SAFETY DATA SHEET

This Safety Data Sheet is compliant with the OSHA Hazard Communication Standard (29 CFR 1910.1200).

SECTION 1: IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

1.1 Product identifier

Trade name:	**Nickel-coated Microspheres**
Synonym(s):	Nickel-Coated Ceramic Proppant; Semi-Crystalline Alumina Silicate; Sintered Kaolinite
Preparation/Revision date:	8 November 2018

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses:	Various industrial uses
Uses advised against:	None known

1.3 Details of the supplier of the safety data sheet

Manufacturer / Supplier

Company name:	CARBO Ceramics Inc.
Address:	575 N. Dairy Ashford Road, Suite 300 Houston, Texas 77079, USA
Customer service:	1-337-367-6151

1.4 Emergency telephone number

For Chemical Emergency
Spill, Leak, Fire, Exposure, or Accident
Call CHEMTREC Day or Night
Within USA and Canada: 1-800-424-9300

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

The mixture has been assessed and /or tested for its physical, health and environmental hazards and the following classifications apply. 99% of the mixture consists of ingredient(s) of unknown acute toxicity.

Classification according to the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Classification:	Skin Sensitization, Category 1

2.2 Label elements

Hazard pictogram:

Signal word: Warning

Hazard statement(s): H317 - May cause an allergic skin reaction.

Precautionary statements:

- Prevention: P261 - Avoid breathing dusts / fume.
  P272 - Contaminated work clothing should not be allowed out of the workplace.
  P280 - Wear protective gloves.
- Response: P302+P352 - IF ON SKIN: Wash with plenty of water.
  P333+P313 - If skin irritation or rash occurs: Get medical advice / attention.
  P321 - Specific treatment (see First Aid Measures on this label).
  P362+P364 - Wash contaminated clothing before reuse.
- Storage: None.
- Disposal: P501 - Dispose of contents / container in accordance with local / regional / national / international regulations.

Hazards Not Otherwise Classified: None

2.3 Other hazards

None

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Mixture

Chemical Name	Percent	CAS No.	Hazard Classification	Notes
Ceramic materials and wares, chemicals	97-99	66402-68-4	Not classified	
Metallic Coating	0-3	Mixture		
Nickel	70-90	7440-02-0	H317, H351	#, †, *

#: This substance has workplace exposure limit(s).

†: Percent represents percent composition within the coating material.

*: Although product is not classified as a carcinogen, nickel dust has been classified as possibly carcinogenic to humans (IARC Category 2B) when inhaled.

Composition comments: The metallic coating is classified as mixture per OSHA regulations, and pertinent coating component information is provided in compliance with these requirements. Exposure will be to the massive form of the metallic coating only, and no airborne or environmental exposure to individual components is expected during normal conditions of use and handling.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

Inhalation:	Remove to fresh air. Get medical attention if irritation or symptoms persist.
Skin contact:	Wash with soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse.
Eye contact:	Rinse immediately with plenty of water, including under the eyelids, for at least 15 minutes. Get medical attention if irritation or symptoms persist.
Ingestion:	Rinse mouth. Do not induce vomiting. Get medical attention.
Notes to Physician:	None specified.

4.2 Most important symptoms and effects, both acute and delayed	Individuals sensitive to nickel may experience an allergic skin reaction. Exposure to dust may cause irritation of eyes, nose, throat and mucous membranes. Prolonged contact with skin may cause irritation. Use of the product as intended does not result in exposure to dust**.**
4.3 Indication of any immediate medical attention and special treatment needed	Provide general supportive measures and treat symptoms as needed.

SECTION 5: FIRE FIGHTING MEASURES

General fire hazards	This product is not flammable under normal conditions.

5.1 Extinguishing Media

Suitable extinguishing media:	Use Class D extinguishing agents or sand.
Unsuitable extinguishing media:	Do not use water if molten metal is present.

5.2 Special hazards arising from the substance or mixture	At temperatures above the melting point, metal fumes or vapors may be emitted.

