Product Safety Summary
Sodium Potassium Alloy

This Product Safety Summary is intended to provide a general overview of the chemical substance. The information on the Summary is basic information and is not intended to provide emergency response information, medical information or treatment information. The summary should not be used to provide in-depth safety and health information. In-depth safety and health information can be found on the Material Safety Data Sheet (MSDS) for the chemical substance.

Chemical Identity

Abbreviation:	NaK
CAS Number:	7440-23-5 (Sodium) 7440-09-7 (Potassium)
Common Names:	Sodium Potassium Alloy Potassium Sodium Alloy NaK

Product Overview

Sodium and potassium, at room temperature are solid materials. When mixed in a ratio of 78% potassium and 22% sodium, they form a eutectic mixture that is a liquid at room temperature. In the liquid form, the material is easier and safer to handle than the solid forms of potassium and sodium. This eliminates the need to heat cylinders and feed lines to transfer the molten, solid material.

Primary uses for NaK are as a catalyst for side-chain alkylation of aromatics and as a reducing agent for inorganic and organic compounds. The high boiling point and low vapor pressure of this material allow NaK to be used as a heat exchange fluid in high temperature applications and the solar cell industry. These properties allow NaK to be used as a hydraulic fluid in high temperature applications.

The primary hazard of NaK is the exothermic reaction with water, alcohols, acids, and oxidizers evolving hydrogen. This reaction can be explosive. Decomposition reactions of NaK produce by-products that are corrosive.

Physical/Chemical Properties

The physical properties for eutectic alloy of NaK (78 wt% K, 22 wt% Na).are

- NaK has a density of 0.866 g/ml, it is lighter than water.
- NaK has a melting point (or becomes a solid below) -2.6 ^{o}C/9.3 ^{o}F
- NaK boils at 785 ^{o}C/1,446 ^{o}F
- NaK has a very low vapor pressure of 1 mm Hg at 355 ^{o}C
- Electrical Conductivity of 40.7 micro ohm-cm
- Thermal Conductivity of 0.232 W/cm at 100 ^{o}C

NaK is a strong reducing agent. It is corrosive and will react violently with water. The reaction with water will liberate extremely flammable gases potentially causing a fire or explosion.

Health Information

NaK is a liquid at room temperature. As a liquid, potential routes of exposure include eye and skin contact, ingestion and inhalation.

The toxicity of the product is based on its corrosivity. It is corrosive to the skin, eyes and respiratory system causing severe burns. There is a risk of serious damage to eyes. Individuals with pre-existing diseases of the respiratory, skin or eyes may have increased susceptibility to excessive exposures.

Environmental Information

NaK has not been specifically tested for environmental hazards, however Potassium hydroxide and Sodium hydroxide are expected to by acutely harmful for aquatic organisms. They can not be eliminated from water from biological processes. Due the pH-value of the hydroxides, neutralization is generally required before discharging sewage into treatment plants. After neutralization, only relatively minor harmful effects of the resulting salts remains.

Additional Hazard Information

When handling or using NaK, all sources of ignition, such as heat, sparks or open flame, should be avoided. Also avoid contact with air, humidity and any direct contact with water.

NaK is a reducing agent; the following substances should be avoided: carbon dioxide, water, oxidizing agent, reducing agents, peroxides, bases, reactive inorganic halogens and halides, halogenated hydrocarbons, Teflon, metal oxides.

NaK may produce strong exothermic reactions which may evolve hydrogen gas. This creates a risk of spontaneous ignition when exposed to air. If the presence of potassium superoxide is suspected do not add any organic compound.

The decomposition products of NaK are Hydrogen, Potassium hydroxide, Potassium superoxide (KO_2), Sodium Hydroxide.

Exposure Potential

NaK is intended only for industrial use, and as such there is no expectation of consumer exposure to NaK liquid.

As an industrial product, potential for exposure in the workplace and during manufacturing processes include the connection, disconnection of product packaging and transfer of product from packaging. NaK may also be present in byproducts of production applications in small amounts.

Risk Management

These general safety and hygiene measures should be taken when handling NaK. Do not get this product in the eyes, on the skin, or on clothing. Wear protective clothing as necessary to prevent contact. Handle only in accordance with good industrial hygiene and safety practice. When using this product do not eat, drink or smoke.

The potential hazards associated with NaK can be avoided if workers are adequately instructed and supervised on the proper procedures of handling NaK.

Personal protective equipment (PPE) should be selected based on the potential for exposure to particular chemical(s), and the unique properties of that chemical. In general, PPE is not an adequate substitute for appropriate workplace controls (such as ventilation), or other safe work practices. There may be situations when the only practical means of preventing employee exposure is through the effective use of PPE. When PPE is provided to employees, they must be trained in how, where, when, and why the equipment should be used. The facility must also have provisions for decontaminating and replacing such equipment as necessary.

Eye protection in the form of tight fitting safety (chemical goggles) and a face shields should be worn to prevent NaK from accidentally splashing in an employee's eyes or the face. Goggles should be non-vented, and designed specifically to protect against chemical splash. If an employee wears corrective lenses, chemical goggles should be worn over the lenses.

Body and skin protection must be chosen depending on activity and possible exposure, e.g. head protection, apron, protective boots, chemical-protection suit, Protective clothing should be flame resistant. For hand protection, protective gloves should be based on the user's assessment of the workplace hazards.

Respiratory protection in case of vapor or aerosols available in two basic varieties, air purifying, and air supplied. In general, air purifying respirators provide less protection than air supplied respirators. Both types, however, have their particular advantages and limitations. The appropriate type of respirator must be selected to provide the appropriate level of protection for the anticipated degree of exposure to airborne vapor or mist. Detailed guidance for the selection of respiratory protection can be found in The American National Standards Institute Document Z88.2. Respiratory protective equipment should be approved by NIOSH. It must be carefully maintained, inspected, and cleaned. All employees required to wear respiratory protection must be medically cleared to do so (this ensures their physical capability to wear a respirator) and trained to use and care for the equipment. OSHA requirements for respiratory protection can be found in 29 CFR 1910.134.

Contact Information

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References

Sodium Potassium Alloy MSDS, United States Version 3.1
Sodium Potassium Alloy Safety and Handling Presentation, March 2008

Sodium Technical Data Sheet, April 2004

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