Akzo Nobel Chemicals Inc.

MATERIAL SAFETY DATA SHEET

DATE PRINTED: 4/28/1997

MSDS NO. 16-084520

FYROL PCF

SECTION 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

PRODUCT NAME
FYROL PCF

CHEMICAL NAME
Tri(B-chloroisopropyl) phosphate

SYNONYM
Tri(B-chloropropyl) phosphate (3:1);
Tri(1-methyl-2-chloroethyl) phosphate.

CHEMICAL FORMULA
C9-H18-C13-04-P

CAS #
13674-84-5

CHEMICAL FAMILY
Alkyl phosphate

MANUFACTURERS NAME
Akzo Nobel Chemicals Inc.

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

REVISION DATE
10/16/1995

ISSUE DATE
1/06/1995

REVISION NO.
003

SECTION 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE DESCRIPTION		PERCENT	CAS#
2-Propanol, 1-chloro-, phosphate (3:1) and isomers	**	83.000- 99.700	13674-84-5
Propane, 2,2'-oxybis(1-chloro)		0.001- 0.100	108-60-1
2-Propanone		0.001- 0.100	67-64-1
Ethanol, 2-chloro-,phosphate (3:1)	**	0.001- 4.000	115-96-8
Propylene oxide		0.001- 0.010	75-56-9
1,2-Dichloropropane		0.001- 1.000	78-87-5

** SUBSTANCE IS A COMPOUND AND/OR MIXTURE

SECTION 3. HAZARDS IDENTIFICATION

Appearance & Odor
Clear, colorless liquid

STATEMENT OF HAZARDS
CAUTION! May cause skin, eye, and respiratory tract irritation
May be harmful if swallowed
Inhalation of vapors or mists may be harmful
May cause liver and kidney effects based on animal data
May cause cholinesterase inhibition
Warning! This product contains chemicals known to the State of California to cause cancer or reproductive toxicity.

Fire & Explosion Hazards
This product is not defined as flammable or combustible. However, the product may support combustion and decompose under fire conditions to give off toxic phosphorus oxides, hydrogen chloride, and oxides of carbon. The material is self extinguishing once the source of ignition is removed. It is not sensitive to static discharge.

SECTION 3. HAZARDS IDENTIFICATION (CONTINUED)

Primary Route of Exposure
Skin or eye contact and inhalation of vapor or mists are the principal routes of exposure to this product.

Inhalation Acute Exposure
Inhalation of vapors or mists can cause respiratory tract irritation.

Skin Contact - ACUTE
Skin contact can cause irritation. There is no indication that the material is absorbed through the skin.

Eye contact - ACUTE
Eye contact may cause mild irritation.

Ingestion - ACUTE
The product is expected to be slightly toxic by ingestion based on animal tests. The acute oral LD50 is expected to be greater than 2,800 mg/kg.

CARCINOGENICITY

IARC	....NO	OSHA	....NO
NTP	....NO	ACGIH	....NO

SECTION 4. FIRST AID MEASURES

Inhalation First Aid
Remove to fresh air. If not breathing, clear victim's airway and start artificial respiration. If victim is breathing, supplemental oxygen may be given from a demand-type or continuous-flow inhaler, preferably with a physician's advice. Get medical attention immediately.

Skin Contact - First Aid
IMMEDIATELY remove and discard contaminated clothing and shoes. Under a safety shower, wash all affected areas with plenty of soap and water for at least 15 minutes. Do not attempt to neutralize with chemical agents. Obtain medical attention immediately.

Eye Contact - First Aid
IMMEDIATELY flush eyes with large amounts of water for at least 15 minutes. Hold eyelids apart to ensure rinsing of the entire surface of the eye and lids with water. Do not attempt to neutralize the material, and do not apply ointments or oils to the eyes at this time. Get medical attention immediately.

