

**MATERIAL SAFETY DATA SHEET****PHENOL**

PRODUCT CODE NUMBER(S): 5520-1; 5521-1; 5522-1

**PRODUCT IDENTIFICATION****Chemical Name and Synonyms:** Phenol; Benzenol; Carboic acid, Phenyl acid, Phenyl hydroxide; Phenyl alcohol**Chemical Family:** Phenol, aromatic alcohol**Chemical Formula:** C<sub>6</sub>H<sub>5</sub>OH**Product Use:** Laboratory reagent**Manufacturer's Name and Address:**Caledon Laboratories Ltd.  
40 Armstrong Avenue  
Georgetown, Ontario L7G 4R9**Telephone No:** (905) 877-0101**Fax No:** (905) 877-6666**Emergency Telephone No:** CANUTEC (613) 996-6666**HAZARDOUS INGREDIENTS OF MATERIALS**

Ingredients	%	TLV Units	CAS No.
Phenol	>99	5 ppm	108-95-2
<i>(skin can contribute to overall exposure)</i>			

**PHYSICAL DATA****Physical State:** Crystalline solid**Odour and Appearance:** Colourless to pink solid or thick liquid with a sweet, tarry odour**Odour Threshold (ppm):** 0.012 ppm (detection); 0.057 ppm (recognition). Poor warning properties. Odour threshold satisfactory, but material readily absorbed through skin**Vapour Pressure (mm Hg):** 0.36 mm @ 20°C**Vapour Density (Air = 1):** 3.24**Evaporation Rate:** < 1 (Butyl acetate = 1)**Boiling Point (degrees C):** 182°C**Melting Point (degrees C):** 41°C**pH:** 6 (saturated aqueous solution)**Specific Gravity:** 1.06 @ 20°C**Coefficient of Water/Oil distribution:** LogP(oct)=1.46**SHIPPING DESCRIPTION****UN:** 1671 (molten 2312)**T.D.G. Class:** 6.1**Pkg. Group:** II**REACTIVITY DATA****Chemical Stability:** Moderately stable. Slowly turns pink or red when exposed to air, light, or temperatures above 50°C. Hygroscopic.**Incompatibility with other substances:** Acetaldehyde: violent condensation reaction. 1,3-Butadiene, borontrifluoride diethyl ether complex, sodium nitrate, trifluoroacetic acid: intense exothermic reaction. Calcium hypochlorite: intense exothermic reaction with ignition; Formaldehyde: temperature and pressure increase in closed container. May react explosively with strong oxidizers, sodium nitrite, peroxodisulfuric acid, peroxomonosulfuric acid, when heated, aluminum chloride and nitrobenzene mixture under carbon monoxide. Attacks many plastics, rubbers, coatings. Emits flammable hydrogen gas in contact with reducing agents. Corrosive to aluminum, lead, zinc.**Reactivity:** Stable under normal temperatures and pressures; avoid heat, flame or other ignition sources, all incompatible*materials; protect from light and air. Vapour-air mixtures are explosive above flash point.***Hazardous Decomposition Products:** CO<sub>x</sub>**FIRE AND EXPLOSION DATA****Flammability:** Combustible solid, liquid and vapour. Can form explosive mixtures with air at or above 79°C. Vapours may travel to distant source of ignition and flash back. Hot surfaces may be enough to ignite liquid in the absence of sparks or flame.**Extinguishing Media:** Water spray, carbon dioxide, dry chemical, "alcohol" or polymer foam. Water as spray or fog can be used to cool containers and disperse vapours or flush spills away from ignition sources. Fight fire from a distance, from up-wind direction. Firefighters must wear NIOSH/OSHA approved full face-piece, positive-pressure self-contained breathing apparatus and encapsulating chemical splash suit (Bunker Gear is not adequate).**Flash Point (Method Used):** 79°C (TCC)**Autoignition Temperature:** 605°C**Upper Flammable Limit (% by volume):** 8.6**Lower Flammable Limit (% by volume):** 1.8**Hazardous Combustion Products:** CO<sub>x</sub>**Sensitivity to Impact:** None identified**Sensitivity to Static discharge:** Liquid will probably not accumulate static charge, or be ignited by static discharge. Mixtures of vapours with air may be ignited by static discharge under certain circumstances.**TOXICOLOGICAL PROPERTIES AND HEALTH DATA****Toxicological Data:****LD<sub>50</sub>:** (oral, rat) 317 mg/kg, 530 mg/kg (2 and 5% solutions); (dermal, pig) 500 mg/kg (liquified, 45°C)**LC<sub>50</sub>:** (mouse) 177 mg/m<sup>3</sup>/3h; (rat) 316 mg/m<sup>3</sup>/3h**Effects of Acute Exposure to Product:****Toxic by all routes of exposure; causes burns by all routes of exposure. May cause irreversible effects. May cause CNS depression, liver and kidney damage.****Inhaled:** VERY TOXIC. Vapour and mist are destructive to all tissue, causing severe burns of the nose and throat; absorption causes CNS effects (nausea, dizziness, headache), kidney and liver damage. Brief exposure can cause irreversible injury or death as a result of spasm of larynx and bronchi, chemical pneumonitis and pulmonary edema. Vapours are heavier than air and can collect in low-lying areas, displacing air.**In contact with skin:** CORROSIVE, VERY TOXIC. Liquid and dust are extremely corrosive; hazard increases with phenol concentration; aqueous solutions over 5% are corrosive and toxic. Vapour and liquid can be readily absorbed through the skin in toxic or lethal amounts; effects include shock, collapse, coma, convulsion, kidney and liver damage and death. Moisture on skin (perspiration) accelerates tissue destruction. Causes local anesthesia; severe chemical burns and poisoning can occur with little or no pain.**In contact with eyes:** CORROSIVE. Vapours and concentrated solutions are severely irritating to eyes. Can cause conjunctival swelling, permanent corneal damage and blindness.

