SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Product identifier

Product name: Biphenyl, Flake

Product No.: P3410702

Additional identification

Chemical name:	biphenyl
CAS-No.:	92-52-4

Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Chemical Intermediate, Heat transfer fluids

Uses advised against: None known.

Details of the supplier of the safety data sheet

Manufacturer / Supplier

Eastman Chemical Company
200 South Wilcox Drive
Kingsport, TN 37660-5280 US
+14232292000

Visit our website at www.EASTMAN.com or email emnmsds@eastman.com

Emergency telephone number:

For emergency health, safety, and environmental information, call 1-423-229-4511 or 1-423-229-2000.

For emergency transportation information, in the United States: call CHEMTREC at 800-424-9300 or call 423-229-2000.

SECTION 2: Hazards identification

Hazard Classification:

Health Hazards

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2A
Specific Target Organ Toxicity - Single Exposure	Category 3

OSHA Specified Hazards:

Combustible dust	If converted to small particles during further processing, handling or by other means may form combustible dust concentrations in air.

Warning label items including precautionary statement:

Pictogram:

Signal Words: Warning

Hazard Statement(s):
H315: Causes skin irritation.
H319: Causes serious eye irritation.
H335: May cause respiratory irritation.
If converted to small particles during further processing, handling or by other means may form combustible dust concentrations in air.

Precautionary Statement:

Prevention:
P261: Avoid breathing dust/fume/gas/mist/vapors/spray.
P264: Wash thoroughly after handling.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response:
P302+P352: IF ON SKIN: Wash with plenty of water.
P332+P313: If skin irritation occurs: Get medical advice/attention.
P362+P364: Take off contaminated clothing and wash it before reuse.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313: If eye irritation persists: Get medical advice/attention.
P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312: Call a POISON CENTER/doctor if you feel unwell.

Storage:
P403+P233: Store in a well-ventilated place. Keep container tightly closed.
P405: Store locked up.

Disposal:
P501: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Hazard(s) not otherwise classified (HNOC): No data available.

SECTION 3: Composition/information on ingredients

Substances / Mixtures

General information:

Chemical name	Concentration	Additional identification	Notes
diphenyl	100%	CAS-No.: 92-52-4	#

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
# This substance has workplace exposure limit(s).

SECTION 4: First aid measures

General: Get medical attention if symptoms occur. Show this safety data sheet to the doctor in attendance. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Place unconscious person on the side in the recovery position and ensure breathing can take place. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Description of first aid measures

Inhalation: Move into fresh air and keep at rest. For breathing difficulties, oxygen may be necessary. Consult a physician for specific advice. Persons who have inhaled vapours or smoke fumes have to be put under medical observation for at least 48 hours, due to the delayed appearance of poisoning.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention if symptoms occur.

Skin Contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Ingestion: If swallowed, rinse mouth with water (only if the person is conscious). Do not induce vomiting unless directed to do so by medical personnel. Never give liquid to an unconscious person. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Provide fresh air, warmth and rest, preferably in comfortable upright sitting position. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms and effects, both acute and delayed: May cause skin and eye irritation. May cause respiratory irritation.

Indication of any immediate medical attention and special treatment needed

Hazards: Contact with hot material can cause thermal burns which may result in permanent damage.

Treatment: Treat symptomatically.

SECTION 5: Firefighting measures

General Fire Hazards: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. Keep upwind. In case of fire and/or explosion do not breathe fumes. Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or grounding procedures.

Extinguishing media

Suitable extinguishing media: Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media: Avoid water in straight hose stream; will scatter and spread fire.

Special hazards arising from the substance or mixture:	May ignite at high temperature. During fire, gases hazardous to health may be formed. Risk of chemical pneumonia after aspiration. Hazardous combustion products : carbon dioxide, carbon monoxide , soot . Powdered material may form explosive dust-air mixtures.