Ingestion - First Aid
If victim is conscious and alert, immediately give several glasses of water and induce vomiting by gagging the victim with a blunt object placed on the back of the victim's tongue. Keep head below hips to avoid aspiration. Give fluids until vomitus is clear. Never give anything by mouth to a person who is unconscious or convulsing. Get medical attention immediately.
If victim is unconscious, monitor pulse, breathing, and airway. If breathing stops, begin artificial respiration immediately. If the heart has stopped, give cardiopulmonary resuscitation (CPR). Get medical attention immediately.

Medical conditions aggravated
There are no data available that address medical conditions that are generally recognized as being aggravated by exposure to this product.

SECTION 4. FIRST AID MEASURES (CONTINUED)

Note to Physician
Product is an organophosphorus mixture. This class of compounds can typically cause cholinesterase inhibition. Human symptoms of such inhibition may include salivation, sweating, headache, nausea, muscle twitching, tremors, incoordination, blurred vision, tears, abdominal cramps, diarrhea, and/or chest discomfort. Human experience and animal tests HAVE NOT SHOWN this product to be a cholinesterase inhibitor; however, the possibility of this medical condition should not be disregarded in diagnosing and treating cases of overexposure. If cholinesterase inhibition is suspected, atropine by injection is antidotal. Pralidoxime chloride (2-PAM) is also antidotal when administered early and in conjunction with atropine.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT
425.00 F 218.33 C

FLASH METHOD
Cleveland Open 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 nonessential 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 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, the product may support combustion and decompose under fire conditions to give off toxic phosphorus oxides, hydrogen chloride, and oxides of carbon. The material is self extinguishing once the source of ignition is removed. It is not sensitive to static discharge.

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 will produce toxic oxides of carbon, irritating phosphorus oxides, and corrosive hydrogen chloride gas.

NFPA HEALTH RATING
2

NFPA FLAMMABILITY RATING
1

SECTION 5. FIRE FIGHTING MEASURES (CONTINUED)

NFPA REACTIVITY RATING **NFPA OTHER**
0

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.

SECTION 7. HANDLING AND STORAGE

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. Wear suitable protective clothing, eye protection and respiratory protection to prevent exposure. 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.

Keep away from heat, sparks and open flames. Avoid contact with eyes and skin. Avoid inhalation of vapors and mists. Personnel handling this product should wash thoroughly after contact with this product.

Storage
Store away from foodstuffs or 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. Store below 122 F (50 C) to minimize product degradation. Use caution to prevent damage to or leakage from the container.

MAXIMUM STORAGE TEMPERATURE
122.00 F 50.00 C
(product will degrade)

General Comments
This material is noncorrosive to glass or metals. However, because the product has plasticizing properties, it may soften or deteriorate certain plastics and elastomers (particularly vinyl-based resins, neoprene and natural rubbers).

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

Eye wash fountains or other means of washing the eyes with a gentle flow of water should be readily available in all areas where this product is handled or stored. Water should be supplied through insulated and/or heat-traced pipes to prevent freeze-up in winter.

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.

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.

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. AGCY	PEL	TLV	TWA	STEL	CEIL

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION (CONTINUED)

EXPOSURE LIMITS/REGULATORY INFORMATION (IN MG/M3)

SUBSTANCE DESCRIPTION	REG. AGCY	PEL	TLV	TWA	STEL	CEIL
2-Propanol, 1-chloro-, phosphate (3:1) and isomers						
	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
Propane, 2,2'-oxybis(1-chloro)						
	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
2-Propanone						
	OSHA	1800.0000	N/D	N/D	2400.0000	N/D
	ACGIH	N/D	1780.0000	N/D	2380.0000	N/D
	NIOSH	N/D	N/D	590.0000	N/D	N/D
	SUPPLIER	N/D	N/D	N/D	N/D	N/D
Ethanol, 2-chloro-,phosphate (3:1)						
	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
Propylene oxide						
	OSHA	50.0000	N/D	N/D	N/D	N/D
	ACGIH	N/D	48.0000	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
1,2-Dichloropropane						
	OSHA	350.0000	N/D	N/D	510.0000	N/D
	ACGIH	N/D	347.0000	N/D	508.0000	N/D
	NIOSH	N/D	N/D	N/D	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)
LT - 2 mm at 77 F (25 C)