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**Ingested:** CORROSIVE, VERY TOXIC. Causes severe burns of the mouth and throat, systemic effects as in "In Contact with Skin"; lethal dose may be as little as 15 mL.

**Effects of Chronic Exposure to Product:**

Long-term exposure to phenol may cause dermatitis, darkening of skin and urine, muscular pains, weight loss, anorexia, headache, nausea, vomiting, diarrhea, weakness, kidney and liver damage and skin sensitization. May be fatal. May aggravate cardiovascular, liver and kidney disease, existing respiratory conditions, such as asthma, bronchitis, inflammatory or fibrotic respiratory disease.

**Carcinogenicity:** Not classifiable as carcinogenic (IARC, ACGIH).

**Teratogenicity:** No human information available. Animal studies indicate probably not teratogenic at levels not toxic to mother.

**Reproductive Effects:** No human information available. In a two-generation study with rats, no significant effects on reproductive performance (RTECS No. SJ3325000).

**Mutagenicity:** Mutagenicity tests are inconclusive; both positive and negative results, in cultured animal cells and bacteria.

**Synergistic Products:** Phenol can promote the development of skin cancer when applied with known carcinogens.

**PREVENTIVE MEASURES**

**Engineering Controls:** Corrosion-resistant, non-sparking, grounded ventilation system, separate from other ventilation systems.

**Respiratory Protection:** Use only in a fumehood. To 50 ppm: NIOSH/OSHA approved chemical cartridge respirator with organic vapour cartridge and dust and mist filter. To 125 ppm: supplied air respirator operated in a continuous flow mode or powered air-purifying respirator with organic vapour cartridge and dust and mist filter. To 250 ppm: full facepiece chemical cartridge respirator with organic vapour cartridge and high-efficiency particulate filter or powered, full face-piece, air-purifying respirator with organic vapour cartridge and high-efficiency particulate filter. For higher or unknown concentrations, as in fire or spill conditions, self-contained breathing apparatus with full facepiece operated in a positive pressure mode, or positive-pressure, full face-piece supplied-air respirator with an auxiliary positive-pressure self-contained breathing apparatus.

**Eye Protection:** Chemical safety goggles and faceshield.

**Skin Protection:** Viton™, Viton™/butyl rubber, Trelcehm™HPS, Responder™, Barrier (PE/PA/PE), Tychem™BR/LV, Tychem™SL, Tychem™TK gauntlet gloves. Other impervious protective body-covering clothing, such as apron, sleeves, trousers, coveralls, boots, sufficient to prevent any contact.

**Other Personal Protective Equipment:** Safety shower and eye-wash fountain in work area.

**Leak and Spill Procedure:** Stop or reduce discharge if it can be done safely. Evacuate area. Ventilate area. Eliminate all sources of ignition. Ground and bond all equipment. Cleanup personnel must be thoroughly trained in the hazards of this material, and must wear protective equipment and clothing sufficient to prevent inhalation of vapours or mists (see "Respiratory Protection") and contact with skin, eyes or clothing. Contain material with inert non-combustible absorbent. Prevent entry into water or sewer systems. Collect contaminated absorbent and put in covered containers for collection by approved disposal agency. Contaminated absorbent poses the same hazards as the product; treat with extreme caution. Flush area of spill thoroughly with copious amounts of running water.

