Date of Issue:
31 August 2021

SAFETY DATA SHEET

1. Substance and Source Identification

Product Identifier

SRM Number: 2686b
SRM Name: Portland Cement Clinker
Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Standard Reference Material (SRM) is intended primarily for use in evaluating methods of phase abundance analysis of major phases in cement clinkers. A unit of SRM 2686b consists of one glass bottle containing approximately 50 g of crushed portland cement clinker.

Company Information

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2. Hazards Identification

Classification

Physical Hazard:	Not classified.	
Health Hazard:	Skin Corrosion/Irritation	Category 2
	Eye Damage/Irritation	Category 1
	Skin Sensitization	Category 1
	Carcinogenicity, Inhalation	Category 1
	STOT, Single Exposure	Category 3
	STOT, Repeated Exposure	Category 1

Label Elements

Symbol



Signal Word

DANGER

Hazard Statement(s)

H315	Causes skin irritation.
H318	Causes serious eye damage.
H317	May cause an allergic skin reaction.
H350	May cause cancer by inhalation.
H335	May cause respiratory irritation.
H372	Causes damage to lungs through prolonged or repeated exposure (inhalation).

Precautionary Statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P264	Wash hands thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated room.
P272	Contaminated work clothing must not be allowed out of the workplace.
P280	Wear protective gloves, protective clothing, eye protection, and face protection.
P302+P352	If on skin: Wash with plenty of water.
P333+P313	If skin irritation or rash occurs, get medical attention.
P304+P340	If inhaled: Remove person to fresh air and keep comfortable for breathing.
P314	Get medical attention if you feel unwell.
P305+P351+P338	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P310	Immediately call a doctor.
P362+P364	Take off contaminated clothing and wash it before reuse.
P308+P313	If exposed or concerned: Get medical attention.
P403+P233	Store in well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents and container according to local regulations.

Hazards Not Otherwise Classified: None.

Ingredients(s) with Unknown Acute Toxicity: None.

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Substance: Portland cement

Other Designations: Hydraulic cement; cement (portland); silicate, portland cement; portland cement silicate.

Components are listed in compliance with OSHA 29 CFR 1910.1200. Cement may contain trace amounts of oxides and other chemicals due to the starting materials and manufacturing process, including chromium compounds. This SDS is for portland cement clinker with ≤0.1% of quartz. Information values for constituents in SRM 2686b are listed in the NIST Certificate of Analysis.

Hazardous Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Portland cement	65997-15-1	266-043-4	≥99.9
Quartz (crystalline silica)	14808-60-7	238-878-4	≤0.1
Hexavalent chromium	18450-29-9	not available	*

* Hexavalent chromium is included due to dermal sensitivity associated with the component.

4. FIRST AID MEASURES

Description of First Aid Measures

Inhalation: If adverse effects occur, remove to well-ventilated (uncontaminated) area and keep at rest in a position comfortable for breathing. If breathing is difficult, qualified personnel may administer oxygen. If not breathing, qualified personnel should give artificial respiration. Seek immediate medical attention.

Skin Contact: Rinse affected skin with water for at least 15 minutes, and then wash thoroughly with non-abrasive pH neutral soap or mild detergent and water. If skin irritation persists, seek medical aid and bring the container or label. Thoroughly clean and dry contaminated clothing and shoes before reuse.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: If a large amount is swallowed, seek medical attention.

Most Important Symptoms/Effects, Acute and Delayed: Inhalation of dust particles may cause irritation. Prolonged exposure to respirable silica particles can cause lung damage (silicosis) and cancer.

Indication of any immediate medical attention and special treatment needed, if necessary: If any of the above symptoms are present, seek immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire hazard as provided. See Section 9, "Physical and Chemical Properties" for flammability properties.

Extinguishing Media

Suitable: Use extinguishing agents appropriate to surrounding fire.

Unsuitable: None listed.

Specific Hazards Arising from the Chemical: Thermal decomposition may include carbon dioxide, carbon monoxide, sulfur oxides, and metal oxide(s).

Special Protective Equipment and Precautions for Fire-Fighters: Move container from fire area if it can be done without personal risk. Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

NFPA Ratings (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 2 Fire = 0 Reactivity = 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: Use suitable protective equipment; see Section 8, "Exposure Controls and Personal Protection".

Methods and Materials for Containment and Clean up: Avoid generating dust. Collect in appropriate container for disposal.

7. HANDLING AND STORAGE

Safe Handling Precautions: Use suitable personal protection equipment (PPE) to prevent skin and eye contact and inhalation of generated dust. See Section 8, "Exposure Controls and Personal Protection".

