Vulcan Materials Company

MATERIAL SAFETY DATA SHEET

Eeffective Date: 05/01/2012
Replaces: 05/31/2009

Slag Cement

SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name:
Slag Cement

Formula:
Mixture

Synonyms/Common Names:
Ground Granulated Blast Furnace Slag, Slag Cement, Blast Furnace Slag, Granulated Slag, Pelletized Slag, Metallic Slag, Slag Cement Grade 80, 100, 120, Non-metallic Slag

Manufacturer/Contact Info:
Vulcan Materials Company and its subsidiaries and affiliates
1200 Urban Center Drive
Birmingham, AL 35242

General Phone Number:
1.866.401.5424

Emergency Phone Number:
1.866.401.5424 (3E Company, 24 hours/day, 7 days/week)

SECTION 2. COMPOSITION INFORMATION ON INGREDIENTS

Hazardous Components	CAS No.	% by Weight
Amorphous Silica	7631-86-9	30-50
Complexed silicates and fused mineral oxides, including: Ca_2FeO_5, $Ca_3Mg(SiO4)_2$, and $Ca_2AL_2SiO_7$	Mixture	0-40
Calcium Oxide	1305-78-8	0-5
Crystalline Silica-Quartz	14808-60-7	0-15
Iron Compounds	Various	0-10
Magnesium Compounds	Various	0-20
Titanium Compounds	Various	0-5
Manganese Compounds	Various	0-2
Sulfur	7704-34-9	<2

SECTION 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING
Cement, when it comes into contact with moisture (such as in the eyes or on the skin) or mixed with water becomes highly caustic and can cause severe chemical burns to the eyes and skin, potentially resulting in blindness. Repeated and prolonged skin contact may cause allergic contact skin dermatitis. Avoid breathing excessive dust. Breathing silica-containing dust for prolonged periods in the workplace can cause lung damage and a lung disease called silicosis. Several scientific organizations have classified crystalline silica as causing lung cancer in humans. Silicosis or lung cancer can result in permanent injury or death.

POTENTIAL HEALTH EFFECTS

Note: This product is caustic if wet (pH approximately equal 8-11)

Primary Routes of Exposure:
Eyes, skin, inhalation

Eye Contact:
Contact may result in chemical (caustic) burns and eye injury which may be progressive and could cause blindness. Symptoms may include tearing, redness, pain, swelling with blurred vision. Dust from hardened product may be irritating to the eyes.

Skin Contact:
May cause severe skin dehydration and irritation with redness, an itching or burning feeling, and swelling of the skin. More severe effects, including chemical (alkali) burns and skin ulcers may occur due to reaction with moisture. May cause allergic contact dermatitis which is caused by sensitization to hexavalent chromium. Dust from hardened product may be irritating to the skin.

POTENTIAL HEALTH EFFECTS

Skin Absorption:

Not expected to be a significant exposure route following short-term exposure.

Inhalation:

Dusts may severely irritate the mouth, nose, throat and lungs. Coughing, choking, sneezing and shortness of breath may occur.

Ingestion:

Direct contact with exposed tissues may result in severe irritation with pain, nausea, vomiting, and/or diarrhea and possibly chemical (alkali)burns.

Effects Following Prolonged or Repeated Exposure:

Chronic exposure to cement dust has been associated with dermatitis, cracking and brittleness of the fingernails, and ulceration and perforation of the nasal septum (dividing wall of the nose).

Chronic exposure may cause allergic contact dermatitis. Allergic contact dermatitis is caused by sensitization to hexavalent chromium (chromate). The reaction can range from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with slag. Others may develop allergic dermatitis after years of repeated contact with slag.

Exposure to high levels of respirable crystalline silica is associated with silicosis, lung cancer, and autoimmune disorders. For additional information, see Section 11.

Carcinogenicity:

The following component(s) has been listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA):

Crystalline silica-quartz
Hexavalent Chromium (VI)

For additional information, see Section 11.