5.3 Advice for firefighters

Special protective equipment for firefighters:	In the event of fire, wear self-contained breathing apparatus.
Special firefighting procedures:	Not applicable
Special remarks on fire hazards:	None

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel:	Avoid dust formation. Wear gloves and other suitable protective clothing. Avoid contact with skin and eyes. Contaminated clothing should not be allowed outside of the workplace.
For emergency responders:	Use personal protection recommended in Section 8 of the SDS.

6.2 Environmental Precautions	None known
6.3 Methods and materials for containing and cleaning up	Sweep up spilled substance and remove to safe place. Pick up and arrange for disposal without creating dust. Spilled material can reduce traction and may present a slip hazard. Collect and dispose of spillage as indicated in Section 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling	Avoid dust formation. Avoid breathing dust. Wear protective gloves. Contaminated clothing should not be allowed outside of the workplace. Observe good industrial hygiene practices. Spilled material can reduce traction and may present a slip hazard.
7.2 Conditions for safe storage, including any incompatibilities	Keep container tightly closed. Store in original containers in a cool and dry environment. Store in accordance with local, regional, national and international regulations.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

United States. Occupational Exposure Limits

Component	CAS No.	OSHA PEL	ACGIH TLV	NIOSH
Nickel	7440-02-0	1 mg/m^3	1.5 mg/m^3 (inhalable fraction)	0.0015 mg/m^3 (TWA) 10 mg/m^3 (IDLH)

Consult local authorities for acceptable exposure limits

8.2 Exposure Controls

8.2.1. Appropriate engineering controls — Observe occupational exposure limits and prevent generation of dusts.

General Information: — Personal protective equipment should be chosen according to applicable standards and in consultation with the supplier of the personal protective equipment. Spilled material can reduce traction and may present a slip hazard.

8.2.2 Individual Protective Measures

Eye/face protection: — Wear safety glasses with side shields or goggles. Avoid wearing contact lenses while handling.

Skin protection:

- Hand protection: — Wear protective gloves.
- Other: — Minimize skin contact.

Respiratory protection: — In case of inadequate ventilation or risk of inhalation of dust, use a suitable air-purifying respirator with particle filter or dust mask (Type P2 or equivalent).

Thermal hazards: — Not applicable

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Form	Solid spheres	**Explosive properties**	Not applicable
Color	Silver to gray	**Explosive limit**	Not applicable
Odor	Odorless	**Vapor pressure**	Not applicable
Odor threshold	Not applicable	**Vapor density**	Not applicable
pH	Not applicable	**Evaporation rate**	Not applicable
Melting/freezing point	2,000°F / 1,093°C (coating) 4,000°F / 2,204°C (Estimated - Substrate)	**Relative density**	2.7 (water = 1)
Boiling point, initial boiling point and boiling range	Not applicable	**Partition coefficient (n-octanol/water)**	No data available
Flash point	Not applicable	**Solubility (water)**	Insoluble in water
Auto-ignition temperature	Not applicable	**Decomposition temperature**	No data available
Flammability (solid, gas)	Not applicable	**Bulk density**	82 lb/ft^3 (1.31 g/cm^3)
Flammability limit-lower %	Not applicable	**Viscosity**	Not applicable
Flammability limit-upper %	Not applicable	**VOC (weight %)**	0 %
Oxidizing properties	Not applicable	**Percent volatile**	Not applicable

9.2 Other Information No relevant additional information available.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity The product is stable and non-reactive under normal conditions of use, storage and transport.

10.2 Chemical stability Material is stable under normal conditions.

10.3 Possibility of hazardous reactions Hazardous polymerization does not occur under normal conditions.

10.4 Conditions to avoid Avoid contact of molten coating with water.

10.5 Incompatible materials Oxidizers, acids, alkalines and halogenated compounds.

10.6 Hazardous decompositions products At temperatures above the melting point, metal fumes or vapors may be emitted.

SECTION 11: TOXICOLOGICAL INFORMATION

General information on likely routes of exposure

Ingestion: May cause discomfort if swallowed.