Advice for firefighters

Special fire fighting procedures:	In case of fire: Evacuate area. Move container from fire area if it can be done without risk. Use water spray to keep fire-exposed containers cool. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Special protective equipment for fire-fighters:	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures:	No action shall be taken involving any personal risk or without suitable training. Keep unauthorized personnel away. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Avoid breathing dust. Avoid contact with eyes, skin, and clothing. Ventilate closed spaces before entering them. Do not touch or walk through spilled material. Wear appropriate personal protective equipment. See Section 8 of the SDS for Personal Protective Equipment.
Environmental Precautions:	Prevent further leakage or spillage if safe to do so. Clear up spills immediately and dispose of waste safely. Do not contaminate water sources or sewer.
Methods and material for containment and cleaning up:	Small Spillages: Remove small spills with vacuum cleaner. Collect in containers and seal securely. Large Spillages: Eliminate sources of ignition. Cover powdered spills with plastic sheet or tarpaulin to minimize spreading and protect from water. Sweep up and place in a clearly labeled container for chemical waste. Collect spillage in containers, seal securely and deliver for disposal according to local regulations. Clean surface thoroughly to remove residual contamination.
Notification Procedures:	In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

SECTION 7: Handling and storage:

Precautions for safe handling:

Do not handle until all safety precautions have been read and understood. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Avoid heat, sparks, open flames and other ignition sources. An eye wash bottle must be available at the work site. Wear appropriate personal protective equipment. See Section 8 of the SDS for Personal Protective Equipment. Do not taste or swallow. Do not breathe mist or vapor from heated material. In case of inadequate ventilation, use respiratory protection. Do not get in eyes and avoid contact with skin and clothing. Wash promptly with soap and water if skin becomes contaminated. Remove contaminated clothing and wash it before reuse. Destroy or thoroughly clean contaminated shoes. Drain or remove substance from equipment prior to break-in or maintenance. Handle in accordance with good industrial hygiene and safety practice. See also Section 8 for additional information on hygiene measures. Minimize dust generation and accumulation.

Conditions for safe storage, including any incompatibilities:

Store in a cool, dry place out of direct sunlight. Keep container tightly closed and in a well-ventilated place. Keep in original container. Store locked up. Store away from incompatible materials. Keep away from food, drink and animal feeding stuffs. Store in accordance with local/regional/national/international regulations.

Specific end use(s):

www.processfluid.com

SECTION 8: Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Country specific exposure limits have not been established or are not applicable unless listed below.

Chemical name	type	Exposure Limit Values	Source
biphenyl	TWA	0.2 ppm	US. ACGIH Threshold Limit Values (01 2010)
	PEL	0.2 ppm 1 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)

Exposure controls

Appropriate engineering controls:

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

General information:

An eye wash bottle must be available at the work site. Provide access to washing facilities including soap, skin cleanser and fatty cream.

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. Recommendations: Wear safety glasses with side shields (or goggles). Use safety goggles and face shield in case of splash risk.

Skin protection

Hand Protection: It is a good industrial hygiene practice to minimize skin contact. If prolonged or repeated contact is likely, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. After contamination with product change the gloves immediately and dispose of them according to relevant national and local regulations. When material is heated, wear gloves to protect against thermal burns.

Other: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommendations: Apron or other light protective clothing and boots. If prolonged or repeated contact is likely, chemical resistant clothing is recommended. Promptly remove non-impervious clothing that becomes wet or contaminated.

Respiratory Protection: Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using the product. Wash at the end of each work shift and before eating, smoking and using the toilet. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse. Keep away from food, drink and animal feeding stuffs.

Environmental Controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels. Do not contaminate water sources or sewer.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance

Physical state:	solid
Form:	Flake
Color:	White
Odor:	Aromatic
Odor Threshold:	No data available.
pH:	No data available.
Melting Point	69 °C
Boiling Point:	255 °C (1,013 hPa)
Flash Point:	113 °C
Evaporation Rate:	No data available.
Flammability (solid, gas):	This product is not flammable.
Flammability Limit - Upper (%)–:	5.6 %(V)
Flammability Limit - Lower (%)–:	0.6 %(V)
Vapor pressure:	1.19 Pa (25 °C)
Vapor density (air=1):	No data available.
Specific Gravity:	1.04 (20 °C)
Solubility(ies)	
Solubility in Water:	7.35 mg/l (25 °C)
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	log Pow: 4.09
Autoignition Temperature:	540 °C (ASTM E659)
Decomposition Temperature:	No data available.
Dynamic viscosity:	No data available.
Kinematic viscosity:	0.98 mm2/s (100 °C) | 0.43 mm2/s (200 °C) | 0.24 mm2/s (300 °C)
Explosive properties:	Not classified.
Oxidizing properties:	Not classified.

