

Akzo Nobel Functional Chemicals LLC
MATERIAL SAFETY DATA SHEET

DATE PRINTED: 10/31/2001

PAGE 1
MSDS NO. 16-084547

PHOSFLEX 4

SECTION 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

PRODUCT NAME
PHOSFLEX 4

CHEMICAL NAME
Tributyl phosphate

SYNONYM
TBP; Tri-n-butyl phosphate.

CHEMICAL FORMULA
C12-H27-O4-P

CAS #
126-73-8

CHEMICAL FAMILY
Trialkyl phosphate

MANUFACTURERS NAME
Akzo Nobel Functional Chemicals LLC

PRODUCT/TECHNICAL INFORMATION
1-800-666-1200

ADDRESS
5 Livingstone Avenue
Dobbs Ferry, NY 10522

MEDICAL/HANDLING EMERGENCY
1-914-693-6946

COUNTRY
USA

TRANSPORTATION EMERGENCY
CHEMTREC 1-800-424-9300

PRODUCT USE
Heat exchange medium; plasticizer;

REVISION DATE
5/16/2000

ISSUE DATE
6/05/1995

REVISION NO.
007

SECTION 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE DESCRIPTION	PERCENT	CAS#
Tributyl phosphate	100.000	126-73-8

SECTION 3. HAZARDS IDENTIFICATION

Appearance & Odor
Odorless, colorless to pale yellow liquid.

STATEMENT OF HAZARDS

WARNING!
May cause eye, skin and respiratory tract irritation
May cause cholinesterase inhibition

Fire & Explosion Hazards

This product is not defined as flammable or combustible. However, it may decompose under fire conditions to give off toxic materials such as phosphorus oxides and flammable organic substituents. The product is self-extinguishing once the source of ignition is removed.

Primary Route of Exposure

Skin contact and inhalation are the primary routes of exposure to this product.

Inhalation Acute Exposure

Inhalation of vapor may irritate the respiratory tract. Overexposure may cause dizziness, nausea, and other symptoms of cholinesterase inhibition such as weakness, salivation, sweating, tremors, blurred vision, abdominal cramps, diarrhea and chest discomfort.

MARKETED BY
**HARWICK STANDARD
DISTRIBUTION CORPORATION**
60 S. Seiberling Street • Akron, Ohio 44305

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SECTION 3. HAZARDS IDENTIFICATION
(CONTINUED)

Skin Contact - ACUTE

Skin contact may cause mild to moderate irritation depending upon the severity of exposure.

Eye contact - ACUTE

Eye contact may cause irritation.

Ingestion - ACUTE

Irritation to the mouth, throat, esophagus and stomach may be caused by ingestion of this material. This material is a mild cholinesterase inhibitor. Signs of cholinesterase inhibition may include weakness, dyspnea, pulmonary edema and muscle twitching.

CARCINOGENICITY

IARCNO	OSHANO
NTPNO	ACGIHNO

SECTION 4. FIRST AID MEASURES

Inhalation First Aid

Remove victim to fresh air. If respiratory irritation occurs or if breathing is difficult, get medical attention. If breathing has stopped, give artificial respiration. Maintain airway and administer oxygen if available. Get medical attention immediately.

Skin Contact - First Aid

Immediately flush skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Do not attempt to neutralize with chemical agents. If irritation occurs or persists, get medical attention. Wash clothing before reuse. Discard shoes.

Eye Contact - First Aid

Immediately flush eyes with large quantities of running water for a minimum of 15 minutes. If the victim is wearing contact lenses, remove them. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eye and lids with water. Do not let victim rub eye(s). Do not attempt to neutralize with chemical agents. Oils or ointments should not be used at this time. Get medical attention immediately.

Ingestion - First Aid

Get medical attention by calling a physician or a poison control center immediately. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, keep head below hips to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

Medical conditions aggravated

Persons with pre-existing skin, respiratory, or diseases of the nervous system may be at increased risk if exposed to this material.

Note to Physician

Be sure to advise the person exposed that the product may cause cholinesterase inhibition. If cholinesterase inhibition is suspected, atropine by injection is antidotal. 2-PAM (Protopam chloride) is also antidotal when administered early and in conjunction with atropine.

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SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT
330.00 F 165.55 C

FLASH METHOD
Closed cup

AUTO IGNITION TEMPERATURE
N/D F N/D C

UPPER EXPLOSION LIMIT
N/D Not determined

LOWER EXPLOSION LIMIT
N/D Not determined

Extinguishing Media

Use water fog, dry powder, foam or carbon dioxide extinguishing agents. Use of a direct, high pressure water stream may scatter spilled material. Dike fire control water for later disposal.

