

MATERIAL SAFETY DATA SHEET

Date prepared: January 3, 2000
page 1 of 5

1. Product and Company Identification

PRODUCT IDENTIFIER: **Potassium-sodium alloy (NaK)**

PRODUCT USE: High-temperature heat-transfer fluid, catalyst, reagent in petrochemical processing, electrically-activated hydraulic fluid

MANUFACTURED BY: Callery Chemical Company
Division of Mine Safety Appliances Company
PO Box 429; Pittsburgh, PA 15230
Callery Customer Service: 1-412-967-4141
Callery 24-Hour Telephone: 1-412-967-4100
Transportation Emergency: 1-800-424-9300 in USA or 1-703-527-3887 outside USA

2. Composition/Information on Ingredients

	<u>wt%</u>	<u>Synonym(s)</u>
Potassium (CASRN: 7440-09-7)	78	K
Sodium (CASRN: 7440-23-5)	22	Na

OSHA REGULATORY STATUS: Hazardous by definition of Hazard Communication Standard, 29 CFR 1910.1200.

Indications of danger (Annex II): F (highly flammable) and C (corrosive)

Nature of special risk attributed to dangerous substances (Annex III): R14/15, R34

Safety advice concerning dangerous chemical substances (Annex IV): S6, S7/8, S16, S43

3. Hazards Identification

EMERGENCY OVERVIEW: Silver-colored liquid metal, no odor. Corrosive. Reacts violently with water, liberating and igniting flammable hydrogen gas, perhaps explosively. May catch fire if exposed to air or oxygen. Causes severe caustic and thermal burns to eyes and skin. Fumes may cause severe respiratory tract irritation.

PHYSICAL HAZARDS: Corrosive. Reacts violently with water, liberating and igniting flammable hydrogen gas, perhaps explosively. May catch fire if exposed to air or oxygen. Do not store metal under oil or hydrocarbons.

POTENTIAL HEALTH EFFECTS: Causes severe caustic and thermal burns to eyes and skin. Fumes may cause severe respiratory tract irritation.

Primary Routes of Entry: Eye and skin contact, inhalation

Target Organs: Eyes, skin, respiratory tract

Medical Conditions Generally Recognized as Aggravated by Exposure: Persons with preexisting skin and respiratory conditions may be more susceptible to the effects of this product.

Carcinogenicity: Potassium-sodium alloy is not listed in the National Toxicology Program (NTP) Annual Report on Carcinogens, not found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs, and not listed as an OSHA carcinogen.

POTENTIAL ENVIRONMENTAL EFFECTS: No environmental toxicity data for the product. See Section 12 for additional information.

4. First Aid Measures

CAUSES SEVERE ALKALI AND THERMAL BURNS! SEND TO A PHYSICIAN IN ALL CASES.

Note: Immediately flushing with plenty of water is the appropriate eye and skin emergency first aid treatment for this water-reactive chemical. For the eye, it is extremely important that flushing with water (with the eyelids held open) begins within the first minute after NaK has entered the eye and continues for the full 20 minutes. Continue to flush with water even though NaK may temporarily flash or spark on exposed areas of the skin. If large amounts of NaK are

(NaK)

Revision: ANSIZ400.1-1998-R0

page 2 of 5

involved, caustic fumes and waters may be produced during the emergency first aid treatment procedure; therefore, emergency showers should be adequately ventilated and equipped to handle caustic fumes, smoke, and water that NaK emergency first aid treatment may generate.

Eyes: Immediately flush eyes with plenty of water for at least 20 minutes, holding eyelids open.

Skin: Immediately and thoroughly shake off any material on skin, remove contaminated clothing and shoes, then flush skin with plenty of cool water for at least 20 minutes. Dispose of contaminated clothing and shoes in compliance with all local, state, and federal laws and regulations.