Storage and Incompatible Materials: Store in a well-ventilated area. See the Certificate of Analysis for storage conditions.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits			
Components	**OSHA (PEL)**	**ACGIH (TLV)**	**NIOSH (REL)**
Portland Cement	TWA: 15 mg/m^3 (total dust) TWA: 5 mg/m^3 (respirable fraction) TWA: 50 mppcf (<1 % crystalline silica)	TWA: 1 mg/m^3 (respirable fraction, particulate matter containing no asbestos and <1 % crystalline silica)	TWA: 10 mg/m^3 (total dust) TWA: 5 mg/m^3 (respirable dust) IDLH: 5000 mg/m^3
Quartz, crystalline silica	TWA: 30/(%SiO_2 + 2) mg/m^3 (total dust) TWA: 10/(%SiO_2 +2) mg/m^3 (respirable fraction) TWA: 250/(%SiO_2 + 5) mppcf (respirable fraction)	TWA: 0.025 mg/m^3 (respirable fraction)	TWA: 0.05 mg/m^3 (respirable dust) IDLH: 50 mg/m^3 (respirable dust)
Particles Not Otherwise Regulated (Total Dust)	TWA: 5 mg/m^3 (respirable fraction) TWA: 15 mg/m^3 (total dust)	TWA: 3 mg/m^3 (respirable fraction) TWA: 10 mg/m^3 (total dust)	

Engineering Controls: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Personal Protection Measures: In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate PPE to minimize exposure to this material.

Respiratory Protection: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29 CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye Protection: Wear splash resistant safety goggles when handling dust or wet cement. Wearing contact lenses when working with cement is not recommended. An emergency eyewash station is recommended.

Skin and Body Protection: Chemical-resistant clothing and waterproof, alkali-resistant gloves are recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

Descriptive Properties	**Portland Cement**
Molar Mass (g/mol)	not applicable
Molecular Formula	not applicable
Appearance (physical state, color, etc.)	white to gray powder
Odor	odorless
Odor threshold	not available
pH	12 to 13 (wet cement)
Evaporation rate	not applicable
Melting point/freezing point	not available
Relative Density as Specific Gravity (water = 1)	2.7 to 3.15
Density	not available
Vapor Pressure	not available
Vapor Density (air = 1)	not applicable
Viscosity	not applicable
Solubilities	water: 0.1 % to 1 %
Partition coefficient (n-octanol/water)	not applicable
Thermal Stability Properties	
Autoignition Temperature	not applicable
Thermal Decomposition	may include carbon dioxide, carbon monoxide, sulfur oxides, and metal oxide(s)
Initial boiling point and boiling range	>1000 °C (>1832 °F)
Explosive Limits, LEL (Volume %)	not applicable
Explosive Limits, UEL (Volume %)	not applicable
Flash Point	not applicable
Flammability (solid, gas)	not applicable

10. STABILITY AND REACTIVITY

Reactivity: Stable at normal temperatures and pressure.

Stability: X Stable _____ Unstable

Possible Hazardous Reactions: Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to Avoid: Avoid generating dust.

Incompatible Materials: Oxidizing materials, acids, aluminum and ammonium salt.

Hazardous Decomposition: Miscellaneous decomposition products; may include carbon dioxide, carbon monoxide, sulfur oxides, and metal oxide(s).

Hazardous Polymerization: Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Exposure: X Inhalation X Skin X Ingestion

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: Eye damage, skin irritation, skin sensitization, respiratory irritation.

Potential Health Effects (Acute, Chronic, and Delayed)

Inhalation: Irritation, cough accompanied by phlegm. Prolonged exposure to mixed cement dusts may cause cough, expectoration, dyspnea, wheezing, pharyngitis, chronic bronchitis, emphysema, cement pneumoconiosis, and silicosis.

Skin Contact: Irritation (possibly severe) and dermatitis. Direct contact with wet cement, combined with prolonged contact time and pressure may cause ulcerations and possibly burns. Sensitivity to constituents of cement may induce allergic skin reactions (chromium compounds).

Eye Contact: Irritation, visual disturbances, eye damage. In addition, wet cement may cause a burning sensation, corneal edema indicated by seeing halos around lights, and injury to the conjunctiva.

Ingestion: Irritation (long-term) and possible gastroduodenal ulcers.

Numerical Measures of Toxicity

Acute Toxicity: Not classified.

Portland cement: No data available.

Quartz (crystalline silica): Rat, Oral LD50: 500 mg/kg

Skin Corrosion/Irritation: Category 2, Skin irritation.

Exposure may cause irritation (rash, scaling, and cracking) and dermatitis. May cause serious burns in the presence of moisture.

Serious Eye Damage/Irritation: Category 1, Serious eye damage/eye irritation.

Exposure to portland cement dust may cause severe eye damage and burns in the presence of moisture.

Respiratory Sensitization: Classification not possible; no data available.

Portland cement may contain trace amounts of hexavalent chromium compounds which may cause respiratory effects. May cause respiratory tract irritation.

Skin Sensitization: Category 1, Skin sensitization.

Portland cement may cause sensitization due to the potential presence of trace amounts of hexavalent chromium, which may cause allergic skin reactions.

Germ Cell Mutagenicity: No data available.