Fire Fighting Procedures

As in any fire, prevent human exposure to fire, smoke, fumes or products of combustion. Evacuate non-essential personnel from the fire area. Firefighters should wear full-face, self-contained breathing apparatus and impervious protective clothing. If possible, move containers from the fire area. If not leaking, keep fire exposed containers cool with a water fog or spray to prevent rupture due to excessive heat. High pressure water may spread product from broken containers increasing contamination or fire hazard.

Dike fire control water for later disposal. Do not allow contaminated water to enter waterways.

Fire & Explosion Hazards

This product is not defined as flammable or combustible. However, it may decompose under fire conditions to give off toxic materials such as phosphorus oxides and flammable organic substituents. The product is self-extinguishing once the source of ignition is removed.

Other Fire + Explosion Hazards

No other explosion hazards of this product are known.

Hazardous Products/Combustion

Decomposition of this product under fire conditions will produce toxic and corrosive oxides of phosphorus and toxic oxides of carbon.

NFPA HEALTH RATING
2

NFPA FLAMMABILITY RATING
1

NFPA REACTIVITY RATING
0

NFPA OTHER
NA

SECTION 6. ACCIDENTAL RELEASE MEASURES

Cleanup

Isolate spill area and restrict nonessential personnel. All personnel involved in spill cleanup should follow appropriate industrial hygiene practices (see Section 8).

Stop source of spill. Dike area to prevent spill from spreading. Soak up liquid with a suitable absorbent such as clay, sawdust, or kitty litter. Sweep up absorbed material and place in a chemical waste container for disposal. CAUTION! Spill area may be slippery. Cover spill area with a slurry of powdered household detergent and water. Use stiff brush to work slurry into cracks and crevices. Allow to stand for 2-3 minutes, then flush with water. Dike wash water for later disposal. Do not allow contaminated water to enter waterways or sewers.

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SECTION 7. HANDLING AND STORAGE

Handling

At temperatures below 40 degrees F (4.4 degrees C) the viscosity is such that improved pumping rates may be achieved by warming. Temperatures from 80-100 degrees F (27-37.8 degrees C) provide good rates of flow.

Storage

Store away from foodstuffs or animal feed. Containers should be kept tightly capped and stored in a cool, dry, well ventilated area away from oxidizing materials. Keep container closed and exercise care to prevent damage to, or leakage from, the container.

MAXIMUM STORAGE TEMPERATURE

149.00 F 65.00 C

General Comments

Keep containers tightly closed. Wash thoroughly after handling.

This product is not corrosive to materials commonly used in the construction of process equipment, storage containers, and shipping containers.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory protection

Use a NIOSH-approved organic vapor/acid gas respirator (OVAG) with dust, mist, and fume filters to reduce potential for inhalation exposure if use conditions generate vapor, mist, or aerosol and adequate ventilation (e.g., outdoor or well ventilated area) is not available. Where exposure potential necessitates a higher level of protection (e.g., if breakthrough resulting in dizziness or numbness is experienced) use a NIOSH-approved, positive-pressure pressure demand, air-supplied respirator.

When using respirator cartridges or canisters, they must be changed frequently (following each use or at the end of the workshift) to assure breakthrough exposure does not occur.

Skin Protection

Skin contact with this product should be prevented through the use of suitable protective clothing, gloves, and footwear selected with regard for use condition exposure potential. Neoprene, Viton A and ethylene propylene elastomers are recommended materials.

Eye Protection

Eye contact with the liquid or its aerosol must be prevented through the use of chemical safety goggles or a face shield selected with regard for use condition exposure potential.

Ventilation protection

At elevated processing temperatures, or in the event that use conditions generate airborne vapor, aerosol or mist, the material should be handled in a well-ventilated area. Where adequate ventilation is not available, use a NIOSH-approved organic vapor/acid gas (OVAG) respirator with dust, mist, and fume filter to reduce exposure. Where exposure potential under use conditions is greater, use a NIOSH-approved, positive-pressure air-supplied respirator.

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**SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
(CONTINUED)**

Other Protection

All food and smoking materials should be kept in a separate area away from the storage/use location. Eating, drinking and smoking should be prohibited in areas where there is a potential for significant exposure to this material. Before eating, drinking or smoking, hands and face should be thoroughly washed.

APPLICABLE EXPOSURE LIMITS

Other than any exposure limits which may be displayed in Section 8, there are no other known exposure limits applicable to this product or its components.

