

Akzo Nobel Functional Chemicals LLC
MATERIAL SAFETY DATA SHEET

DATE PRINTED: 10/31/2001

PAGE 1
MSDS NO. 16-084380

PHOSFLEX HF

SECTION 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

PRODUCT NAME PHOSFLEX HF	CHEMICAL NAME Mixed Triaryl Phosphates
SYNONYM None available	CHEMICAL FORMULA Mixture
CAS # MIXTURE	CHEMICAL FAMILY Aryl 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 Flame-retardant plasticizer	REVISION DATE 12/08/1999
ISSUE DATE 5/27/1999	REVISION NO. 001

SECTION 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE DESCRIPTION	PERCENT	CAS#
Triphenyl phosphate	5.000- 30.000	115-86-6
Butylated triphenyl phosphate mixture	** 5.000- 70.000	MIXTURE
Trixylenyl phosphate	** 5.000- 95.000	25155-23-1

** SUBSTANCE IS A COMPOUND AND/OR MIXTURE

SECTION 3. HAZARDS IDENTIFICATION

Appearance & Odor

Black liquid; essentially odorless.

STATEMENT OF HAZARDS

May cause mild skin and eye irritation.
Inhalation of vapor or mist may cause respiratory tract irritation.
May cause nerve damage if inhaled, swallowed, or absorbed through the skin.
May cause cholinesterase inhibition.

Fire & Explosion Hazards

This product is not defined as flammable or combustible. It is self-extinguishing once the source of ignition is removed. The material is not sensitive to static discharge or physical impact. It may decompose under fire conditions.

Primary Route of Exposure

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

Inhalation Acute Exposure

Inhalation of vapors or mists may cause respiratory tract irritation. Inhalation may cause cholinesterase inhibition and nerve damage (see Section 4, "Note to Physician," for signs and symptoms of these effects).

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SECTION 3. HAZARDS IDENTIFICATION
(CONTINUED)

Skin Contact - ACUTE

Skin contact may cause mild irritation.
May cause nerve damage and cholinesterase inhibition if absorbed through the skin. See Section 4, "Note to Physician," for signs and symptoms of these effects.

Eye contact - ACUTE

Eye contact may cause mild irritation.

Ingestion - ACUTE

Ingestion may cause gastrointestinal tract irritation and diarrhea. May cause cholinesterase inhibition and nerve damage. See Section 4, "Note to Physician," for signs and symptoms of these effects.

CARCINOGENICITY

IARCNO	OSHANO
NTPNO	ACGIHNO

SECTION 4. FIRST AID MEASURES

Inhalation First Aid

If inhaled, remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Skin Contact - First Aid

Immediately remove contaminated clothing and shoes. Under a safety shower, wash all affected areas with soap and plenty of water for at least 15 minutes. Get medical attention. Wash clothing before reuse. Thoroughly clean or destroy contaminated shoes.

Eye Contact - First Aid

Immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lenses, if worn. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eye and lids. Get medical attention if irritation develops and persists.

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 neuromuscular disorders may be at an increased risk from exposure to this material.

Note to Physician

This product contains trixylenyl phosphate and triphenyl phosphate. Overexposure to this product by ingestion, inhalation, or through skin absorption may produce abdominal pain, nausea and vomiting. Delayed effects such as peripheral neuropathy and cholinesterase inhibition may result. Symptoms of peripheral neuropathy may include: diarrhea, conjunctivitis, laryngitis, rhinitis, pharyngitis, distal extremity paresthesias, and cramping pain in the calves. Later symptoms may include: flaccid paralysis followed by spasticity of the lower extremities resulting in a spastic gait. Symptoms of cholinesterase inhibition may include: headache, nausea, sweating, numbness and tingling of the hands and feet, salivation, muscle twitching, tremors, incoordination, blurred vision, tears, abdominal cramps, diarrhea, and chest discomfort. In cases of

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SECTION 4. FIRST AID MEASURES
(CONTINUED)

cholinesterase inhibition, atropine by injection is antidotal. Pralidoxime chloride (2-PAM; Protopam chloride) is also antidotal when administered early and in conjunction with atropine.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT

475.00 F 246.11 C

FLASH METHOD

Pensky-Martens Closed Cup

AUTO IGNITION TEMPERATURE

N/D F N/D C

UPPER EXPLOSION LIMIT

N/D

LOWER EXPLOSION LIMIT

N/D

Extinguishing Media

Use water fog or spray, dry chemical, foam or carbon dioxide extinguishing agents.