Signs and Symptoms of Exposure:

Symptoms of silicosis may include (but are not limited) to shortness of breath, difficulty breathing with or without exertion, coughing, diminished work capacity, diminished chest expansion, reduction of lung volume, right heart enlargement and/or failure. .

Medical Conditions Aggravated by Exposure:

Pre-existing medical conditions that may be aggravated by exposure include disorders of the eye, skin and lung (including asthma and other breathing disorders).

SECTION 4. FIRST AID MEASURES

Eyes:

Immediately flush eye(s) with plenty of clean water for at least 15 minutes while holding the eyelid(s) open. Occasionally lift the eyelid(s) to ensure thorough rinsing. Beyond flushing, do not attempt to remove material from the eye(s). Get immediate medical attention.

Skin:

Wash affected areas thoroughly with mild soap and fresh water. Remove and wash contaminated clothing and shoes. Contact a physician if irritation persists or later develops. Burns should be treated as caustic burns.

Inhalation:

If inhaled remove to fresh air. Dust in throat and nasal passages should clear spontaneously. Contact a physician if irritation persists or if breathing is difficult.

Ingestion:

If person is conscious, do not induce vomiting. Give large quantity of water and get immediate medical attention. Never attempt to make an unconscious person drink.

Notes to Physician:

Calcium oxide particles readily adhere to the conjunctiva and may form clumps of moist compound which can be difficult to remove by usual irrigation. These clumps tend to lodge deep in inferior and superior cul-de-sacs and act as reservoirs of calcium hydroxide over long periods of time. Rapid irrigation is indicated; however, debridement and use of a complexing agent (such as disodium EDTA) may also be necessary.

Not all individuals with silicosis will exhibit symptoms of the disease. However, silicosis is progressive, and symptoms can appear at any time, even years after exposures have ceased. Persons with silicosis have an increased risk of pulmonary tuberculosis infection.

For emergencies, contact 3E Company at 1-866-401-5424 (24 hours/day, 7 days/week).

SECTION 5. FIREFIGHTING MEASURES

Flash Point (Method Used):

Not applicable

Flammable Limits:

LEL: Not applicable **UEL:** Not applicable

Autoignition Temperature:

Not applicable

Extinguishing Media:

The presence of this material in a fire does not hinder the use of any standard extinguishing medium. Use extinguishing medium for surrounding fire.

Special Firefighting Procedures:

None

Unusual Fire and Explosion Hazards:

Hydrogen sulfide gas could accumulate if heated moist slag is enclosed without adequate ventilation. Hydrogen sulfide is an extremely flammable gas and can explode if an ignition source is provided. A self-contained breathing apparatus approved by NIOSH/MSHA is recommended.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released:

Persons involved in cleanup processes should first observe precautions (as appropriate) identified in Section 8 of this MSDS. Spilled material, where dust is generated, may overexpose cleanup personnel to cement dust and respirable crystalline silica-containing dust. Do not dry sweep. Wetting of spilled material and/or use of respiratory protective equipment may be necessary. Prevent spilled materials from entering streams, drains, or sewers. Allow to dry or solidify before disposal.

For emergencies, contact 3E Company at 1-866-401-5424 (24 hours/day, 7 days/week).

Waste Disposal Methods:

Dispose of waste materials in accordance with applicable federal, state and local laws and regulations..

Environmental Precautions:

Prevent spilled materials from entering streams, drains, or sewers.

SECTION 7. HANDLING AND STORAGE

Storage:

Store in sealed containers in a dry area away from the weather and flood danger. Cement will swell and generate heat when moistened, and could burst containers. Do not store near food and beverages or smoking materials.