**EXPOSURE LIMITS/REGULATORY INFORMATION
(IN MG/M3)**

SUBSTANCE DESCRIPTION	REG. AGENCY	PEL	TLV	TWA	STEL	CEIL
Tributyl phosphate	OSHA	2.5000	N/D	N/D	N/D	N/D
	ACGIH	N/D	2.2000	N/D	N/D	N/D
	NIOSH	N/D	N/D	2.5000	N/D	N/D
	SUPPLIER	N/D	N/D	N/D	N/D	N/D

LEGEND:

EXPOSURE LIMIT DESCRIPTIONS

CEIL Ceiling Exposure Limit
 PEL Permissible Exposure Limit
 STEL Short Term Exposure Limit
 TLV Threshold Limit Value
 TWA Time Weighted Average
 N/D = Not Determined

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

VAPOR PRESSURE (mm Hg)
0.014 @ 68 F (20 C)

VAPOR DENSITY (Air = 1.0)
9.2

EVAPORATION RATE
LT 0.1

VOLATILE %
N/D

BOILING POINT
358.00 F 181.11 C
@ 22 mmHg & decomposes @ 289 C

ODOR THRESHOLD (ppm)
N/D

SPECIFIC GRAVITY
0.978 @ 68 F/68 F (20 C/20 C)

BULK DENSITY
8.2 lbs/gal @ 77 F (25 C)

SOLUBILITY IN WATER
0.1 g/100ml @ 68 F (20 C)

SOLUBILITY IN OTHER SOLVENTS
Alcohols and organic solvents

COEFFICIENT OF OIL/WATER
N/D

POUR POINT
N/D F N/D C

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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES
(CONTINUED)

MELTING POINT
-112.00 F -80.00 C

pH FACTOR
N/D

CLOUD POINT
N/D F N/D C

FLASH POINT
330.00 F 165.55 C

FLASH METHOD
Closed cup

UPPER EXPLOSION LIMIT
N/D Not determined

LOWER EXPLOSION LIMIT
N/D Not determined

AUTO IGNITION TEMPERATURE
N/D F N/D C

Other
Viscosity @77F (25C)=4.5cps

SECTION 10. STABILITY AND REACTIVITY

Stability

This product is stable at ambient temperatures and atmospheric pressures. It is not self-reactive and has a long shelf life in the absence of moisture and under sealed conditions. It is not sensitive to physical impact or static discharge.

Incompatibilities

This product is incompatible with strong oxidizers, strong acids and strong alkalis. It hydrolyzes slowly at ambient temperatures in acidic or alkaline aqueous solutions.

Polymerization

Hazardous polymerization is not expected to occur under normal temperatures and pressures.

Decomposition

Under wet alkaline conditions, this product hydrolyzes slowly to form butyl alcohol and butyl phosphoric acid salts.

Conditions to Avoid

Under wet alkaline or acidic conditions, prolonged storage at elevated temperatures should be avoided to assure product integrity.

Store away from foodstuffs, animal feed and incompatibles such as oxidizers and strong alkalis.

SECTION 11. TOXICOLOGICAL INFORMATION

Toxicological - Inhalation

Inhalation toxicity data are not available for this product.

Inhalation Chronic Exposure

This material is a weak cholinesterase inhibitor. Symptoms may include salivation, sweating, headache, nausea, muscle twitching, incoordination, diarrhea, blurred vision, abdominal cramps, tears, tremor, and chest discomfort.

Toxicological - Dermal

Practically non-toxic; the acute dermal LD50 is greater than 4640 mg/kg in rabbits. A single dermal application of 4640 mg/kg did not produce signs of toxicity in rabbits.

This product was not irritating to rabbit skin following a 4-hour exposure but was severely irritating to rabbit skin after a 24-hour exposure. It is not a skin sensitizer based on tests with guinea

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SECTION 11. TOXICOLOGICAL INFORMATION
(CONTINUED)

pigs.

Skin Contact - CHRONIC

Prolonged or repeated skin contact may cause irritation with redness, swelling, and dermatitis.

Toxicological - Eye

This product is a mild irritant to rabbit eyes.

Toxicological - Ingestion

Slightly toxic; the acute oral LD50 for this material is 3160 mg/kg in male rats.

Ingestion - CHRONIC

Chronic ingestion effects of this product are not known; however, symptoms of cholinesterase inhibition may occur (see "Note to Physicians, Section 5).

CARCINOGENICITY/MUTAGENICITY

This product was examined for mutagenic activity in a series of in vitro microbial assays employing Salmonella and Escherichia indicator organisms. Mutagenic activity was not demonstrated in any of the assays conducted.

The product was also examined in the Sex-Linked Recessive Lethal Test in Drosophila melanogaster. No mutagenic activity was induced in this assay.

Tributyl phosphate did not produce genotoxic effects in standard tests using mammalian cells and is not considered to be mutagenic or clastogenic.