Ingestion: For any accidental contamination of the mouth, gargle with water and rinse mouth thoroughly for at least 15 minutes. If swallowed, do not induce vomiting. Give demulcent such as milk, olive oil, or margarine in small amounts up to 2 or 3 ounces. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Note to Physician: For eyes, serious alkali burns may require 2 hours of irrigation. Testing of the conjunctival sac with wide-range pH test paper, such as pHydriion paper (pH1 to pH11) every five to ten minutes in the course of irrigation can be used to obtain a measure of the rate at which the pH is returning to a tolerable value, such as a pH of 8 or 8.5. (It should not be expected to come to pH 7.) Grant, W. Morton, and Joel S. Schuman, Toxicology of the Eye, Charles C. Thomas, Springfield, IL, 1993.

5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Water-reactive, may be pyrophoric.

Flashpoint (closed cup): No information

Flammable Limits: No information

Autoignition Temperature (for sodium): ~120-125°C (248-257°F). The autoignition temperature varies widely depending on exposure to air, pool or droplet size, air temperature, velocity, humidity, etc.

EXTINGUISHING MEDIA: Cover with DRY soda ash, DRY sodium chloride, or Ansul's Met-L-X.

DO NOT use water, dry chemical, carbon dioxide, halogenated or foam extinguishing agents.

FIRE & EXPLOSION HAZARDS: NaK reacts violently with water, liberating and igniting flammable hydrogen gas, perhaps explosively. NaK may ignite spontaneously and explode if exposed to air or oxygen. Even very small quantities (less than one gram) of NaK can be a significant fire and explosion hazard. On concrete, burning may be more vigorous and accompanied by spattering. NaK reacts violently with a wide variety of chemicals and can cause fires or explosions.

The NFPA Fire Protection Guide on Hazardous Materials lists specific reactions under sodium potassium alloy, potassium, and sodium. Maintain a DRY nitrogen cover gas over the metal to prevent formation of superoxide. If superoxide contamination is suspected, do not add organics.

FIRE FIGHTING EQUIPMENT: Wear full protective clothing, including protective gloves and boots. For respiratory protection, wear a NIOSH approved self-contained breathing apparatus with full facepiece operated in a positive-pressure mode. Work upwind if possible. Protect against caustic fumes, smoke, and water.

6. Accidental Release Measures

PROCEDURES FOR CLEANUP: Wear recommended personal protective equipment. Be prepared to fight fire.

Eliminate ignition sources. Do not flush spill to drain. Cover with DRY soda ash, DRY sodium chloride, or Ansul's Met-L-X. Scoop into a DRY metal container with additional extinguisher powder, properly label, and cover. (If not handled appropriately, even very small quantities (less than one gram) of NaK can be a significant fire and explosion hazard.) Take immediately to a waste handling area. Flush spill area with a large amount of water, directing caustic wastewater to a chemical drain. Otherwise collect and neutralize wastewater before disposal. Protect against caustic fumes and smoke. Handle in compliance with all local, state, and federal laws and regulations.

7. Handling And Storage

HYGIENIC PRACTICES: Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Wear recommended personal protective equipment.

STORAGE: DO NOT store metal under oil or hydrocarbons. If yellow potassium superoxide contamination is suspected,

(NaK)

Revision: ANSIZ400.1-1998-R0

page 3 of 5

do not add organics. Dispose of all reaction residues immediately. Store away from any water source including sprinkler systems. Store under vacuum or DRY nitrogen atmosphere in DRY equipment. Keep away from heat, sparks, and flame. Keep container tightly closed. Maintain cover gas pressure.

Class D fire extinguisher should be readily available. Floor drains should be covered and not trapped.

Do not store residues. Properly dispose of all residues immediately.

EXPLOSION HAZARD: Prolonged exposure to even small amounts of air or oxygen can create a potentially explosive condition. Maintain a DRY nitrogen cover gas over the metal to prevent formation of superoxide. If superoxide contamination is suspected, do not add organics.

WORK PRACTICES: Keep away from any possible contact with water, air, moist air, oxygen, oxidizing materials, carbon dioxide, halogens, halogenated hydrocarbons (including tetrafluoroethylene (Teflon®) and similar materials), and acids. Handle and store under vacuum or DRY nitrogen atmosphere in DRY equipment. Keep away from heat, sparks, and flame. Keep container tightly closed. Maintain cover gas pressure.