Inhalation: While the use of this product as intended generally does not create respirable dusts, small amounts may form from transport or conveyance. Inhalation of dust may cause respiratory tract irritation. Prolonged inhalation of insoluble, respirable (less than 10 micron) dusts can lead to pulmonary damage. Prolonged inhalation of nickel can cause respiratory tract damage and cancer. Use standard hygienic practices to minimize exposure to dusts that may form.

Skin contact: Use of this product as intended does not result in exposure to dust. Individuals sensitive to nickel may experience an allergic skin reaction. Dust may irritate skin.

Eye contact: Dust may irritate eyes. Use of this product as intended does not result in exposure to dust.

Symptoms: Individuals sensitive to nickel may experience an allergic skin reaction. Exposure to dust may cause irritation of eyes, nose, throat and mucous membranes. Prolonged contact with skin may cause irritation. Use of the product as intended does not result in exposure to dust.

11.1 Information on toxicological effects

Acute Toxicity: No data were identified for the product as a whole or in coating form. Data are for constituents.

Product / ingredient name	Result	Species	Dose	Exposure
Ceramic Materials and Wares, Chemicals	No data	No data	No data	No data
Metallic Coating	No data	No data	No data	No data
Nickel (powder)	LD_{50}	Rat	>9000 mg/kg	Oral

Serious Eye Damage/Irritation:	No data were identified for this product as a whole. Nickel powder was not irritating to the eyes of rabbits in experimental tests.
Skin corrosion/Irritation:	No data were identified for this product as a whole. Nickel metal powder was not irritating to the skin of rabbits in experimental tests.
Respiratory/Skin Sensitization:	Individuals sensitive to nickel may experience an allergic reaction.
Germ Cell Mutagenicity:	No data were identified for this product or its constituents.
Carcinogenicity:	Nickel is suspected of causing cancer via inhalation and is listed by NTP as an anticipated carcinogen and by IARC as a Category 2B carcinogen.
Reproductive Toxicity:	No data were identified for this product or its constituents.
Developmental Effects:	No data were identified for this product or its constituents.
STOT – Single Exposure:	No data were identified for this product or its constituents.
STOT – Repeated Exposure:	While the use of this product as intended is not anticipated to create respirable dust, small amounts may form from transport or conveyance. Prolonged inhalation of respirable dust (less than 10 micron) can lead to pulmonary damage. Prolonged inhalation of nickel can cause respiratory tract damage.
Aspiration Hazard:	Not relevant based on physical form of the product.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity / Aquatic ecotoxicity No data were identified for the product as a whole. Data are for constituents.

Product / ingredient name	Species	Result (mg/L)	Exposure
Metallic Coating	No data	No data	No data
Nickel	Algae (OECD 201 or equivalent)	EC_{50}: 0.18	72 hours
	Fish (OECD 203 or equivalent)	LC_{50}: >100	96 hours
	Invertebrate (OECD 202 or equivalent)	EC_{50}: > 100	48 hours

12.2 Persistence and degradability	Product is not biodegradable, has low solubility in water and is not expected to decompose in the environment.
12.3 Bioaccumulative potential	Product is not biodegradable, has low solubility in water and is not expected to accumulate in the environment.
12.4 Mobility	No data available.
12.5 Results of PBT and vPvB assessment	Not a PBT or vPvB material.
12.6 Other adverse effects	No data were identified for this product. Not classified for hazards to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

Residual waste:	Dispose of in accordance with all applicable regulations.
Contaminated packaging:	Empty containers should be taken to an approved waste handling site for recycling or disposal.
Disposal methods/information:	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local, regional, national and international regulations.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

SECTION 14: TRANSPORT INFORMATION

14.1 UN Number	Not applicable, not regulated as hazardous for transport.
14.2 UN proper shipping name	Not applicable, not regulated as hazardous for transport.
14.3 Transport hazard class(es)	Not applicable, not regulated as hazardous for transport.
14.4 Packing group	Not applicable, not regulated as hazardous for transport.
14.5 Environmental hazards	Not applicable, not regulated as hazardous for transport.
14.6 Special precautions for user	Not applicable, not regulated as hazardous for transport.