Carcinogenicity: Category 1,

May cause cancer by inhalation. Quartz (crystalline silica) is known to be a human carcinogen.

Listed as a Carcinogen/Potential Carcinogen X **Yes** _____ **No**

Portland cement is not listed by OSHA, IARC, or NTP as a carcinogen or potential carcinogen.

Quartz (crystalline silica) (≤0.1 % of this SRM) is listed as Group 1, *carcinogenic to humans* by IARC, *known human carcinogen* (respirable size) by NTP, and is not listed by OSHA as a designated carcinogen.

Tumorigenic data: Rat, Inhalation, TCLo: 50 mg/m^3 (6 h)

Mutagenic data: Human, 120 mg/L (24 h)

Reproductive Toxicity: No data available.

Specific Target Organ Toxicity (STOT), Single Exposure: Category 3, Quartz (crystalline silica) inhalation may cause respiratory tract irritation. Portland cement may cause irritation to mucous membranes when wet due to caustic nature of material.

Specific Target Organ Toxicity (STOT), Repeated Exposure: Category 1, Lungs.

Repeated and prolonged exposure to Portland cement and respirable quartz may cause chronic bronchitis, emphysema, cement pneumoconiosis, and silicosis.

Aspiration hazard: Not applicable.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data: No recognized unusual toxicity to plants or animals.

Persistence and Degradability: No data available.

Bioaccumulative Potential: No data available.

Mobility in Soil: No data available.

Other Adverse effects: No known significant effects or critical hazards.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Not regulated by DOT and IATA.

15. REGULATORY INFORMATION

U.S. Regulations

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.
SARA Title III Section 302 (40 CFR 355.30): Not regulated.
SARA Title III Section 304 (40 CFR 355.40): Not regulated.
SARA Title III Section 313 (40 CFR 372.65): Not regulated.
OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21)

ACUTE HEALTH:	Yes
CHRONIC HEALTH:	Yes
FIRE:	No
REACTIVE:	No
PRESSURE:	No

State Regulations

California Proposition 65: Warning! This product contains chemicals (trace elements) known to the State of California to cause cancer, birth defects or other reproductive harm. This product contains a chemical (quartz) known to the state of California to cause cancer.

U.S. TSCA Inventory: Portland cement and quartz are listed.

TSCA 12(b), Export Notification: Not listed.

Canadian Regulations: WHMIS Information is not provided for this material.

16. OTHER INFORMATION

Issue Date: 31 August 2021

Sources: Vendor SDS, CEMEX USA: *Portland Cement Clinker*, April 2017

ChemADVISOR, Inc., SDS *Portland Cement*, 09 December 2015.

ChemADVISOR, Inc., SDS *Quartz*, 09 December 2015.

CDC; NIOSH; *NIOSH Pocket Guide to Chemical Hazards*; Department of Health and Human Services (DHHS), Centers for Disease Control and Prevention (CDC), National Institute for Safety and Health; *Particulates Not Otherwise Regulated*, 30 October 2019; available at https://www.cdc.gov/niosh/npg/npgd0480.html (accessed Aug 2021).

United States Department of Labor Occupational Safety and Health Administration, *Preventing Skin Problems from Working with Portland Cement*, available at https://www.osha.gov/sites/default/files/publications/OSHA-3351-portland-cement.pdf (accessed Aug 2021).

PubChem Database, National Library of Medicine, *Silicon Dioxide CAS* 14808-60-7; available at https://pubchem.ncbi.nlm.nih.gov/compound/24261 (accessed Aug 2021).

Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	OSHA	Occupational Safety and Health Administration
CAS	Chemical Abstracts Service	PEL	Permissible Exposure Limit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	RCRA	Resource Conservation and Recovery Act
CFR	Code of Federal Regulations	REL	Recommended Exposure Limit
DOT	Department of Transportation	RQ	Reportable Quantity
EINECS	European Inventory of Existing Commercial Chemical Substances	RTECS	Registry of Toxic Effects of Chemical Substances
EPCRA	Emergency Planning and Community Right-to-Know Act	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	SCBA	Self-Contained Breathing Apparatus
IATA	International Air Transport Association	SRM	Standard Reference Material
IDLH	Immediately Dangerous to Life and Health	STEL	Short Term Exposure Limit
LC50	Lethal Concentration	STOT	Specific Target Organ Toxicity
LD50	Median Lethal Dose or Lethal Dose, 50 %	TCLo	Lowest Toxic Concentration
LEL	Lower Explosive Limit	TLV	Threshold Limit Value
MSDS	Material Safety Data Sheet	TPQ	Threshold Planning Quantity
NFPA	National Fire Protection Association	TSCA	Toxic Substances Control Act
NIOSH	National Institute for Occupational Safety and Health	TWA	Time Weighted Average
NIST	National Institute of Standards and Technology	UEL	Upper Explosive Limit
n.o.s.	Not Otherwise Specified	WHMIS	Workplace Hazardous Materials Information System
NTP	National Toxicology Program		

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