SRM Number: 114p
MSDS Number: 114p
SRM Name: Portland Cement Fineness Standard
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MATERIAL SAFETY DATA SHEET

National Institute of Standards and Technology
Standard Reference Materials Program
Gaithersburg, Maryland 20899
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Portland Cement Fineness Standard

Other Designations: Hydraulic Cement, Portland Cement Silicate

Description: This SRM unit consists of approximately 200 grams of powdered cement, packaged in 20 sealed laminated barrier film pouches, each containing approximately 10 g of cement.

Chemical Formulas: Tricalcium silicate ($3CaO•SiO_2$) and dicalcium silicate ($2CaO•SiO_2$) are portland cements essential constituents, along with varying amounts of alumina, tricalcium aluminate and iron oxide as tetracalcium aluminoferrate. Small amounts of magnesia, sodium, potassium and sulfur are also present. Chromium may be present in the finished cement since the kiln's refractory lining and the steel balls used in the finish-milling operations are possible sources. To improve adhesion, strength and flexibility, cement may be modified with various plastic latexes.

CAS Reg. No.: 65997-15-1

DOT Classification: Not hazardous by DOT regulations.

Manufacturer/ Supplier: Available from a number of suppliers.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Percent Concentrations	Limits and Toxicity Data*
CaO (calcium oxide)	63.6	8 hr. TWA-PEL
SiO_2 (silicon dioxide)	21.6	10 mg/m^3 (total dust)
Al_2O_3 (aluminum oxide)	4.2	
Fe_2O_3 (iron III oxide	3.0	8 hr. TWA-PEL
SO_3 (sulfur trioxide)	2.7	5 mg/m^3 (respirable fraction)
MgO (magnesium oxide)	2.4	
K_2O (potassium oxide)	0.51	ACGIH TLV-TWA:
TiO_2 (titanium dioxide)	0.23	10 mg/m^3 (nuisance dust)
Na_2O (sodium monoxide)	0.19	
SrO (strontium oxide)	0.14	No toxicity data documented.
P_2O_5 (phosphoric anhydride)	0.19	

SECTION III. PHYSICAL/ CHEMICAL CHARACTERISTICS

Appearance and Odor: Odorless, grey powder.
Vapor Pressure: approximately 0 mm
pH: 12 (wet cement)
Solubility in Water: Insoluble.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

(Method Used): N/A

Autoignition Temperature: N/A

Flammability Limits in Air (Volume %): N/A

Extinguishing Media: This material is noncombustible. Use extinguishing media that is appropriate to the surrounding fire.

Special Fire Procedures: Since the fire may produce toxic fumes, wear a self contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

Unusual Fire and Explosion Hazards: None reported.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** _____ **Unstable**

Conditions to Avoid: Avoid moisture.

Incompatibility (Materials to Avoid): No hazardous incompatibilities are reported.

Hazardous Decomposition or Byproducts: Calcium hydroxide forms when water is added to portland cement; this is an alkaline, abrasive and *hygroscopic* (moisture-absorbing) material.

Hazardous Polymerization: _____ **WIll Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** **X** **Ingestion**

Health Hazards (Acute and Chronic): Silicon Dioxide: Portland cement is a nuisance dust and an irritant to the skin, eyes and mucous membranes. Its principle health hazard occurs from the formation of alkaline calcium hydroxide (forming from the addition of water to portland cement); this material is abrasive and can burn the skin. Dry cement will not cause alkaline burns. Some individuals appear to tolerate brief skin contact with wet cement but others develop extensive skin burns. Repeated or prolonged skin contact can cause dermatitis, including skin dryness, *fissures* (cracks in the skin), eczematous rashes and *dystrophy* (a condition caused by defective nutrition) of the nails. Extensive burns with dermal *necrosis* (localized death of living tissue) can occur. Allergic dermatitis may result from the presence of heavy metals such as chromium in the mixture.
Splashes into the eyes can cause corneal edema. Ingestion of the powder may cause burns to the esophagus and stomach. Chronic bronchitis may result from long term exposure. There are reports of x-ray changes without symptoms in cement workers exposed to portland cement. Other studies showing x-ray changes with pulmonary symptoms are noted in workers exposed primarily to the silica-containing products in portland cement.