Handling:

Mixture is caustic when wet. Respirable crystalline silica-containing dust may be generated during processing, handling, and storage. Use personal protection and controls identified in Section 8 of this MSDS as appropriate.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Legend:

NE = Not Established; PEL = Permissible Exposure Limit; TLV = Threshold Limit Value; REL = Recommended Exposure Limit; OSHA = Occupational Safety and Health Administration; MSHA = Mine Safety and Health Administration; NIOSH = National Institute for Occupational Safety and Health; ACGIH = American Conference of Governmental Industrial Hygienists

Component	OSHA/MSHA PEL	ACGIH TLV	NIOSH REL
Amorphous Silica	20 mppcf (80 mg/m^3/percent silica)	NE	6 mg/m^3
Particulates not otherwise classified – Nuisance Dust	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)	10 mg/m^3 (inhalable fraction) 3 mg/m^3 (respirable fraction)	NE
Respirable dust containing silica	10 mg/m^3 ÷ (% silica + 2)	Use Respirable Silica TLV	Use Respirable Silica TLV
Total dust containing silica	OSHA: 30 mg/m^3 ÷ (% silica + 2) MSHA: 30 mg/m^3 ÷ (% silica + 3)	NE	NE
Respirable Crystalline Silica (quartz)	NE - Use respirable dust PEL	0.025 mg/m^3	0.05 mg/m^3
Respirable Tridymite and Cristobalite (other forms of crystalline silica)	½ of OSHA and MSHA respirable dust PEL	0.025 mg/m^3	0.05 mg/m^3
Calcium Oxide	5 mg/m^3	2 mg/m^3	2 mg/m^3
Magnesium Oxide	15 mg/m^3(total dust)	10 mg/m^3 (inhalable fraction)	NE
Aluminum Oxide	15 mg/m^3(total dust) 5 mg/m^3 (Respirable)	10 mg/m^3(total dust)	15 mg/m^3(total dust) 5 mg/m^3 (Respirable)
Iron Oxide	10mg/m^3	5 mg/m^3 (respirable fraction)	5 mg/m^3 (respirable fraction)
Titanium Oxide	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)	10 mg/m^3(total dust) 3 mg/m^3 (respirable fraction)	NE
Manganese Oxide	5 mg/m^3 (as Mn)	0.2 mg/m^3 (as Mn)	1mg/m^3
Hydrogen Sulfide	20 ppm (Ceiling)	14 mg/m^3 21 mg/m^3 (STEL)	10 ppm (Ceiling)
Sulfur Dioxide	13 mg/m^3	5 mg/m^3 13 mg/m^3 (STEL)	5 mg/m^3 13 mg/m^3 (STEL)

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Eye Protection:
Safety glasses with side shields should be worn as minimum protection. Goggles or face shield should be worn where splashing is possible. Dust goggles should be worn when excessively (visible) dusty conditions are present or are anticipated due to working with hardened product. Do not wear contact lenses when using under dusty conditions.

Skin Protection (Protective Gloves/Clothing):
Waterproof gloves, rubber boots, and clothing sufficient to protect the skin from contact with wet product should be worn. Clothing saturated from contact with wet product should be removed promptly to prevent continued contact with skin. As a precaution, wash hands thoroughly before eating, smoking, and using toilet facilities. After working with product, workers should clean their skin/shower with soap and water. Clean clothing should be worn after showering.

Respiratory Protection:
All respirators must be NIOSH-approved for the exposure levels present. (See NIOSH Respirator Selection Guide). The need for respiratory protection should be evaluated by a qualified safety and health professional. Activities that generate dust require the use of an appropriate dust respirator where dust levels exceed or are likely to exceed allowable exposure limits. For respirable silica levels that exceed or are likely to exceed an 8 hr Time Weighted Average (TWA) of 0.5 mg/m3, a high efficiency particulate filter respirator must be worn at a minimum; however, if respirable silica levels exceed or are likely to exceed an 8 hr TWA of 5.0 mg/m3 a positive pressure, full face respirator or equivalent is required. Respirator use must comply with applicable MSHA (42 CFR 84) or OSHA (29 CFR 1910.134) standards, which include provisions for a user training program, respirator inspection, repair and cleaning, respirator fit testing, medical surveillance and other requirements.