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. It is self-extinguishing once the source of ignition is removed. The material is not sensitive to static discharge or physical impact. It may decompose under fire conditions.

Other Fire + Explosion Hazards

No other fire or explosion hazards of this product are known.

Hazardous Products/Combustion

Decomposition of this product under fire conditions can produce carbon monoxide, phosphorus oxides, and organic decomposition products.

NFPA HEALTH RATING

2

NFPA FLAMMABILITY RATING

1

NFPA REACTIVITY RATING

0

NFPA OTHER

ND

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 if possible without being injured. 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

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SECTION 6. ACCIDENTAL RELEASE MEASURES
(CONTINUED)

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.

SECTION 7. HANDLING AND STORAGE

Handling

Wear protective clothing including chemical goggles and/or a face shield and rubber gloves when handling this product to avoid eye and skin contact. Handle in a well-ventilated area. Avoid inhalation of vapor or mist. Wash thoroughly after handling.

Containers should be located in an area where they can be rotated regularly (first in, first out) and visually inspected for dents and bulging on a weekly basis. If bulged drums are found, they should be vented in an open area by removing the two-inch bung very slowly. The two-inch bung should not be removed completely until there is no sound of pressure being released. The bung can then be removed, but this should be done slowly and with care.

Emptied container may retain product residues. Follow all warnings and precautions even after container is emptied.

Storage

Store away from foodstuffs and animal feed. Containers should be stored in a cool, dry, well ventilated area away from flammable or oxidizing materials and sources of heat or flame. Exercise due caution to prevent damage to or leakage from the container.

Prolonged storage at elevated temperatures under wet alkaline or acidic conditions should be avoided to assure product integrity. Care should be taken to prevent moisture condensation in the container. Carbon steel is the preferred material of construction for storage containers. The product is normally shipped in unlined tank cars, trucks and drums.

MAXIMUM STORAGE TEMPERATURE

149.00 F 65.00 C

Higher in absence air/moisture

General Comments

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

This product can be stored and transported in equipment constructed of mild steel.

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, 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.

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

Skin Protection

Skin contact with the liquid or its aerosol must be prevented through the use of suitable protective clothing, gloves, and footwear selected with regard for use condition exposure potential. Combination neoprene over natural latex gloves are recommended.

Eye Protection

Eye contact with the liquid or its aerosol must be prevented through the use of chemical safety goggles and/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, respiratory protection should be used.

Other Protection

Safety showers, with quick opening valves which stay open, and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water, should be readily available in all areas where this material is handled or stored. Water should be supplied through insulated and heat-traced lines to prevent freeze-ups in cold weather. Long sleeved clothing may be used to minimize skin contact.

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
Triphenyl phosphate	OSHA	3.0000	N/D	N/D	N/D	N/D
	ACGIH	N/D	3.0000	N/D	N/D	N/D
	NIOSH	N/D	N/D	3.0000	N/D	N/D
	SUPPLIER	N/D	N/D	N/D	N/D	N/D
Butylated triphenyl phosphate mixture	OSHA	N/D	N/D	N/D	N/D	N/D
	ACGIH	N/D	N/D	N/D	N/D	N/D
	NIOSH	N/D	N/D	N/D	N/D	N/D
	SUPPLIER	N/D	N/D	N/D	N/D	N/D
Trixylenyl phosphate	OSHA	N/D	N/D	N/D	N/D	N/D
	ACGIH	N/D	N/D	N/D	N/D	N/D
	NIOSH	N/D	N/D	N/D	N/D	N/D
	SUPPLIER	N/D	N/D	N/D	N/D	N/D

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
(CONTINUED)

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)

LT 0.10 @ 37.8C (100F)

VAPOR DENSITY (Air = 1.0)

N/D

EVAPORATION RATE

N/D

VOLATILE %

N/D

BOILING POINT

N/D F N/D C

ODOR THRESHOLD (ppm)

N/D

SPECIFIC GRAVITY

N/D

BULK DENSITY

. Not Applicable

SOLUBILITY IN WATER

LT 0.1 g/100 ml miscibility

SOLUBILITY IN OTHER SOLVENTS

Not Determined

COEFFICIENT OF OIL/WATER

N/D

POUR POINT

-.40 F -18.00 C

MELTING POINT

N/D F N/D C

pH FACTOR

N/D

CLOUD POINT

N/D F N/D C

FLASH POINT

475.00 F 246.11 C

FLASH METHOD

Pensky-Martens Closed Cup

UPPER EXPLOSION LIMIT

N/D

LOWER EXPLOSION LIMIT

N/D

AUTO IGNITION TEMPERATURE

N/D F N/D C

Other

Viscosity @ 40 C (104 F) = 28-36 cst

SECTION 10. STABILITY AND REACTIVITY

Stability

This product is stable at ambient temperatures and atmospheric pressure. It is not self-reactive and is not sensitive to static discharge or physical impact.

