

MATERIAL SAFETY DATA SHEET

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Version 1.10

Section 1 - Product and Company Information

Product Name PHENOL, LOOSE CRYSTALS, 99+%, A.C.S.
REAGENT
Product Number 242322
Brand SIAL
Company Sigma-Aldrich
Address 3050 Spruce Street
SAINT LOUIS MO 63103 US
Technical Phone: 800-325-5832
Fax: 800-325-5052
Emergency Phone: 314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
PHENOL	108-95-2	Yes

Formula C6H6O
Synonyms Acide carbolique (French) * Baker's P and S
Liquid and Ointment * Benzenol * Carbolic acid *
Carbolsaure (German) * Fenol (Dutch, Polish) *
Fenolo (Italian) * Hydroxybenzene *
Monohydroxybenzene * Monophenol * NCI-C50124 *
Oxybenzene * Phenic acid * Phenol (ACGIH:OSHA) *
Phenol alcohol * Phenole (German) * Phenyl
hydrate * Phenyl hydroxide * Phenylic acid *
Phenylic alcohol * RCRA waste number U188
RTECS Number: SJ3325000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Toxic.

Toxic by inhalation, in contact with skin and if swallowed. Causes burns. Harmful: danger of serious damage to health by prolonged exposure through inhalation in contact with skin, and if swallowed. Possible risk of irreversible effects.

Vesicant. Readily absorbed through skin. Target organ(s): Central nervous system. Kidneys.

HMIS RATING

HEALTH: 3*

FLAMMABILITY: 2

REACTIVITY: 0

NFPA RATING

HEALTH: 3

FLAMMABILITY: 2

REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

INHALATION EXPOSURE

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

DERMAL EXPOSURE

In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE

Assure adequate flushing of the eyes by separating the eyelids with fingers.

Section 5 - Fire Fighting Measures

FLASH POINT

174.2 °F 79 °C Method: closed cup

EXPLOSION LIMITS

Lower: 1.7 % Upper: 8.6 %

AUTOIGNITION TEMP

715 °C

FLAMMABILITY

N/A

EXTINGUISHING MEDIA

Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP

Cover with dry lime or soda ash, pick up, keep in a closed container, and hold for waste disposal. Avoid raising dust.

Section 7 - Handling and Storage

HANDLING

User Exposure: Do not breathe vapor. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep tightly closed. Keep away from heat and open flame. Handle and store under nitrogen.

SPECIAL REQUIREMENTS

Handle and store under inert gas. Light sensitive.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS

Safety shower and eye bath. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Other: Wear appropriate government approved respirator, chemical-resistant gloves, safety goggles, other protective clothing.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Wash contaminated clothing before reuse.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	5 PPM
Remarks: Skin			
USA	MSHA Standard-air	TWA	5 PPM (19 MG/M3) (SKIN)
USA	OSHA.	PEL	8H TWA 5 PPM (19 MG/M3) (SKIN)
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	5 PPM (SK)
		Ceiling	15.6 PPM/15M (SK)

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	7.8 MG/M3
Poland		NDSch	-
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance	Physical State: Solid	
Property	Value	At Temperature or Pressure
Molecular Weight	94.11 AMU	
pH	6	
BP/BP Range	182 °C	760 mmHg
MP/MP Range	40.0 - 42.0 °C	
Freezing Point	N/A	
Vapor Pressure	0.36 mmHg	20 °C
Vapor Density	3.24 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	1.071 g/cm3	
Bulk Density	N/A	

Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	3.437 Pas	50 °C
Surface Tension	38.2 mN/m	50 °C
Partition Coefficient	Log Kow: 1.46	
Decomposition Temp.	N/A	
Flash Point	174.2 °F 79 °C	Method: closed cup
Explosion Limits	Lower: 1.7 % Upper: 8.6 %	
Flammability	N/A	
Autoignition Temp	715 °C	
Refractive Index	1.5408	41 °C
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Stable: Stable.

Conditions of Instability: May discolor on exposure to light.

Materials to Avoid: Strong oxidizing agents, Strong bases, Strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE

Skin Contact: Causes burns. Causes blisters on contact with skin.