14.7 Transport in bulk according to Annex II MARPOL73/78 and the IBC Code	Not applicable, not regulated as hazardous for transport.

The transport regulation may vary based on the country of use. Check for the appropriate regulations in the country of transport or usage of this product.

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

The metallic coating is classified as a mixture per OSHA regulations, and coating component information is provided in compliance with these requirements. Exposure will be to the massive form of the metallic coating only, and no airborne or environmental exposure to individual components is expected during normal conditions of use and handling.

USA Federal Regulations

29 CFR 1910.1200 Hazard Communication Standard (HCS):	Hazardous
TSCA - U.S. Inventory (TSCA 8b):	Exempt/Compliant
Clean Water Act:	Nickel
Clean Air Act – Hazardous Air Pollutants:	None
SARA Title III – Section 302, Extremely Hazardous Substances (EHS):	None

CERCLA - Hazardous substances:

Components	Concentration	Section 304 CERCLA Hazardous Substance	CERCLA Reportable Quantity	Product Reportable Quantity
Metallic Coating	1-3%			
Nickel	1-3%		100 lbs	3,300 lbs (particles <100µm only)

Release of CERCLA hazardous substances in excess of any reportable quantity threshold to the environment requires notification to the National Response Center (1-800-424-8802 or 1-202-267-2675).

SARA Title III – 311/312, Hazard Classes:

Fire / Flammability:	No
Reactivity:	No
Release of Pressure:	No
Acute Health Hazard:	Yes
Chronic Health Hazard:	No

SARA 313 – Toxic Chemicals: Nickel (as non-metallic coating substance only)

USA State Regulations

Components	Massachusetts – Right-to-Know	New Jersey – Right-to-Know	Pennsylvania – Right-to-Know
Metallic Coating			
Nickel	Yes (as non-metallic substance only)	Yes (as non-metallic substance only)	Yes (as non-metallic substance only)

California Proposition 65: WARNING: This product contains a chemical known to the State of California to cause cancer.

SECTION 16: OTHER INFORMATION

List of abbreviations

ACGIH	American Conference Of Governmental Industrial Hygienists
CAS	Chemical Abstract Service
EC	Effective Concentration (Half Maximal)
°F	Degrees Fahrenheit
g/cm^3	Grams Per Cubic Meter
H351B	Rinse Cautiously with Water for Several Minutes
IARC	International Agency for Research on Cancer
IDLH	Immediately Dangerous To Life or Health
Lb/ft^3	Pounds Per Cubic Foot
LC_{50}	Lethal Concentration (median)
LD_{50}	Lethal Dose (median)

List of abbreviations

mg/kg	Milligrams Per Kilogram
mg/L	Milligrams Per Liter
mg/m^3	Milligrams Per Cubic Meter
N/A	Not Applicable
NIOSH	National Institute for Occupational Safety
NOEC	No Observed Effect Concentration
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration (United States)
PBT	Persistent, Bioaccumulative and Toxic
PEL	Permissible Exposure Limit
STOT	Single Target Organ Toxicity
TLV	Threshold Limit Value
TWA	Time Weighted Average
VOC	Volatile Organic Compound
vPvB	Very Persistent and Very Bioaccumulative

SDS Revisions

SDS prepared on 8 November 2018

Disclaimer

This SDS has been prepared in accordance with the Hazard Communication Rule 29 CFR 1910.1200. Information herein is based on data considered to be accurate as of the date prepared. No warranty or representation, express or implied, is made as to the accuracy or completeness of this data and safety information. No responsibility can be assumed for any damage or injury resulting from abnormal use, failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.