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.

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SECTION 10. STABILITY AND REACTIVITY
(CONTINUED)

Polymerization

Hazardous polymerization is not expected to occur.

Decomposition

Under wet acidic or alkaline conditions this product hydrolyzes slowly and nonviolently to form phenol, substituted phenols, and aryl phosphoric acids.

Vapors may decompose at elevated temperatures to release harmful materials.

Conditions to Avoid

Prolonged storage at elevated temperatures (above 65.6 C; 150 F) should be avoided.

Avoid contact with strong acids, strong bases, and strong oxidizers.

SECTION 11. TOXICOLOGICAL INFORMATION

Toxicological - Inhalation

The acute inhalation LC50 (rat) for a similar product following a 4-hour exposure was > 3.1 mg/l, the highest attainable concentration. No mortalities were observed at this level. Inhalation of this product may cause nerve damage, cholinesterase inhibition, and respiratory tract irritation.

Inhalation Chronic Exposure

Although data are not available for this material, prolonged or repeated inhalation exposure may cause nerve damage, cholinesterase inhibition, and respiratory tract irritation.

Toxicological - Dermal

Practically non-toxic; the acute dermal LD50 (rabbit) for a similar material is greater than 2000 mg/kg. The acute dermal LD50 (rabbit) for trixylenyl phosphate and triphenyl phosphate is > 2000 mg/kg and > 4640 mg/kg, respectively.

Skin contact may cause nerve damage and cholinesterase inhibition.

This product is expected to be a mild skin irritant based on component and similar product data.

Skin Contact - CHRONIC

Although data are not available for this material, prolonged and/or repeated skin contact may cause nerve damage or cholinesterase inhibition.

Toxicological - Eye

This product is expected to be a mild eye irritant based on component and similar product data.

Toxicological - Ingestion

Practically non-toxic; the acute oral LD50 (rat) for a similar material is > 5000 mg/kg. The acute oral LD50 (rat) for trixylenyl phosphate and triphenyl phosphate is > 5000 mg/kg and > 4640 mg/kg, respectively. Ingestion may cause nerve damage and cholinesterase inhibition.

Ingestion - CHRONIC

Although data are not available for this material, repeated ingestion may cause cholinesterase inhibition and nerve damage.

Daily ingestion by rats of 100, 400, or 1600 ppm of a similar product in the diet for three months produced increases in the

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SECTION 11. TOXICOLOGICAL INFORMATION
(CONTINUED)

liver and adrenal gland weights in females and increases in the liver weights of males at the highest dose level. However, no histopathological changes were noted.

CARCINOGENICITY/MUTAGENICITY

The carcinogenic/mutagenic properties of this material have not been determined. Neither this material nor its components have been classified as a carcinogen or suspect carcinogen by IARC, NTP, OSHA, or ACGIH. A similar product was not mutagenic in the Ames test. It did not induce an increase in chromosomal aberration or sister chromatid exchanges in mouse lymphoma cells and did not induce morphological transformations in BALB/3T3 cells. Triphenyl phosphate, a product component, was not mutagenic in the Ames test.

REPRODUCTIVE EFFECTS

Daily administration of a similar product at 100, 400, or 1000 mg/kg to rats on days 6 through 20 of gestation demonstrated maternal toxicity (increased liver weights and reduced food consumption at the high-dose) and fetotoxicity (reduction in fetal body weight at the high-dose) but no indications of teratogenicity were observed. Triphenyl phosphate, a product component, was not teratogenic in rats at dietary levels of up to 10 mg/kg administered through mating and gestation.

NEUROTOXICITY

Neurotoxicity data are not available for this product. An oral dose of 1.14 g/kg of trixylenyl phosphate did not produce significant inhibition of brain neurotoxic esterase. Therefore, acute delayed neurotoxicity would not be expected at this dose level. Acute oral administration of a high dose of a similar material, 11.4 g/kg, to hens produced 85% inhibition of plasma cholinesterase and 94% inhibition of brain neurotoxic esterase. Hens observed for three weeks following administration of this high dose showed motor incoordination starting on the tenth day and increasing in severity with time.

