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MATERIAL SAFETY DATA

OCEAN NETWORK EMERGENCY PHONE 1-800-OLIN-911

THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD,29 CFR 1910.1200.THIS PRODUCT MAY BE CONSIDERED TO BE A HAZARDOUS CHEMICAL UNDER THAT STANDARD.(REFER TO THE OSHA CLASSIFICATION IN SEC.I.)THIS INFORMATION IS REQUIRED TO BE DISCLOSED FOR SAFETY IN THE WORKPLACE.THE EXPOSURE TO THE COMMUNITY,IF ANY,IS QUITE DIFFERENT.

I. PRODUCT IDENTIFICATION

REVISION NO : 3
REVISION DATE : 10/26/95
PRODUCT CODE : JPE840010
FILE NUMBER : JPE01592.0001
PRODUCT NAME: PF DEVELOPER

SYNONYMS: PF Developer Solvent
CHEMICAL FAMILY: Organic solvent
FORMULA: Not Applicable/Mixture
USE DESCRIPTION: Negative photoresist developer
OSHA HAZARD CLASSIFICATION: Flammable liquid; skin, eye and respiratory irritant, nervous system, kidney, liver and blood toxin

II. COMPONENT DATA

PRODUCT COMPOSITION
CAS or CHEMICAL NAME: Stoddard solvent
CAS NUMBER: 8052-41-3
PERCENTAGE RANGE: 50-55%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:	500		100	
CEILING:		None		None
STEL:		None		None

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CAS or CHEMICAL NAME: Mixed xylenes
CAS NUMBER: 1330-20-7
PERCENTAGE RANGE: 35-40%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:	100		100	
CEILING:	None		None	
STEL:	None		150	

CAS or CHEMICAL NAME: Ethylbenzene
CAS NUMBER: 100-41-4
PERCENTAGE RANGE: 5-10%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:	100		100	
CEILING:	None		None	
STEL:	None		125	

III. PRECAUTIONS FOR SAFE HANDLING AND STORAGE

DO NOT TAKE INTERNALLY. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. UPON CONTACT WITH SKIN OR EYES, WASH OFF WITH WATER.

STORAGE CONDITIONS:

STORE IN A COOL, DRY, WELL VENTILATED PLACE.

OTHER:
- Avoid all sources of ignition.
- Outside or detached storage is preferable. Inside storage should be in a standard flammable liquids storage room or cabinet.
- Vapors are heavier than air and may travel to an ignition source and flash back.
- Observe proper grounding procedures when making transfers of this product.

PRODUCT STABILITY AND COMPATIBILITY

INCOMPATIBLE MATERIALS FOR STORAGE OR TRANSPORT: Strong oxidants

IV. PHYSICAL DATA

APPEARANCE: Clear, colorless liquid
FREEZING POINT: No Data
BOILING POINT: 280-410 Deg.F
DECOMPOSITION TEMPERATURE: No Data
SPECIFIC GRAVITY: 0.90
BULK DENSITY: 0.90 (g/cc)
pH @ 25 DEG.C: Not Applicable
VAPOR PRESSURE @ 25 DEG.C: 10 mm Hg
SOLUBILITY IN WATER: Nil

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MATERIAL SAFETY DATA

VOLATILES, PERCENT BY VOLUME: 100%
EVAPORATION RATE: No Data
VAPOR DENSITY: Heavier than air
MOLECULAR WEIGHT: Not Applicable/Mixture
ODOR: Aromatic
COEFFICIENT OF OIL/WATER DISTRIBUTION: No Data

V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

PERSONAL PROTECTION FOR ROUTINE USE OF PRODUCT:
RESPIRATORY PROTECTION:
Wear a NIOSH/MSHA approved respirator if exposures above the TLV are possible.

VENTILATION:
Use local exhaust ventilation to maintain levels to below the TLV.
Use explosion-proof ventilation when handling this product.

SKIN AND EYE PROTECTIVE EQUIPMENT:
Use chemical goggles and impermeable gloves.

EQUIPMENT SPECIFICATIONS (WHEN APPLICABLE):
RESPIRATOR TYPE: NIOSH/MSHA approved organic vapor respirator
PROTECTIVE CLOTHING TYPE (This includes: gloves, boots, apron, protective suit): Impervious

VI. FIRE AND EXPLOSION HAZARD INFORMATION

FLAMMABILITY DATA:
EXPLOSIVE: No
FLAMMABLE: Yes
COMBUSTIBLE: Not Applicable
PYROPHORIC: No
FLASH POINT: 27 Deg.C (81 Deg.F) Test Method: TCC
AUTOIGNITION TEMPERATURE: No Data
FLAMMABLE LIMITS AT NORMAL ATMOSPHERIC TEMPERATURE AND PRESSURE (PERCENT VOLUME IN AIR): LEL - 1.0 UEL - 7.0

NFPA RATINGS:
Not Established

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HMIS RATINGS:

Health:	2
Flammability:	3
Reactivity:	0

EXTINGUISHING MEDIA:
Alcohol foam, carbon dioxide, dry chemical, water spray

FIRE FIGHTING TECHNIQUES AND COMMENTS:
Use water to cool containers exposed to fire.
See Section XI for protective equipment for fire fighting.