Other information

Dust Explosion Description Number Kst:	221 m.b_/s
Minimum ignition energy:	3 - 10 mJ

SECTION 10: Stability and reactivity

Reactivity:	Material is stable under normal conditions.
Chemical Stability:	Material is stable under normal conditions.
Possibility of Hazardous Reactions:	None under normal conditions.
Conditions to Avoid:	Heating in air. Heat, sparks, flames. Avoid conditions which create dust.
Incompatible Materials:	Strong oxidizing agents.
Hazardous Decomposition Products:	Emits acrid smoke and fumes when heated to decomposition.

SECTION 11: Toxicological information

Information on likely routes of exposure

Inhalation: May cause respiratory irritation.

Ingestion: No data available.

Skin Contact: Causes skin irritation.

Eye contact: Causes serious eye irritation.

Information on toxicological effects

Oral

Product: Oral LD-50: (Rat): 2,180 - 5,040 mg/kg Not classified.

Dermal

Product: Dermal LD-50: (rabbit): > 5,010 mg/kg

Inhalation

Product: LC50 (Rat, Male and Female, 1 h): 3.47 mg/l Not classified.

Repeated dose toxicity

Product: NOAEL (Rat(Male and Female), in feed): 38 mg/kg (Target Organ(s): Kidney, Liver, Urinary bladder)
NOAEL (Rabbit, Dermal): > 2,000 mg/kg No information about adverse effects due to exposure.

Skin Corrosion/Irritation

Product: (Rabbit, 24 h): Slightly irritating.
(Human): Strongly irritating.

Serious Eye Damage/Eye Irritation

Product: (Rabbit): Slightly irritating.
(Human): Strongly irritating.

Respiratory or Skin Sensitization

Product: Skin Sensitization: (Guinea Pig): non-sensitizing

Carcinogenicity

Product: Rat, Male and Female: Ingestion ; OECD Test No. 453: Combined Chronic Toxicity/Carcinogenicity Studies; Remarks: Expert judgment and weight of evidence determination: Not classified
This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.

Toxicity to reproduction

Product: (Rat, Male and Female); NOAEL: 40 mg/kg; Ingestion; Remarks: There is no evidence to indicate potential for adverse reproductive effects in humans.

Developmental toxicity

Product: Rat; NOAEL: 500 mg/kg; NOAEL: 500 mg/kg; Gavage (Oral); OECD Test No. 414: Prenatal Developmental Toxicity Study

Germ Cell Mutagenicity

In vitro

Product: Salmonella typhimurium assay (Ames test) (Bacterial Reverse Mutation Assay): negative
Mutagenicity - Mammalian (In vitro Mammalian Cell Gene Mutation Test): positive
Mutagenicity - Mammalian (In vitro Mammalian Cell Gene Mutation Test): negative

In vivo

Product: Mutagenicity - Mammalian (Mammalian Erythrocyte Micronucleus Test) (Mouse): negative
Mutagenicity - Mammalian (Mammalian Bone Marrow Chromosome Aberration Test) (Rat): negative

Specific Target Organ Toxicity - Single Exposure

Product: Inhalation: Respiratory system - Irritating to respiratory system.

Specific Target Organ Toxicity - Repeated Exposure

Product: Kidney, Liver, Urinary bladder - Not classified.

Aspiration Hazard

Product: not applicable

Other effects: No data available.

SECTION 12: Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product: EC-50 (Fathead Minnow, 96 h): 3 mg/l

Aquatic Invertebrates

Product: EC-50 (Daphnia magna, 48 h): 0.36 mg/l

Chronic hazards to the aquatic environment:

Fish

Product: NOEC (Oncorhynchus mykiss, 96 d): 0.229 mg/l

Aquatic Invertebrates

Product: NOEC (Daphnia magna, 21 d): 0.17 mg/l

Toxicity to Aquatic Plants

Product: EC-50 (Alga, 72 h): 1.3 mg/l
NOEC (Alga, 72 h): 0.66 mg/l

Persistence and Degradability

Biodegradation

Product: Readily biodegradable

BOD/COD Ratio

Product: No data available.