**Waste Disposal:** Follow all federal, provincial and local regulations for disposal.

**Handling Procedures and Equipment:** CORROSIVE, VERY TOXIC. Personnel working with this chemical must be thoroughly trained in its hazards, and its safe use, must wear appropriate protective equipment and clothing, in an area with proper ventilation and engineering controls. DO NOT WORK ALONE. Use the smallest amount possible for the purpose, in designated areas with adequate ventilation. Keep away from heat, flame hot surfaces, all sources of

ignition, and all incompatible materials. Ground and bond all equipment to prevent static charge accumulation. Use non-sparking tools. Post "No Smoking" signs. Avoid all inhalation and contact with skin, eyes, and clothing. Avoid procedures which generate dust or mist. Empty containers contain hazardous residues; treat with caution.

**Storage Requirements:** Store in glass containers in a cool, dry, well-ventilated area out of direct sunlight and away from heat, flame, all sources of ignition, and all incompatible materials. Keep containers tightly closed and when opening, use extreme caution. Keep separate from other materials. Protect from damage. Inspect frequently for signs of damage or leaking. Storage area should have raised sills or ramps and a trench which drains to a safe location, and sealed floors to prevent absorption. Empty containers may contain hazardous residues; treat with extreme care.

**FIRST AID MEASURES**

**Specific Measures:**

**Immediate medical attention is essential in all cases of phenol exposure.**

**Eyes:** Immediately flush eyes with warm running water for at least sixty (60) minutes, holding eyelids open while flushing. DO NOT INTERRUPT FLUSHING. Use neutral saline to flush as soon as it is available. Take care not to flush contaminated water into unaffected eye. Wear protective gloves to avoid contact during first aid procedures. GET MEDICAL ATTENTION IMMEDIATELY.

**Skin:** Immediately remove all contaminated clothing (including rings, watches, belts, and shoes) under running water. Wear gloves and other protective clothing sufficient to prevent ANY contact with chemical. Flush exposed area with large amounts of gently running, lukewarm water for at least sixty (60) minutes. If polyethylene glycol-300 is available, stop water flushing after the chemical is removed and immerse the affected part in PEG-300, or if immersion is not possible, spray or swab with it continuously until medical help arrives. GET VICTIM TO MEDICAL FACILITY IMMEDIATELY. If breathing has stopped give artificial respiration. If breathing and pulse are absent, give CPR. Use mouth guards to prevent contact. Keep contaminated clothing in closed, labelled containers until it can be safely discarded.

**Inhalation:** IMMEDIATELY remove to fresh air (caution must be used by rescuers to avoid exposure). Give oxygen for breathing difficulty. If breathing has stopped give artificial respiration. If breathing and pulse are absent, give CPR. Use mouth guards to prevent contact. GET MEDICAL ATTENTION IMMEDIATELY. Stay with casualty until medical assistance is reached.

**Ingestion:** DO NOT INDUCE VOMITING. DANGER OF ASPIRATION WITH EMESIS. If casualty is alert and not convulsing, rinse out mouth with water and give 15 to 30 cc of castor oil or vegetable oil. GET MEDICAL ATTENTION IMMEDIATELY. If spontaneous vomiting occurs have casualty lean forward with head down to avoid breathing in of vomitus. If breathing has stopped give artificial respiration. If breathing and pulse are absent, give CPR. Use mouth guards to prevent contact.

**Note to physician:** After initial decontamination with copious amounts of water, polyethylene glycol/alcohol (2:1) may be used to remove phenol from skin (do not use in eyes). Determination of urinary phenols may help in establishing extent of exposure. If lavage is performed, suggest endotracheal and/or esophagoscopy control.

## REFERENCES USED

CCINFO disc: Cheminfo  
Online NIOSH Pocket Guide to Chemical Hazards  
Budavari: *The Merck Index*, 12th ed., 1997  
Royal Society of Chemistry: *Chemical Safety Data Sheets*,  
Vol. 4b, 1991  
Sax, Lewis: *Hawley's Condensed Chemical Dictionary*, 11th  
ed., 1987  
*Suppliers' Material Safety Data Sheets*

## ADDITIONAL INFORMATION

**Date Issued:** June 15, 1989  
**Revision:** April 2011  
**MSDS:** 5520-1; 5521-1; 5522-1  
**Proposed WHMIS Classification:** B3; D1A; D2A; E

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