VII. REACTIVITY INFORMATION

CONDITIONS UNDER WHICH THIS PRODUCT MAY BE UNSTABLE:
TEMPERATURES ABOVE: 40 Deg.C (104 Deg.F)
MECHANICAL SHOCK OR IMPACT: No
ELECTRICAL (STATIC) DISCHARGE: Yes
HAZARDOUS POLYMERIZATION: Will not occur
INCOMPATIBLE MATERIALS: Strong oxidizers such as chromic acid, concentrated oxygen, and liquid chlorine
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide
OTHER CONDITIONS TO AVOID: All ignition sources, high heat

SUMMARY OF REACTIVITY:

EXPLOSIVE:	No
OXIDIZER:	No
PYROPHORIC:	No
ORGANIC PEROXIDE:	No
WATER REACTIVE:	No

VIII. FIRST AID

EYES:

Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Call a physician at once.

SKIN:

Immediately flush with water for 15 minutes. Wash the contaminated skin with soap and water. If irritation develops, call a physician. If clothing comes in contact with the product, the clothing should be laundered before re-use.

INGESTION:

Immediately drink large quantities of water. DO NOT induce vomiting. Call a physician at once. DO NOT give anything by mouth if the person is unconscious or if having convulsions.

INHALATION:

If person experiences nausea, headache or dizziness, person should stop work immediately and move to fresh air until these symptoms disappear. If breathing is difficult, administer oxygen, keep the person warm and at rest. Call a physician. In the event that an individual inhales enough product to lose consciousness, person should be moved to fresh air at once and a physician should be called immediately. If breathing has stopped, artificial respiration should be given immediately. In all cases, ensure adequate ventilation and provide respiratory protection before the person returns to work.

IX. TOXICOLOGY AND HEALTH INFORMATION

ROUTES OF ABSORPTION
Ingestion, inhalation, skin and eye contact

WARNING STATEMENTS AND WARNING PROPERTIES
DO NOT TAKE INTERNALLY. CAUSES EYE IRRITATION. CAUSES MUCOUS MEMBRANE IRRITATION. CAUSES SKIN IRRITATION. DO NOT INHALE MIST OR VAPOR. INHALATION MAY CAUSE CHEMICAL PNEUMONITIS. MAY CAUSE RESPIRATORY IRRITATION. INHALATION OF HIGH VAPOR CONCENTRATIONS MAY CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION. PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE DERMATITIS.

HUMAN THRESHOLD RESPONSE DATA
ODOR THRESHOLD: No Data
IRRITATION THRESHOLD: No Data
IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: No IDLH concentration has been established for this product.

SIGNS, SYMPTOMS, AND EFFECTS OF EXPOSURE:
INHALATION
ACUTE:
If inhaled, may cause irritation to the upper respiratory tract. Any irritation would be transient with no permanent damage expected. Inhalation of high concentrations may produce CNS depression, characterized by: headache, dizziness, weakness, drowsiness, fatigue, narcosis, tremors, impaired short term memory, mental confusion, nausea, vomiting and GI discomfort.

Inhalation of concentrations of xylene significantly above the TLV may sensitize the heart muscle resulting in cardiac arrhythmia. The face may appear flushed and reddened and there may be a feeling of increased body heat due to dilation of blood vessels in the skin.

CHRONIC:

Chronic exposure may result in labored breathing and impaired pulmonary function as well as respiratory tract irritation and inflammation. Studies also suggest that liver and kidney damage may occur after exposures to elevated levels. Anemia may result with hyperplasia of the bone marrow.

SKIN

ACUTE:

Skin contact may produce slight to moderate irritation consisting of transient redness and drying of the contacted area. This irritant effect would not result in permanent damage.

CHRONIC:

Prolonged or repeated skin contact may cause defatting leading to dermatitis.

EYE

Contact with the eyes would be expected to cause irritation consisting of tearing, itching, painful stinging or burning or eyes and lids, redness, swelling, and mucous discharge to the conjunctiva. Contact with the eyes may cause corneal clouding (opaqueness of cornea) which may result in permanent eye damage leading to loss of sight.

INGESTION

ACUTE:

Ingestion may cause gastrointestinal discomfort with any or all of the following symptoms: nausea, vomiting, lethargy, or diarrhea. If significant quantities are ingested, may cause C.N.S depression with symptoms similar to those listed under acute inhalation exposure.

