).

The tank should be equipped for water washing, draining and have a man-way for visual inspections. An access should be included on the side of the tank near the bottom to expedite cleaning. The procedure for cleaning includes rinsing with water to clear away buildup, draining the tank completely and air-drying.

Storage tanks should be emptied and inspected annually.

Tanks that are installed indoors should be kept at 70°F (50°F minimum). Outdoor installation may require provisions for keeping the material above 50°F. The tanks should be equipped with hot water or low-pressure steam coils or externally heated with steam tracing or electric heating tape. Avoid hot spots exceeding 120°F. If conditions warrant, the tank should be insulated.

The materials of construction are the same as those recommended for caustic service: mild steel, plastic, natural and synthetic rubber. Avoid using copper, brass and other copper alloys.

Splashing of Liquid Sodium Aluminate while filling the tank should be avoided. This can be accomplished by using a down-comer or bottom filling.

## Transfer to Process

A positive displacement pump (less than 70 strokes/minute if of reciprocating design) will be required for metering. A pump of this specification will insure the most accurate metering and minimize mechanical shear of the fluid. The transfer lines should be designed to allow for potential cleaning or inspection.

## Equipment and Piping

**Storage Tanks:** Tanks may be constructed of fiberglass/epoxy, rubber lined steel or Type 316 stainless steel. Wood with a plastic liner of PVC or polyethylene has also been used.

**Piping:** Schedule 80 PVC is often used for operating temperatures not exceeding 120° F. At temperatures above 120° F, use schedule 80 CPVC, carbon steel or Type 316 stainless steel. Glass reinforced plastic or hard rubber are also suitable materials for piping. Due to the high coefficient of expansion for PVC and CPVC, piping made of these materials should allow for expansion and must be adequately supported when installed.

## Sodium Aluminate STORAGE AND HANDLING (USALCO 38, 45)

### Equipment and Piping Cont.

Gravity feed, when possible, is preferable to the use of pumps. Initial pump cost and maintenance are eliminated. When centrifugal pumps are used they should be sized for head and flow requirements. Wetted parts should be of Ductile Iron or Type 316 stainless steel. Packing may be of graphite or Teflon. Gasket materials are Teflon, neoprene or rubber.

There are several types of valves suitable for handling Liquid Sodium Aluminate. Please consult with your engineers or your USALCO sales representative. Their wetted parts should be of Ductile Iron, Steel or Type 316 stainless steel, Teflon, or PVC.

Feed rates and metering can be accomplished using rotameters, volumetric displacement pumps, weighing devices and mechanical feeders. The wetted parts of these devices should be of Type 316 stainless steel, Teflon or PVC.

Maintenance of the equipment should follow general industry standards and manufacturers' recommendations.

### Safety

Liquid Sodium Aluminate is harmful by contact with skin and if swallowed. Liquid Sodium Aluminate can cause serious damage to eyes. It is not flammable, but may release toxic vapors if decomposed in a fire.

Liquid Sodium Aluminate must be handled with care. Employ precautions to prevent spraying or splashing, particularly if the material is hot. Avoid contact with Liquid Sodium Aluminate. In areas where a Sodium Aluminate mist may be present and cannot be controlled, a NIOSH approved cartridge respirator should be worn.

Employers and employees should not rely exclusively on PPE for protection from hazards. PPE should be used, when appropriate, in conjunction with engineering controls, guards, and safe work practices and procedures.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for their workplace and to train employees on how and when to use protective equipment.

The following recommendations are guidelines and may not apply to every situation.

**Ventilation:** Under normal conditions, Liquid Sodium Aluminate solution will not generate mists or vapors. No special ventilation is required.

**Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or non-routine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. **Warning!** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

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### Safety Cont.

**Protective Clothing/Equipment:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

**Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

**Contaminated Clothing:** Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

**Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

### Spill Cleanup

Liquid Sodium Aluminate when spilled on stairways, walkways and floors may become very slippery and pose a danger. Non-ferrous metals, such as aluminum, copper and brass, will deteriorate rapidly when exposed to Liquid Sodium Aluminate.

Spill residuals that have a pH greater than 12.5 that are scheduled for off-site disposal are a hazardous waste under RCRA. Spill residuals with a pH less than 12.5 are not a hazardous waste under RCRA, but may be subject to state and/or local regulations. Residues may be neutralized with a mild acid such as citric acid or sodium bicarbonate.

Liquid Sodium Aluminate spills do not have a Reportable Quantity (RQ) under CERCLA, but may be subject to State and/or local reporting requirements.

Disposal of any waste must comply with local, state and federal regulations.

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