Ventilation:
Activities that generate dust require the use of local exhaust or general ventilation adequate to maintain exposures below appropriate exposure limits.

Other:
A clean water supply for emergency first aid and washing facilities should be readily available. Clothing should be washed between uses.Dust and other components should be monitored regularly to determine worker exposure levels. Exposure levels in excess of appropriate exposure limits should be reduced by all feasible engineering controls, including (but not limited to) wet suppression, ventilation, process enclosure, and enclosed employee workstations.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: Not applicable	**pH:** 8-11 in water	**Specific Gravity (H_2O = 1):** 2-3
Evaporation Rate (Butyl Acetate = 1): Not applicable	**Melting Point:** Not applicable	**Vapor Pressure (mm Hg.):** Not applicable
Solubility in Water: 0.1 - 1%	**Vapor Density (Air = 1):** Not applicable	**% Volatile:** None

Appearance and odor:
Gray, solid (powder); no odor

SECTION 10. STABILITY AND REACTIVITY

Stability:
Stable under normal temperatures and pressures. Reacts with water resulting in a slight release of heat, depending on the amount of calcium oxide present.

Conditions to Avoid:
Avoid heating moist or wet slag because toxic hydrogen sulfide gas may be produced. Contact with incompatible materials should be avoided (see below). See Sections 5 and 7 for additional information.

Incompatibility (Materials to Avoid):
Trace amounts of calcium oxide in slag may react with water to form caustic calcium hydroxide. Calcium oxide reacts violently with phosphoric anhydride halogenated compounds including boron trifluoride, chlorine trifluoride, hydrogen fluoride, and fluorine. Contact with hydrochloric acid may produce toxic chlorine gas. Silica reacts violently with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride yielding possible fire and/or explosions. Silica dissolves readily in hydrofluoric acid producing a corrosive gas - silicon tetrafluoride.

Hazardous Decomposition or Byproducts:
Hydrogen sulfide gas may be released from slag when it is heated or dried. Toxic chloride and fluoride fumes may be released during thermal decomposition. When heated, quartz is slowly transformed into tridymite (above 860˚C/1580˚F) and cristobalite (above 1470˚C/2678˚F). Both tridymite and cristobalite are considered more fibrogenic to the lungs than quartz.

Hazardous Polymerization:
Not known to occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute Effects:

When slag containing moisture is heated, it can release small quantities of hydrogen sulfide (H_2S) gas which can be extremely hazardous, particularly in confined spaces. Do not depend upon the sense of smell for warning of overexposure, since H_2S causes rapid olfactory fatigue which deadens the sense of smell at levels as low as 50 ppm. Exposure to H_2S concentrations above the permissible exposure limit causes irritation of the mucous membranes, headache, dizziness, vomiting, coughing, nasal discharge and pulmonary edema. At levels between 500 and 700 ppm, respiratory paralysis, loss of consciousness, and possibly death can occur within 30 to 60 minutes. Exposure to higher concentrations of H_2S can result in immediate death. Repeated exposure to low levels may also cause eye effects including conjunctivitis and corneal injury. There is no evidence that H_2S will accumulate in the body tissue after repeated overexposure. Calcium oxide (lime) severely irritates the tissues contacted primarily because of its alkalinity.

Effects Following Prolonged or Repeated Exposure:

Slag cement may contain trace amounts of hexavalent chromium. Hexavalent chromium has been associated in some individuals with causing allergic skin reactions which may be manifested as contact dermatitis and skin ulcerations. Individuals who develop allergies to skin sensitizers such as hexavalent chromium, may experience a reaction upon repeated contact with those compounds. Irritated or broken skin is more likely to develop further complications such as ulcers and infection.

Repeated or prolonged exposure of the skin and eyes to sulfur containing dust may cause dermatitis and/or conjunctivitis (inflammation of the eye).