Signs and Symptoms of Exposure: Inhalation symptoms include eye, nose and upper respiratory tract irritation, cough, expectoration, shortness of breath and wheezing. Within 12 to 48 hours after 1-to-6 hour exposures, first, second and/or third degree burns may occur. There may be no obvious pain at the time of exposure. Allergic reactions and changes in x-rays are also signs of exposure.

Medical Conditions Generally Aggravated by Exposure: Individuals with a sensitivity to hexachromium salts should avoid exposure. Individuals with chronic respiratory disorders or skin diseases should minimize exposure.

Calcium Oxide: Inhalation of 250 mg/m3 of calcium oxide is immediately dangerous to life and health. Inhalation may cause severe irriation of the mucous membranes with sore throat, coughing

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	____	X
In the International Agency for Research (IARC) Monographs	____	X
By the Occupational Safety and Health Administration (OSHA)	____	X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Contact medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under eyelids, with copious amounts of water until victim is transported to an emergency medical facility. **Contact a physician immediately! This material can cause *corneal edema*!**

Inhalation: Move the victim to fresh air. If breathing is difficult, give oxygen; if victim is not breathing, give artificial respiration. Contact medical assistance if necessary.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, have the conscious victim drink 4 to 8 oz. of milk or water. Contact a physician immediately.

Note to Physician: Ingestion of large amounts of cement is unlikely. However, to prevent re-exposing the esophagus and the stomach, do not induce emesis or perform gastric lavage. Immediate dilution may prevent esophageal burns. For severe espohageal burns, consider esophagoscopy within the first 24 hours. Neutralization with acidic agents is not advised because of the increased risk of exothermic burns.

Water-mineral oil soaks may aid in the removal of hardened cement from the skin. Dried on cement is extremely difficult to remove; surgical debridement and possibly even skin grafting may be necessary. Consult an opthalmologist for ocular burns. Consider topical mydriatic-cycloplegics to guard against development of posterior synechiae and ciliary spasm.

TARGET ORGAN(S) OF ATTACK: The upper respiratory tract (URT), skin, digestive tract and eyes.

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken in Case Material is Released or Spilled: Notify safety personnel of large leaks. Provide adequate ventilation. Cleanup personnel must be protected against dust inhalation and direct contact with the wet cement. Avoid creating airborne dust conditions. Cleanup methods such as vacuuming (with an appropriate filter) or wet mopping minimizes dust dispersion. Carefully scoop up spilled dry material into a suitable container (with secure lid) for disposal or reclamation.

Waste Disposal: Contact your local, licensed contractor for detailed recommendations. Follow all Federal, state and local regulations.

Handling and Storage: Those handling portland cement should wear protective eyeglasses or chemical safety goggles, per OSHA eye and face protection regulations. Wear other protective clothing such as gloves, boots and aprons to prevent skin contact. Wear a NIOSH approved respirator for prolonged exposure or exposures above the TLV. **Warning:** *Air-purifying* respirators will not protect workers in an oxygen-deficient atmosphere.

Never eat, drink or smoke in the work area. Launder soiled clothing before wearing.

Note: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the lab.

Provide general and local ventilation systems to maintain airborne concentrations below the OSHA PELs and ACGIH TLV. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source. Store in tightly closed containers in a cool, dry, well ventilated area. Protect containers from physical damage.

SECTION VIII. SOURCE DATA/ OTHER COMMENTS

Sources: Genium Publishing Corporation, MSDS No. 718, August, 1990.
Hawley's Condensed Chemical Dictionary, 11th ed., 1987.

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Note: Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references, however NIST does not certify the data on the MSDS. The certified values for this material are given only on the NIST Certificate of Analysis.