VAPOR DENSITY (Air = 1.0)
N/D

EVAPORATION RATE
N/D

VOLATILE %
N/D

BOILING POINT
428.00 F 220.00 C
Decomposes

ODOR THRESHOLD (ppm)
N/D

SPECIFIC GRAVITY
- 1.290 @ 77 F/77 F (25 C/25 C)

BULK DENSITY
N/D

SOLUBILITY IN WATER
LT - 1 % at 77 F (25 C).

SOLUBILITY IN OTHER SOLVENTS
Not determined

COEFFICIENT OF OIL/WATER
N/D

POUR POINT
N/D F N/D C

MELTING POINT
N/D F N/D C

pH FACTOR
N/D

CLOUD POINT
N/D F N/D C

FLASH POINT
425.00 F 218.33 C

FLASH METHOD
Cleveland Open Cup

UPPER EXPLOSION LIMIT
N/D

LOWER EXPLOSION LIMIT
N/D

AUTO IGNITION TEMPERATURE
N/D F N/D C

Other
Viscosity @ 77 F (25 C) - 57 cp

SECTION 10. STABILITY AND REACTIVITY

Stability
A slight increase in acidity is normal during storage. This product is stable at ambient temperature and atmospheric pressures. It is not self-reactive and has an almost indefinite shelf life under sealed conditions. It is not sensitive to physical impact.

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

Polymerization
Hazardous polymerization is not expected to occur.

Decomposition
Under wet alkaline or neutral conditions this product hydrolyzes slowly and nonviolently.

Conditions to Avoid
Prolonged storage at elevated temperatures (above 122 F; 50 C) should be avoided.
Contact with strong acids, strong bases and strong oxidizers should be avoided.

Prolonged storage at elevated temperatures under wet conditions should be avoided. Care should be taken to prevent moisture from condensing in the container.

SECTION 11. TOXICOLOGICAL INFORMATION

Toxicological - Inhalation
The acute 4-hour LC50 in rats is greater than 4600 mg/m3 (greater than 90% respirable).

Inhalation Chronic Exposure
Chronic inhalation exposure effects of this product are not known. However, it may cause irritation of the respiratory tract.

Toxicological - Dermal
The acute dermal LD50 is greater than 5000 mg/kg in rabbits. A single dermal application of 5000 mg/kg produced mild diarrhea and no mortality.
The product is a mild irritant to rabbit skin following a 24-hour exposure.

Skin Contact - CHRONIC
The effects of chronic dermal exposure to this product are not known; however, prolonged or repeated exposure is expected to cause irritation.

Toxicological - Eye
This product did not produce irritation when tested in rabbit eyes.

Toxicological - Ingestion
An oral LD50 study in Sprague-Dawley rats reported values of 4200 mg/kg in male, and 2800 mg/kg in female rats.

In a 90-day subchronic oral toxicity study, no adverse effect levels (NOAELS) for male and female Sprague-Dawley rats were determined to be 800 and 7500 ppm in the diet, respectively. Effects on liver weight, kidney weight and/or morphology, and/or sternal bone marrow cytology were observed at higher concentrations.

Ingestion - CHRONIC
Health effects as a result of chronic ingestion are not known.

CARCINOGENICITY/MUTAGENICITY
This product was deemed nongenotoxic, with and without metabolic activation where appropriate, in the following assays: Ames assay using Salmonella and Saccharomyces tester strains (T-6361), in vitro Mouse lymphoma Forward Assay (T-6343A), and in two in vitro Cell Transformation Assays (T-6359 & T-10182).