Ingestion may lead also to aspiration of isoparaffinic hydrocarbons (Stoddard solvent) into the lungs. Aspiration may cause pulmonary edema, congestion and chemical pneumonitis.

CHRONIC:

There are no known or reported effects from chronic exposure except for effects similar to those experienced from single exposure. Based on the potential acute effects from aspiration of this product, repeated ingestion should be avoided.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Skin contact may aggravate an existing dermatitis. Persons with anemia, liver, kidney, nervous system or respiratory disorders may be more susceptible to the effects of this product.

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MATERIAL SAFETY DATA

INTERACTIONS WITH OTHER CHEMICALS WHICH ENHANCE TOXICITY:
None known or reported

ANIMAL TOXICOLOGY
ACUTE TOXICITY:
Inhalation LC 50: No Data
Dermal LD 50: Believed to be > 2g/kg. (rabbit), based on constituents
Oral LD 50: Believed to be 4.5-5 g/kg. (rat), based on constituents
Irritation: Eye and mucous membrane irritant; respiratory and skin irritant

ACUTE TARGET ORGAN TOXICITY:
Isoparaffinic hydrocarbons have caused slight effects to the skin and eyes (mild irritation) in laboratory animals. Irritation of the eyes, mucous membranes, skin and respiratory tract may result from contact with liquid or vapor containing xylene. At high vapor concentrations, these compounds may cause central nervous system (CNS) depression.

CHRONIC TARGET ORGAN TOXICITY:
Inhalation, ingestion, or dermal contact of significant amounts of this product may cause C.N.S. depression. May cause liver, kidney and blood damage.

REPRODUCTIVE AND DEVELOPMENTAL TOXICITY:
This product is not known or reported to effect reproductive function or fetal development.

Inhalation of isoparaffinic hydrocarbons by pregnant rats at concentrations up to 900 ppm in air showed these compounds were not teratogenic (cause birth defects) or fetotoxic.

The relevant routes of industrial exposure to this product are through inhalation and dermal contact. Xylene has been tested in laboratory animals using the inhalation and dermal routes of exposure. Xylene was found not to produce any reproductive and developmental effects at non-maternally toxic doses. However, through oral administration to CD-1 mice, mixed xylene isomers (contaminated with 17% ethylbenzene) was reported to produce fetotoxicity and embryotoxicity, cleft palate and wavy ribs at a dose producing minimal toxicity in the dams. Cleft

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palate and wavy ribs are two types of spontaneous malformations commonly found in CD-1 mice. Under normal industrial uses and practices, xylene is not considered to be a reproductive or developmental hazard.

CARCINOGENICITY:

This product is not known or reported to be carcinogenic by any reference source, including: IARC, OSHA, NTP or EPA.

Xylenes have been tested by NTP for carcinogenicity in rats and mice by the oral route of exposure. There was no evidence of carcinogenicity of xylenes for either male or female rats and mice. Xylenes have also been tested in a skin painting study in rats and produced no evidence of carcinogenicity. IARC has evaluated several carcinogenicity studies conducted on laboratory animals using xylenes. IARC has classified xylenes as having inadequate evidence for carcinogenicity to humans and animals. IARC therefore considered xylenes to be not classifiable as to its carcinogenicity to humans.

MUTAGENICITY:

This product is not known or reported to be mutagenic.

Xylenes and its components (o-xylene, m-xylene, p-xylene or ethylbenzene) have been tested in a battery of in vivo and in vitro mutagenicity and genotoxicity assays and test systems. Based on these studies, the weight of evidence suggests that exposure to xylenes and its components does not pose a mutagenic or genotoxic hazard.

AQUATIC TOXICITY:

No data available for mixture. Individual constituents are as follows:

Xylene:

Fathead minnow, 96 hr. LC50 (measured, flow-through): 13.4 mg/l
Rainbow trout, 96 hr. LC50 (nominal): 13.5-17.3 mg/l
Daphnia magna, 24 hr. LC50 (nominal, static): 150 mg/l
Bluegill, 96 hr. LC50 (measured, static): 24.5 mg/l
Bluegill, 96 hr. LC50 (measured, flow-through): 15.7 mg/l

Ethyl benzene:

Daphnia magna, 48 hr. LC50 (nominal, static): 75 mg/l
Fathead minnow, 96 hr. LC50 (measured, flow-through): 9.1-12.1 mg/l

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MATERIAL SAFETY DATA

X. TRANSPORTATION INFORMATION

THIS MATERIAL IS REGULATED AS A DOT HAZARDOUS MATERIAL.