Data from a lifetime study in rats has shown an increased incidence of urinary bladder tumors at a very high dose level. These tumors appeared to have developed in response to long-term irritation of the bladder wall by bladder stones that formed in response to the lifetime administration of large amounts of the test article. In addition, a recent risk assessment has shown no risk to human health from occupational exposure to tributyl phosphate.

Tributyl phosphate was administered in the diet of mice for 18 months at concentrations of 100, 150 and 3500 ppm. The only treatment related change other than an increase in liver weight at 1000 and 3500 ppm was an increase in the incidence of benign liver tumors in the high dose males.

REPRODUCTIVE EFFECTS

This material was not teratogenic or embryotoxic when administered orally to pregnant rats at levels up to 750 mg/kg/day. A decrease in fetal body weight was observed at the maternally toxic dose of 750 mg/kg/day.

It was not maternally toxic, embryotoxic, fetotoxic or teratogenic when orally administered to pregnant rabbits at levels up to 150 mg/kg/day. Equivocal embryotoxicity was observed only at the maternally toxic dose of 400 mg/kg/day.

In a two generation reproductive toxicity study, rats were dosed with tributyl phosphate at concentrations of 200, 700 or 3000 ppm (approximately 15, 53 or 225 mg/kg/day). There was no evidence of reproductive organ histopathology and no effect of pre-natal or postnatal mortality at any dose. The NOEL was greater than 3000 ppm.

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SECTION 11. TOXICOLOGICAL INFORMATION
(CONTINUED)

NEUROTOXICITY

There was no evidence that this material affected nervous system function and structure of rats following both acute (single dose) and subchronic (repeated dosing over a 90 day period) exposure. This material is not considered neurotoxic based on these tests.

Other Toxicological Effects

This product is a weak cholinesterase inhibitor. Initial symptoms of cholinesterase inhibition may include salivation, sweating, headache, nausea, muscle twitching, tremors, incoordination, blurred vision, tears, abdominal cramps, diarrhea and chest discomfort. Severe cholinesterase inhibition may lead to convulsions, pulmonary edema, respiratory failure and death.

Target Organs

Overexposure to this material may affect the skin, eyes, respiratory tract and nervous system.

SECTION 12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

Rainbow Trout:96 hr. LC50: 13 mg/l (slightly toxic)
Amphipod:96 hr. LC50: 2.4 mg/l (moderately toxic)
Algae:96 hr. LC50: 4.4 mg/l (moderately toxic)
Daphnia magna:48 hr. LC50: 2.6 mg/l (moderately toxic)

DISTRIBUTION

Other ecological information on this product is not known.

CHEMICAL FATE

Chemical fate information on this product is not known.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal

Material that cannot be used or chemically reprocessed should be disposed of in accordance with all applicable regulations. Product containers designed for single use should be thoroughly emptied before disposal.
NOTE! State and local regulations may be more stringent than federal.

This product, if unused, does not meet the EPA's RCRA criteria as either a listed or a characteristic hazardous waste. Generators of wastes are required to evaluate their materials for compliance with RCRA and local disposal procedures and regulations.

CONTAINER DISPOSAL

Containers should be drained of residual product before disposal. Empty containers should be disposed of in accordance with all applicable laws and regulations.

SECTION 14. TRANSPORT INFORMATION

SHIPPING DESCRIPTION

This product is not regulated as a hazardous material for either domestic or international transport by any mode.

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SECTION 14. TRANSPORT INFORMATION
(CONTINUED)

REQUIRED LABELS

Not regulated for shipping; no transport labels required.

ENVIRON. HAZARDOUS SUBSTANCE

This product does not contain an environmentally hazardous substance per 49 CFR 172.101, Appendix A.

SECTION 15. REGULATORY INFORMATION

Component Tributyl phosphate is subject to the following

Environmental List

DSL	Domestic Substance List-Canada
MA. LIST	Massachusetts Substance List
NJ R-T-K	New Jersey R-T-K Hazard. Sub.
PA. LIST	Penn. Hazardous Substance List
TSCA	Toxic Subst. Cont. Act -listed

OTHER REGULATORY INFORMATION

No other regulatory information is available on this product.

WHMIS HAZARD CLASS

D-2B

HAZARD RATING SOURCE

HMIS

HEALTH

2

REACTIVITY

0

FLAMMABILITY

1

OTHER

SECTION 16. OTHER INFORMATION

OTHER INFORMATION

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Revisions made in Section(s) 2, 4, 11, 15

CREATED BY

Product Safety 914-674-5000

KEY TO ABBREVIATIONS:

EQ=Equal

LT=Less Than

GT=Greater Than

AP=Approximately

TR=Trace

ND=No Data available

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