Bioaccumulative Potential

Bioconcentration Factor (BCF)

Product: Bioconcentration Factor (BCF): 1,900

Partition Coefficient n-octanol / water (log Kow)

Product: Log Kow: 4.09

Mobility in Soil: No data available.

Known or predicted distribution to environmental compartments

biphenyl: soil - Log Koc: 3.19 (OECD Test No. 106: Adsorption - Desorption Using a Batch Equilibrium Method)

Other Adverse Effects: No data available.

SECTION 13: Disposal considerations

Waste treatment methods

General information: The generation of waste should be avoided or minimized wherever possible. Dispose of waste and residues in accordance with local authority requirements.

Disposal methods: This material when discarded may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Act (RCRA), 40 CFR 261.24, due to its toxicity characteristic. This material should be analyzed in accordance with Method 1311 for the compound D018 BENZENE. Consult 40 CFR 268.40 or appropriate local regulations for concentration based standards. Do not allow to enter drains, sewers or watercourses.

Since emptied containers retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14: Transport information

Important Note: Shipping descriptions may vary based on mode of transport, quantities, package size, and/or origin and destination. Consult your company's Hazardous Materials/Dangerous Goods expert for information specific to your situation.

DOT

Class 9, Packing Group III when material is shipped in quantities in one package at or above the Reportable Quantity and when no other hazard class applies; otherwise, not regulated.

Reportable Quantity: 45.4 kg (biphenyl)
Marine pollutant.: diphenyl
Possible Shipping Description(s):

UN 3077 Environmentally hazardous substances, solid, n.o.s. (biphenyl) 9 III

IMDG - International Maritime Dangerous Goods Code

Marine pollutant.: (diphenyl)

Possible Shipping Description(s):

UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (biphenyl)
9 III

IATA

Possible Shipping Description(s):

UN 3077 Environmentally hazardous substance, solid, n.o.s. (biphenyl) 9 III

SECTION 15: Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture.:

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.
WHMIS (Canada) Status: controlled
WHMIS (Canada) Hazard Classification: D/2/B

SARA 311-312 Hazard Classification(s):
immediate (acute) health hazard
delayed (chronic) health hazard

US EPCRA (SARA Title III) Section 313 - Toxic Chemical List
BIPHENYL 100%

OSHA: hazardous

TSCA (US Toxic Substances Control Act): This product is listed on the TSCA inventory. Any impurities present in this product are exempt from listing.

DSL (Canadian Domestic Substances List) and CEPA (Canadian Environmental Protection Act): This product is listed on the DSL. Any impurities present in this product are exempt from listing.

AICS / NICNAS (Australian Inventory of Chemical Substances and National Industrial Chemicals Notification and Assessment Scheme): This product is listed on AICS or otherwise complies with NICNAS.

MITI (Japanese Handbook of Existing and New Chemical Substances): This product is listed in the Handbook or has been approved in Japan by new substance notification.

ECL (Korean Toxic Substances Control Act): This product is listed on the Korean inventory or otherwise complies with the Korean Toxic Substances Control Act.

Philippines Inventory (PICCS) : This product is listed on the Philippine Inventory or otherwise complies with PICCS.

Inventory of Existing Chemical Substances in China: All components of this product are listed on the Inventory of Existing Chemical Substances in China (IECSC).

SECTION 16: Other information

HMIS® Hazard Ratings: Health - 2, Flammability - 1, Chemical Reactivity - 0

HMIS® rating involves data interpretations that may vary from company to company. They are intended only for rapid, general identification of the magnitude of the specific hazard. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be considered.

Revision Information:	Not relevant.
Key literature references and sources for data:	www.processfluid.com
Training information:	No data available.
Issue Date:	05/04/2015
SDS No.:	
Disclaimer:	This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.