DOT DESCRIPTION FROM THE HAZARDOUS MATERIALS TABLE 49 CFR 172.101:
LAND (U.S. DOT): FLAMMABLE LIQUID N.O.S., (CONTAINS XYLENE, ETHYL BENZENE) 3, UN1993, PG III

WATER (IMO): FLAMMABLE LIQUID N.O.S., (CONTAINS XYLENE, ETHYL BENZENE) 3.3, UN1993, PG III

AIR (IATA/ICAO): SAME AS LAND

HAZARD LABEL/PLACARD: FLAMMABLE LIQUID
REPORTABLE QUANTITY: 100 lbs. as xylene (Per 49 CFR 172.101, Appendix)
EMERGENCY GUIDE NO: 27

XI. SPILL AND LEAKAGE PROCEDURES

FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC AT 800-424-9300.

REPORTABLE QUANTITY: 1000 lbs. Xylene/ethyl benzene (Per 40 CFR 302.4)

SPILL MITIGATION PROCEDURES:
Evacuation procedures must be placed into effect. Hazardous concentrations in air may be found in local spill area and immediately downwind. This product may represent an explosion hazard in confined spaces when mixed with air. Remove all sources of ignition.

AIR RELEASE: Vapors may be suppressed by the use of water fog. Contain all liquid for treatment and/or disposal as a (potential) hazardous waste.

WATER RELEASE: This material is lighter than and insoluble in water. Notify all downstream users of possible contamination. Divert water flow around spill if possible and safe to do so. If unable to divert, create an underflow dam to contain material.

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LAND SPILL: Create a dike or trench to contain materials. Spill materials may be absorbed using non-flammable absorbant. Do not place spill materials back in their original containers. Containerize and label all spill materials properly. Decontaminate all clothing and the spill area using detergent and flush with large amounts of water.

SPILL RESIDUES:
Dispose of per guidelines under Section XII, WASTE DISPOSAL.

PERSONAL PROTECTION FOR EMERGENCY SPILL AND FIRE-FIGHTING SITUATIONS:
Additional respiratory protection is necessary when a spill or fire involving this product occurs. You are recommended to use a NIOSH/ MSHA approved positive pressure supplied-air respirator.

Additional protective clothing must be worn to prevent personal contact with this material. Those items include but are not limited to: boots, gloves, hard hat and splash-proof goggles.

Protective concerns must also address the potential of the physical charac teristic of this product as flammable.

XII. WASTE DISPOSAL

If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waste number: D001.

If this product becomes a waste, it will be a hazardous waste which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.

As a hazardous liquid waste, it must be disposed of in accordance with local, state and federal regulations in a permitted hazardous waste treatment, storage and disposal facility by incineration.

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.

XIII. ADDITIONAL REGULATORY STATUS INFORMATION

TOXIC SUBSTANCES CONTROL ACT:
The components of this product are listed on the Toxic Substance Control Act inventory.

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MATERIAL SAFETY DATA

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT TITLE III:
HAZARD CATEGORIES, PER 40 CFR 370.2:
HEALTH:
Immediate (Acute)
Delayed (Chronic)
PHYSICAL:
Fire

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW, PER 40 CFR 355, APP.A:
EXTREMELY HAZARDOUS SUBSTANCE - THRESHOLD PLANNING QUANTITY:
None Established

SUPPLIER NOTIFICATION REQUIREMENTS, PER 40 CFR 372.45:
This mixture or tradename product contains 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.

CHEMICALS LISTED ARE: Mixed Xylenes, Ethylbenzene

XIV. ADDITIONAL INFORMATION

MSDS REVISION STATUS: Transportation Information and References Revised

XV. MAJOR REFERENCES

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3. Zeiger, E., et al., 1987. Salmonella Mutagenicity Tests: III. Results from the Testing of 255 Chemicals. Environmental Mutagenesis. Journal of the Environmental Mutagen Society, Volume 9, Supplement 9:1-110. Alan R. Liss, Inc. NY.
4 Ungvary, Gyorgy, et al., Studies on the Embryotoxic Effects of ortho-, meta-, and para-Xylene. Toxicology, 18, 1980, pp. 61-74.
5. American Industrial Hygiene Association. Odor Thresholds for Chemicals with Established Occupational Health Standards. Akron, OH. 1989.

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13. Shepard, Thomas H., Catalog of Teratogenic Agents, 6th Edition, The Johns Hopkins University Press, Baltimore, MD, 1989.
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15. Toxicological Profile for Total Xylenes, Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1989.
16. Carpenter, C.P., et al., Petroleum Hydrocarbon Toxicity Studies. V. Animal and Human Responses to Vapors of Mixed Xylenes. Toxicology and Applied Pharmacology, Vol. 33, pp, 543-558, 1975.
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MATERIAL SAFETY DATA

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. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. OLIN BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MATERIAL SAFETY DATA SHEET IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT OLIN AT THE PHONE NUMBER LISTED BELOW TO MAKE CERTAIN THAT THIS SHEET IS CURRENT.

OLIN MSDS CONTROL GROUP
Olin Corporation
120 Long Ridge Road
Stamford, CT 06904

Phone Number: (203) 356-3449

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