Chronic overexposure to iron oxide dust has resulted in a benign pneumoconiosis called Siderosis. The condition has not been found to cause fibrosis or decreased pulmonary function, and has not been associated with illness nor decreased life expectancy.

Prolonged overexposure to respirable dusts in excess of appropriate exposure limits can cause inflammation of the lung leading to possible fibrotic changes, a medical condition known as pneumoconiosis.

Prolonged and repeated inhalation of respirable crystalline silica-containing dust in excess of allowable exposure limits may cause a chronic form of silicosis, an incurable lung disease that may result in permanent lung damage or death. Chronic silicosis generally occurs after 10 years or more of overexposure; a more accelerated type of silicosis may occur between 5 and 10 years of higher levels of exposure. In early stages of silicosis, not all individuals will exhibit symptoms (signs) of the disease. However, silicosis can be progressive, and symptoms can appear at any time, even years after exposure has ceased. Symptoms of silicosis may include, but are not limited to, the following: shortness of breath; difficulty breathing with or without exertion; coughing; diminished work capacity; diminished chest expansion; reduction of lung volume; right heart enlargement and/or failure. Persons with silicosis have an increased risk of pulmonary tuberculosis infection.

Repeated overexposures to very high levels of respirable crystalline silica (quartz, cristobalite, tridymite) for periods as short as six months may cause acute silicosis. Acute silicosis is a rapidly progressive, incurable lung disease that is typically fatal. Symptoms include (but are not limited to): shortness of breath, cough, fever, weight loss, and chest pain.

Respirable dust containing newly broken silica particles has been shown to be more hazardous to animals in laboratory tests than respirable dust containing older silica particles of similar size. Respirable silica particles which had aged for sixty days or more showed less lung injury in animals than equal exposures of respirable dust containing newly broken particles of silica.

There are reports in the literature suggesting that excessive crystalline silica exposure may be associated with autoimmune disorders and other adverse health effects involving the kidney. In particular, the incidence of scleroderma (thickening of the skin caused by swelling and thickening of fibrous tissue) appears to be higher in silicotic individuals. To date, the evidence does not conclusively demonstrate a causal relationship between silica exposure and these adverse health effects.

Carcinogenicity:

Epidemiology studies on the association between crystalline silica exposure and lung cancer have had both positive and negative results. There is some speculation that the source and type of crystalline silica may play a role. Studies of persons with silicosis indicate an increased risk of developing lung cancer, a risk that increases with the level and duration of exposure. It is not clear whether lung cancer develops in non-silicotic patients. Several studies of silicotics do not account for lung cancer confounders, especially smoking, which have been shown to increase the risk of developing lung disorders, including emphysema and lung cancer.

In October 1996, an IARC Working Group designated respirable crystalline silica as carcinogenic (Group 1). The NTP's Report on Carcinogens, 9th edition, lists respirable crystalline silica as a “known human carcinogen.” In year 2000, the American Conference of Governmental Industrial Hygienists (ACGIH) listed respirable crystalline silica (quartz) as a suspected human carcinogen (A-2). These classifications are based on sufficient evidence of carcinogenicity in certain experimental animals and on selected epidemiological studies of workers exposed to crystalline silica.

Slag Cement is not listed as a carcinogen by International Agency for Research on Cancer (IARC) or National Toxicological Program (NTP); however Slag Cement does contain trace amounts of Chromium VI (hexavalent) which is classified by IARC and NTP as a known human carcinogen.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Ecotoxicological Data:

No specific data on this product. Large releases of high pH material may result in toxicity to aquatic organisms and systems.

Environmental Fate Data:

No specific data on this product. Not expected to bioaccumulate, based on components.

Other:

No specific data on this product.

SECTION 13. DISPOSAL CONSIDERATIONS

Place contaminated materials in appropriate containers and dispose of in a manner consistent with applicable federal, state, and local regulations. Do not dump on the ground unless allowed by local regulatory officials. Prevent from entering drainage, sewer systems, and unintended bodies of water. It is the responsibility of the user to determine, at the time of disposal, whether product meets criteria for hazardous waste. Product uses, transformations, mixture and processes, may render the resulting material hazardous.