Skin Absorption: Toxic if absorbed through skin. Readily absorbed through skin.

Eye Contact: Causes burns.

Inhalation: Toxic if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

Ingestion: Toxic if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

Spleen. Pancreas. Liver. Kidneys. Central nervous system.

SIGNS AND SYMPTOMS OF EXPOSURE

Ingestion can cause circulatory collapse, tachypnea, paralysis, convulsions, coma, necrosis of mouth and G.I. tract, jaundice, death from respiratory failure, sometimes from cardiac arrest.

Exposure can cause: Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

CONDITIONS AGGRAVATED BY EXPOSURE

May cause nervous system disturbances.

TOXICITY DATA

Oral

Rat

410.0 - 650.0 mg/kg

LD50

8 H

Inhalation

Rat

900 mg/m3

LC50

Skin

Rabbit

*

LD50

Oral

Infant

10 mg/kg

LDLO

Remarks: Behavioral:Muscle weakness. Lungs, Thorax, or
Respiration:Cyanosis.

Oral

Human

14000 mg/kg

LDLO

Remarks: Behavioral:Muscle weakness. Lungs, Thorax, or
Respiration:Cyanosis.

Oral

Human

140 mg/kg

LDLO

Remarks: Behavioral:Hallucinations, distorted perceptions. Skin
and Appendages: Other: Sweating.

Oral

Rat

317 mg/kg

LD50

Remarks: Behavioral:Convulsions or effect on seizure threshold.

Inhalation

Rat

316 mg/m3

LC50

Skin

Rat

669 mg/kg

LD50

Remarks: Behavioral:Tremor. Kidney, Ureter, Bladder:Hematuria.
Skin and Appendages:Skin: After topical exposure: Cutaneous
sensitization (experimental).

Intraperitoneal

Rat

127 MG/KG

LD50

Subcutaneous
Rat
460 MG/KG
LD50

Oral
Mouse
270 mg/kg
LD50

Inhalation
Mouse
177 mg/m3
LC50

Intraperitoneal
Mouse
180 MG/KG
LD50

Subcutaneous
Mouse
344 MG/KG
LD50

Intravenous
Mouse
112 MG/KG
LD50
Remarks: Behavioral:Tremor.

Skin
Rabbit
630 mg/kg
LD50

Oral
Mammal
500 mg/kg
LD50

IRRITATION DATA

Skin
Rabbit
500 mg
24H
Remarks: Severe irritation effect

Skin
Rabbit
535 mg
Remarks: Open irritation test

Skin
Rabbit
100 mg
Remarks: Mild irritation effect

Eyes

Rabbit
5 mg
Remarks: Severe irritation effect

Eyes
Rabbit
5 mg
30S
Remarks: Rinsed

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

Species: Mouse
Route of Application: Skin
Dose: 16 GM/KG
Exposure Time: 40W
Frequency: I
Result: Skin and Appendages: Other: Tumors.
Tumorigenic: Carcinogenic by RTECS criteria.

Species: Mouse
Route of Application: Skin
Dose: 4000 MG/KG
Exposure Time: 24W
Frequency: I
Result: Skin and Appendages: Other: Tumors.
Tumorigenic: Neoplastic by RTECS criteria.

IARC CARCINOGEN LIST

Rating: Group 3

NTP CARCINOGEN LIST

Rating: No evidence.
Species: Mouse/rat
Route: Oral

ACGIH CARCINOGEN LIST

Rating: A4

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 1200 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat
Dose: 600 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (12-14D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse

Dose: 2600 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse
Dose: 4 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse
Dose: 2800 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

CHRONIC EXPOSURE - MUTAGEN

Result: May alter genetic material.