Use only with clean, completely enclosed systems that have been thoroughly purged with DRY nitrogen gas including containers, transfer lines, vessels, tanks, etc., such that the atmosphere stays below 3% oxygen. Use packless valves, welded piping, and other leakproof construction. Maintain a leakproof system.

Use non-sparking tools when opening or closing containers. Bond and ground all systems when handling.

REMOVAL INSTRUCTIONS: DO NOT use any tetrafluoroethylene (Teflon®) with NaK. HAVE RECOMMENDED FIRE EXTINGUISHANTS AVAILABLE IN CASE OF SPILL.

Large cylinder (250# or 750# carbon steel cylinder): Ensure that 1/2" valve is closed prior to removing valve plug and connecting pipe. Transfer NaK through 1/2" valve (marked "L") by pressurizing the container with DRY nitrogen through the smaller vent valve. DO NOT exceed 10 psig on the container.

Small cylinder (2 to 10 gallon stainless steel vessel): First, carefully remove one of the 1/4" pipe plugs.

CAUTION: DO NOT remove the 3/8" pipe plug until container is fully vented. With the container vented, carefully remove the 3/8" pipe plug and install the 3/8" pipe nipple and valve. Close 3/8" valve. Install 1/4" pipe nipple and 1/4" valve on the opened 1/4" container port. Close valve and connect 10 psi nitrogen to 1/4" valve. Connect NaK pipeline to 3/8" valve. Transfer NaK by pressurizing the container with DRY nitrogen. DO NOT exceed 10 psig on the container.

Since empty containers retain product residue, follow label warnings even after container is emptied.

PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE OF CONTAMINATED EQUIPMENT: See Section 8.

8. Exposure Controls/Personal Protection

ENGINEERING CONTROLS: Maintain a leakproof system. Use packless valves, welded piping, and other leakproof construction. Use only with clean, completely enclosed systems that have been thoroughly purged with DRY nitrogen gas including containers, transfer lines, vessels, tanks, etc., such that the atmosphere stays below 3% oxygen. Handle in a DRY closed system under DRY nitrogen gas. Provide adequate local exhaust ventilation to minimize worker exposure. Prevent electrostatic charge buildup by using common bonding and grounding techniques.

EXPOSURE CONTROLS: None established for the product.

For potassium hydroxide: ACGIH TLV-C: 2 mg/m³ (ceiling)

OSHA PEL-TWA: none

NIOSH REL-TWA: 2 mg/m³

No IDLH established for potassium hydroxide.

For sodium hydroxide: ACGIH TLV-C: 2 mg/m³ (ceiling)

OSHA PEL-TWA: 2 mg/m³

NIOSH REL-TWA: 2 mg/m³

The IDLH for sodium hydroxide is 10 mg/m³.

(NaK)

Revision: ANSIZ400.1-1998-R0

page 4 of 5

PERSONAL PROTECTIVE EQUIPMENT:

Normal Use & Handling: When exposure to eyes or skin is possible, wear chemical protective goggles with a faceshield attached to a hardhat equipped with fire-retardant hood or hood liner, DRY leather gloves, and fire-retardant protective clothing covering the entire body. Two, or preferably more, layers of fire-retardant clothing are clearly more effective than one. Protective clothing with snaps or Velcro® closures, which can permit quick removal, is strongly recommended.

Exposure limits have not been established for potassium-sodium alloy. When inhalation of fumes or smoke is possible, wear a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a positive-pressure mode. Showers and eye wash stations should be available in an adjacent room and should be adequately ventilated and equipped to handle caustic fumes, smoke, and water that NaK emergency first aid treatment may generate.

Emergency Handling: For firefighting, wear full protective clothing, including protective gloves and boots. For chemical spills, wear special protective clothing (vapor-protective suit with additional chemical flash fire escape protection, as specified in NFPA 1991). For respiratory protection, wear a NIOSH-approved self-contained breathing apparatus with full facepiece operated in a positive-pressure mode.