SECTION 14. TRANSPORT INFORMATION [Note: Not intended to be all-inclusive.]

DOT Proper Shipping Name:	DOT Hazard Classification:
Not regulated.	Not applicable.
UN/NA Number:	**DOT Packing Group:**
Not applicable.	Not applicable.

Labeling Requirements:

Not applicable. Label as required by the OSHA Hazard Communication standard [29 CFR 1910.1200(f)], MSHA Hazard Communication standard [30 CFR Part 47] and applicable state and local regulations.

SECTION 15. REGULATORY INFORMATION [Note: Not intended to be all-inclusive.]

Toxic Substances Control Act (TSCA):

The components in this product are listed on the TSCA Inventory or are exempt.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA):

Releases of this material to air, land, or water are not reportable to the National Response Center under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to state and local emergency planning committees under the Superfund Amendments and Reauthorization Act.

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III:

Section 302 extremely hazardous substances:
None

Section 311/312 hazard categories:
Acute Health
Delayed Health

Section 313 reportable ingredients at or above de minimus concentrations:
None

California Proposition 65:

This product may contain chemicals (crystalline silica; trace hexavalent chromium; trace metals) known to the State of California to cause cancer.

State Regulatory Lists:

Each state may promulgate standards more stringent than the federal government. This section cannot encompass an inclusive list or all state regulations. Therefore, the user should review the components listed in Section 2 and consult state or local authorities for specific regulations that apply.

Canadian Workplace Hazardous Materials Information System (WHMIS):

TThis product contains crystalline silica and calcium oxide and is classified as D2A, E (Very toxic material causing other toxic effects; corrosive solid), subject to WHMIS requirements. Consult local authorities for acceptable exposure limits.

WHMIS information 416-327-7066.

SECTION 16. OTHER INFORMATION

Disclaimer

NO WARRANTY IS MADE, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE.

Vulcan Materials Company and its subsidiaries and affiliates ("Vulcan") believe the information contained herein is accurate; however, Vulcan makes no guarantees with respect to such accuracy and assumes no liability whatsoever in connection with the use of any information contained herein by any party. The provision of the information contained herein is not intended to be, and should not be construed as, legal advice or as ensuring compliance with any federal, state, or local laws, rules or regulations. Any party using any information contained herein should review all applicable laws, rules and regulations prior to use.

Vulcan Materials Company and its subsidiaries and affiliates
1200 Urban Center Drive
Birmingham, AL 35242

MSDS 3239-075

Vulcan
Materials Company

Dear Customer/Contractor:

Please find attached a material safety data sheet (MSDS) for the product that you purchased from Vulcan Materials Company or one of its subsidiaries or affiliates ("Vulcan"). This is a revised MSDS and replaces any previous versions of the MSDS for this product. This MSDS is provided to you as required by the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard (29 CFR 1910.1200), the Mine Safety and Health Administration's (MSHA) Hazard Communication Standard (30 CFR Part 47), and/or any applicable state Right-to-Know laws.

It is the responsibility of your company to communicate this information to your employees, customers, and contractors who may use or come in contact with this product. Further, if you distribute this product, Vulcan requests, and applicable laws may require, that you forward this MSDS to your customers.

Please direct this information to the person responsible for safety and health compliance at your company. If you have questions about the MSDS, please contact Vulcan at 1200 Urban Center Drive, Birmingham, AL 35242 or 1-866-401-5424.

If you need additional copies of this or any other Vulcan MSDS or a Spanish language version, you can obtain them at www.vulcanmaterials.com or by calling 1-866-401-5424.

La MSDS puede obtenerse en www.vulcanmaterials.com o llamando al 1-866-401-5424.

Sincerely,

Chad E. McDougal, CIH, CSP

Manager, Occupational Health