Data from an In vitro Unscheduled DNA Synthesis in Human WI-38 Cells (T-6359) was uninterpretable.

REPRODUCTIVE EFFECTS
The reproductive toxicity of this product is not known.

NEUROTOXICITY
While inducing signs of toxicity in the hen after two acute doses of the product were administered 21 days apart, neither plasma nor brain cholinesterase was inhibited and, therefore, the product did not induce an organophosphorus-like delayed neurotoxicity (OPIDN) in the hen.

Other Toxicological Effects
No other toxic effects for this product are known.

Target Organs
Target organs are the eyes, skin, kidneys, liver, and the respiratory system.

SECTION 12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION
EC50, algae, S. capricornutum: 47 mg/l (biomass).

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.

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 B.

SECTION 15. REGULATORY INFORMATION

Component 2-Propanol, 1-chloro-, phosphate (3:1) and isomers is subject to t

Enviromental List

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

SECTION 15. REGULATORY INFORMATION (CONTINUED)

Component Propane, 2,2'-oxybis(1-chloro) is subject to the following

Enviromental List

CERCLA	CERCLA Hazardous Substances
MA. LIST	Massachusetts Substance List
NDSL	Non-Domestic Subst.List-Canada
NJ R-T-K	New Jersey R-T-K Hazard. Sub.
PA. LIST	Penn. Hazardous Substance List
SARA 313	SARA Title III, Section 313
TSCA	Toxic Subst. Cont. Act -listed

Component 2-Propanone is subject to the following

Enviromental List

CERCLA	CERCLA Hazardous Substances
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
SARA 302	SARA Title III, Section 302
SARA 313	SARA Title III, Section 313
TSCA	Toxic Subst. Cont. Act -listed

Component Ethanol, 2-chloro-,phosphate (3:1) is subject to the following

Enviromental List

DSL	Domestic Substance List-Canada
PROP 65	California Proposition 65
TSCA	Toxic Subst. Cont. Act -listed

Component Propylene oxide is subject to the following

Enviromental List

CAA 112	Clean Air Act Sect. 112
CERCLA	CERCLA Hazardous Substances
DSL	Domestic Substance List-Canada
IARC	IARC Carcinogens-Grps. 1,2A,2B
MA. LIST	Massachusetts Substance List
NJ R-T-K	New Jersey R-T-K Hazard. Sub.
PA. LIST	Penn. Hazardous Substance List
PROP 65	California Proposition 65
SARA 302	SARA Title III, Section 302
SARA 313	SARA Title III, Section 313
TSCA	Toxic Subst. Cont. Act -listed

SECTION 15. REGULATORY INFORMATION (CONTINUED)

Component 1,2-Dichloropropane is subject to the following

Enviromental List

CAA 112	Clean Air Act Sect. 112
CERCLA	CERCLA Hazardous Substances
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
PROP 65	California Proposition 65
SARA 313	SARA Title III, Section 313
TSCA	Toxic Subst. Cont. Act -listed

OTHER REGULATORY INFORMATION
This product contains 1,2-dichloropropane (CAS# 78-87-5), Bis(2-chloroisopropyl) ether(CAS# 108-60-1), 2-propanone (CAS# 67-64-1) and propylene oxide (CAS# 75-56-9) which are subject to the SARA TITLE III, Section 313 reporting requirement.

WHMIS HAZARD CLASS
NOT CONTROLLED

HAZARD RATING SOURCE
HMIS

HEALTH
1

REACTIVITY
0

FLAMMABILITY
1

OTHER

SECTION 16. OTHER INFORMATION

OTHER INFORMATION
FYROL is a registered trademark of Akzo Nobel Chemicals Inc.

CREATED BY
Product Safety 914-674-5000

KEY TO ABBREVIATIONS:

EQ=EQual
AP=APproximately
LT=Less Than
TR=TRace
GT=Greater Than
ND=No Data available