Oral administration of 420 or 2000 mg/kg/day of triphenyl phosphate for 5 days to hens did not cause significant inhibition of neurotoxic esterase or clinical signs of neurotoxicity. Hens dosed twice orally 3 weeks apart with 11.7 g/kg of a similar product did not show signs of delayed neurotoxicity. In a separate study, a similar product inhibited plasma cholinesterase but not neurotoxic esterase.

Other Toxicological Effects

No other toxic effects for this product are known.

Target Organs

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

SECTION 12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

Data are not available for this product; however, the following data are available for a product component and a similar product:
96-hr. LC50 (Rainbow trout) = > 100 mg/l trixylenyl phosphate (practically non-toxic)
96-hr. LC50 (Sheepshead minnow) = > 1.3 mg/l similar product (highest concentration tested)
96-hr. LC50 (Mysid shrimp) = > 1.0 mg/l similar product (highest concentration tested)

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SECTION 12. ECOLOGICAL INFORMATION
(CONTINUED)

DISTRIBUTION

Triaryl phosphate esters, including triphenyl phosphate, exhibit low aqueous solubility, have moderate potential for bioconcentration, and readily undergo biodegradation.

CHEMICAL FATE

Chemical fate information on this product is not known. Triphenyl phosphate, a product component, is readily biodegradable. Hydrolysis rates for triphenyl phosphate are:
at pH 9.5: half-life: 0.23 days
at pH 8.2: half-life: 7.5 days

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

Emptied containers may retain residues of this material. Follow all warnings and precautions even after the container is emptied.

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

SECTION 14. TRANSPORT INFORMATION

SHIPPING DESCRIPTION

FOLLOWING SHIPMENTS ARE NOT REGULATED FOR TRANSPORT:
Surface transport within North America (U.S.A., Canada, Mexico) in packages of 119 gallons or less (non-bulk).
Air transport within North America (U.S.A., Canada, Mexico).
FOLLOWING SHIPMENTS ARE REGULATED FOR TRANSPORT (SHIPPING DESCRIPTION FOLLOWS):
Bulk surface shipments within North America (> 119 gallons).
Water transport within North America (U.S.A., Canada, Mexico).
Export shipments (excluding non-bulk shipments to Canada and Mexico and shipments via air transport to Canada and Mexico).

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

(Contains Triphenyl Phosphate and Trixylenyl Phosphate)
9, UN3082, PG III
NORTH AMERICAN EMERGENCY RESPONSE GUIDE NO: 171

REQUIRED LABELS

PRIMARY LABEL: Class 9
SUBSIDIARY RISK LABEL: Marine pollutant

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SECTION 14. TRANSPORT INFORMATION
(CONTINUED)

ENVIRON. HAZARDOUS SUBSTANCE

This product contains triphenyl phosphate and trixylenyl phosphate which are Marine Pollutants as per 49 CFR, 172.101, Appendix B.

SECTION 15. REGULATORY INFORMATION

Component Triphenyl phosphate is subject to the following

Enviromental 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

Component Butylated triphenyl phosphate mixture is subject to the following

Enviromental List

DSL Domestic Substance List-Canada
TSCA Toxic Subst. Cont. Act -listed

Component Trixylenyl phosphate is subject to the following

Enviromental List

DSL Domestic Substance List-Canada
TSCA Toxic Subst. Cont. Act -listed

OTHER REGULATORY INFORMATION

No other regulatory information is available on this product.

WHMIS HAZARD CLASS
D-2A; D-2B

HAZARD RATING SOURCE
HMIS

HEALTH
2

REACTIVITY
1

FLAMMABILITY
1

OTHER

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SECTION 16. OTHER INFORMATION

OTHER INFORMATION

PHOSFLEX is a registered trademark of Akzo Nobel Chemicals Inc.

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

The information in this material safety data sheet should be provided to all who will use, handle, store, transport or otherwise be exposed to this product. All information concerning this product and/or suggestions for handling and use contained herein are offered in good faith and are believed to be reliable as of the date of publication. However, no warranty is made as to the accuracy of and/or sufficiency of such information and/or suggestions as to the merchantability or fitness of the product for any particular purpose, or that any suggested use will not infringe any patent. Nothing in here shall be construed as granting or extending any license under any patent. Buyer must determine for himself, by preliminary tests or otherwise, the suitability of this product for his purposes, including mixing with other products. The information contained herein supersedes all previously issued bulletins on the subject matter covered. If the date of this document is more than three years old, call to make certain that this sheet is current.