Species: Human
Dose: 17 MG/L
Cell Type: HeLa cell
Mutation test: Other mutation test systems

Species: Human
Dose: 1 MMOL/L
Cell Type: HeLa cell
Mutation test: DNA inhibition

Species: Human
Dose: 5 UMOL/L
Cell Type: lymphocyte
Mutation test: Other mutation test systems

Species: Human
Dose: 5 UMOL/L
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Rat
Route: Oral
Dose: 4 GM/KG
Mutation test: Unscheduled DNA synthesis

Species: Mouse
Route: Oral
Dose: 265 MG/KG
Mutation test: Micronucleus test

Species: Mouse
Route: Intraperitoneal
Dose: 265 MG/KG
Mutation test: Micronucleus test

Species: Mouse
Dose: 300 MG/L (+S9)
Cell Type: lymphocyte

Mutation test: Mutation in microorganisms

Species: Mouse
Dose: 1500 UMOL/L
Cell Type: lymphocyte
Mutation test: DNA damage

Species: Mouse
Route: Oral
Dose: 20 GM/KG
Mutation test: DNA inhibition

Species: Mouse
Dose: 800 UMOL/L
Cell Type: lymphocyte
Mutation test: DNA inhibition

Species: Mouse
Dose: 2500 UMOL/L
Cell Type: Other cell types
Mutation test: Other mutation test systems

Species: Mouse
Dose: 1890 UMOL/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster
Dose: 4 MMOL/L
Cell Type: lung
Mutation test: Micronucleus test

Species: Hamster
Dose: 175 MG/L
Cell Type: ovary
Mutation test: Micronucleus test

Species: Hamster
Dose: 10 UMOL/L
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Hamster
Dose: 3 UMOL/L
Cell Type: Embryo
Mutation test: Unscheduled DNA synthesis

Species: Hamster
Dose: 1900 UMOL/L
Cell Type: lung
Mutation test: DNA inhibition

Species: Hamster
Dose: 2 GM/L
Cell Type: ovary
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 100 UMOL/L
Cell Type: Embryo
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 300 MG/L
Cell Type: ovary
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 1 MMOL/L
Cell Type: Embryo
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 3 MMOL/L
Cell Type: Embryo
Mutation test: Mutation in mammalian somatic cells.

Species: Mammal
Dose: 250 MMOL/L
Cell Type: lymphocyte
Mutation test: DNA damage

Species: Rabbit
Dose: 250 UMOL/L
Cell Type: Bone marrow
Mutation test: Other mutation test systems

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 300 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 3600 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Other effects. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat
Dose: 1200 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Other effects.

Species: Mouse
Dose: 2300 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetal death. Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 24 h

Value: 12 mg/l

Test Type: EC100 Daphnia
Species: Daphnia magna
Time: 24 h
Value: 100 mg/l

Test Type: LC50 Fish
Species: Leuciscus idus
Time: 48 h
Value: 14.0 - 25.0 mg/l

Test Type: LC50 Fish
Species: Carassius auratus (Goldfish)
Time: 96 h
Value: 36.1 - 68.8 mg/l

Test Type: EC50 Algae
Species: Chlorella vulgaris
Time: 96 h
Value: 370 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber.

Section 14 - Transport Information

DOT

Proper Shipping Name: Phenol, solid
UN#: 1671
Class: 6.1
Packing Group: Packing Group II
Hazard Label: Toxic substances.
PIH: Not PIH

IATA

Proper Shipping Name: Phenol, solid
IATA UN Number: 1671
Hazard Class: 6.1
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION

Symbol of Danger: T-C
Indication of Danger: Toxic. Corrosive.
R: 23/24/25-34-48/20/21/22-68
Risk Statements: Toxic by inhalation, in contact with skin and if swallowed. Causes burns. Harmful: danger of serious damage to health by prolonged exposure through inhalation in contact with skin, and if swallowed. Possible risk of irreversible effects.
S: 24/25-26-28-36/37/39-45
Safety Statements: Avoid contact with skin and eyes. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of soap-suds. Wear suitable protective clothing,

gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Toxic.

Risk Statements: Toxic by inhalation, in contact with skin and if swallowed. Causes burns. Harmful: danger of serious damage to health by prolonged exposure through inhalation in contact with skin, and if swallowed. Possible risk of irreversible effects.

Safety Statements: Avoid contact with skin and eyes. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of soap-suds. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US Statements: Vesicant. Readily absorbed through skin. Target organ(s): Central nervous system. Kidneys.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes

DEMINIMIS: 1 %

NOTES: This product is subject to SARA section 313 reporting requirements.

TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.