9. Physical And Chemical Properties

APPEARANCE: Silver-colored liquid metal

ODOR: No odor

MELTING POINT: 12°F/-11°C

BOILING POINT: 1445°F/785°C

VAPOR PRESSURE: 0.8 psig @ 1000°F

DENSITY : 0.855 g/cc @ 100°C

VISCOSITY: 0.505 centipoise @ 100°C

SOLUBILITY IN WATER: Reacts violently, liberating and igniting flammable hydrogen gas, perhaps explosively.

STABILITY TO AIR: May ignite spontaneously; after exposure to air, may form yellow potassium superoxide which reacts violently and explosively with organics.

10. Stability And Reactivity

STABILITY (CONDITIONS TO AVOID): Stable under DRY nitrogen gas. Keep away from heat, sparks, and flame.

INCOMPATIBILITY (SPECIFIC MATERIALS TO AVOID): Water, air, moist air, oxygen and oxidizing materials, carbon dioxide, halogens, halogenated hydrocarbons including tetrafluoroethylene (Teflon®) and similar materials, acids.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen gas, sodium oxides, and potassium oxides including potassium superoxide.

HAZARDOUS POLYMERIZATION: Not expected to occur.

11. Toxicological Information

NaK causes severe caustic and thermal burns to eyes and skin. Burns may result from the reaction of NaK with the moisture of the skin to produce potassium hydroxide, sodium hydroxide, and hydrogen. If skin is dry, caustic will slowly form and cause skin to redden and chemical burns to develop; pain may be delayed and will not provide a warning.

When NaK burns and/or reacts with water, caustic fumes and/or smoke can occur that can cause severe respiratory tract irritation and a choking cough.

There are no known health effects from long-term exposure to NaK.

TOXICITY DATA: No information found for the product.

12. Ecological Information

ECOLOGICAL DATA: No environmental toxicity data for the product.

13. Disposal Considerations

WASTE DISPOSAL: Do not flush to sewer. Dispose in compliance with all local, state, and federal laws and regulations.

14. Transport Information

Callery Chemical Company holds a DOT exemption (DOT-E 9508) used for the shipment of 200 pounds and 750 pounds of NaK in DOT4BW240 cylinders. As required under 49 CFR, DOT exempt packages must be properly described and marked, and all shipments must be accompanied by a copy of the exemption. Please contact Callery Chemical Company for further information.

HAZARDOUS MATERIALS/DANGEROUS GOODS CLASSIFICATION:

Proper Shipping Name: Potassium sodium alloys
Hazard Class: 4.3
Packaging Group: I
Identification Number: UN1422
Labels: Dangerous when wet

15. Regulatory Information

TSCA: NaK is a mixture of potassium and sodium which are listed on the TSCA Public Inventory.

SARA 313 INFORMATION: Potassium-sodium alloy (NaK) does not contain 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 372.

CERCLA/SUPERFUND: No reportable quantity established for this product.
The reportable quantity (RQ) for sodium is 10 pounds.

EUROPEAN LABEL INFORMATION:

Symbols: F, C
Indications of danger (Annex II): Highly flammable, Corrosive
Nature of special risk attributed to dangerous substances (Annex III):
R14/15 Reacts violently with water, liberating highly flammable gases.
R34 Causes burns.
Safety advice concerning dangerous chemical substances (Annex IV):
S6 Keep under dry nitrogen cover gas.
S7/8 Keep container tightly closed and dry.
S16 Keep away from sources of ignition - No smoking.
S43 In case of fire, use DRY soda ash, DRY sodium chloride, or Ansul's Met-L-X.
DO NOT use water, dry chemical, carbon dioxide, halogenated or foam extinguishing agents.

PENNSYLVANIA: This product is subject to the Pennsylvania Worker and Community Right-to-Know Act. The listed name is potassium alloy, nonbase, K, Na.

16. Other Information

NOTE: DRY argon gas may also be used as a cover gas in place of DRY nitrogen gas..

WARNING: This is a dangerous chemical product. By following the directions and warnings provided with this product, the dangers associated with the use of this product can be greatly reduced but never entirely eliminated. Callery Chemical Company makes no warranties, expressed or implied, with respect to this product and EXPRESSLY DISCLAIMS THE WARRANTY OF MERCHANTABILITY AND ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. Users assume all risks in handling, using or storing this product.