ADVANCED CERAMICS MANUFACTURING

7800 South Nogales Highway || Tucson, AZ 85756
t: 520.547.0850 || www.acmtucson.com

SAFETY DATA SHEET

SECTION 1 — IDENTIFICATION

Product Identifier

Product Name	**CF4/CF4-B/CF4-C/CF4-D**
Product Code	

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

Recommended use	Water soluble material for forming molds and cores.

Details of the supplier of the safety data sheet

Manufacturer	Advanced Ceramics Manufacturing, LLC.
	7800 South Nogales Highway
	Tucson, AZ 85756
Telephone (General)	520.547.0850

Emergency Telephone Number

800.554.9964 - Hazardous Materials Support Center
800.424.9300 - CHEMTREC (Spill related emergencies)

SECTION 2 — HAZARD(S) IDENTIFICATION

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012

Oxidizing solids (Category 3), H272
Eye irritation (Category 2A, H319
The formula is proprietary information and is the property of Advanced Ceramics Manufacturing.

Label Components

Oxidizer

Other Dangers

OSHA HCS 2012

H272 May intensify fire; oxidizer Eye Contact – Direct contact may cause irritation.

H319 Causes serious eye irritation.
P210 Keep away from heat
P220 Keep/Store away from clothing/combustible materials
P221 Take any precaution to avoid mixing with combustibles
P264 Wash skin thoroughly after handling

P280 Wear protective gloves/eye protection/face protection

P305, P351, P338 IF IN EYE: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337, P313 If eye irritation persists, get medical advice/attention
P370, P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish
P501 Dispose of contents/container to an approved waste disposal plant

SECTION 3 — COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Characterization: Mixture (water-soluble core material)

Materials:	**Identifiers**	**WT%**	**TLV (mg/m³)**	**PEL (mg/m³)**
KNO3	7757-79-1	20%-50%	NE	NE
NaNO3	7631-99-4	50%-80%	NE	NE
NaNO2	7632-00-0	0%-65%	NE	NE
Proprietary inorganic powder		0.1-30%	NE	NE

(T) - Total (R) - Respirable (I) - Inhalable (NE) - Not Established

SECTION 4 — FIRST-AID MEASURES

General advice	Move out of dangerous area. Consult a physician. Show this SDS to the physician.
Contact with Eyes	Flush eyes with running water for at least 15 minutes — lift upper and lower eyelids. Consult a physician
Contact with Skin	Wash skin thoroughly with mild soap and plenty of water. Consult a physician.
Inhalation	Move the injured person to fresh air. If not breathing, initiate pulmonary resuscitation. Get medical attention.
Ingestion	Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Most important symptoms and effects, both acute and delayed

Refer to section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

No data available.

SECTION 5 — FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media	Dry powder or dry sand

Special hazards arising from the substance or mixture	
Unusual Fire and Explosion Hazards	Explodes when heated above 1000°F / 537°C. Nitrogen oxides (Nox), potassium oxides, sodium oxides, sulpher oxides may form
Advice for Firefighters	Wear self-contained breathing apparatus for firefighting if necessary
Further information	Use water spray for cool unopened containers.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	
Personal Precautions	Avoid dust formation, Avoid breathing vapors, mist or gas, Ensure an adequate ventilation
Emergency Procedures	Ensure an adequate ventilation
Environmental Precautions	
	Do not let product enter drains
Methods and material for containment and cleaning up	
Containment/Clean-up Measures	Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

SECTION 7 — HANDLING AND STORAGE

Precautions to be taken in Handling and Storing	
Handling	Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs. Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.Keep away from heat and sources of ignition. For precautions see section 2.
Conditions for safe storage, including any incompatibilities	
Storage	Keep container tightly closed in a dry and well-ventilated place. hygroscopic Store under inert gas. Storage class (TRGS 510): 5.1B: Oxidizing hazardous materials Keep away from sources of heat, sparks and flame.
Specific End Use	
	Not indicated.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters	
PNOS	TLV-TWA$_{ACGIH}$= No exposure limit value known. TLV-TWA$_{ACGIH}$ = No exposure limit value known.
Exposure Control	
Engineering Measures/Controls	Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal Protective Equipment Pictograms	
Respiratory Protection	Use of a Class NIOSH N95 respirator where dust is generated is recommended. Follow the OSHA respirator regulations found in 29 CFR 1910.134.
Eye / Face Protection	Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Skin Protection	Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
Other Clothing & Equipment	Work clothing or coveralls to minimize skin contact.
General Industrial Hygiene Considerations	Handle in accordance with good industrial hygiene and safety practice. Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Ventilation	Where risk assessment shows air-purifying respirators are appropriate use a fullface particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Environmental Exposure Controls	Do not let product enter drains.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Information on Physical and Chemical Properties	
Appearance:	White powder
Smell:	no detectable odor
Odor threshold:	not available
pH:	5.5 - 8.0 at 50 g/l at 20 °C (68 °F)
Melting point / freezing point:	170-270°C (estimated)
Initial boiling point and boiling range:	not available
Flash point:	noncombustible
Evaporation rate:	not available
Flammability (solid, gas):	not available
Upper / lower flammability or explosive limits:	not available
Vapor pressure:	not available

Vapor density:	not available
Relative density:	2.17 g/cc
Solubility:	soluble in water
Partition coefficient n-octanol/water:	not available
Auto-ignition temperature:	not applicable
Decomposition temperature:	See reactivity
Viscosity:	not applicable
Explosive properties:	See Section 5 and 10.
Oxidizing properties:	Oxidizer. See section 2.

SECTION 10 — STABILITY AND REACTIVITY

Reactivity	The product is not reactive under normal conditions of use and storage. When heated to decomposition oxides of sulfur will be released. Do not allow molten material to contact magnesium.
Chemical stability	The product is stable under normal conditions of use and storage.
Possibility of hazardous reactions	Refer to Reactivity
Conditions to avoid	Fusion of mixtures of metal cyanides, including lead thiocyanate, with metal chlorates, perchlorates, nitrates or nitrites causes a violent explosion. Addition of one solid component (even as a residue in small amount) to another molten component is also highly dangerous. Heat
Incompatible materials	Strong acids, Strong reducing agents, Powdered metals, Organic materials, Alkali metals, Alkaline earth metals, Cyanides, thiocyanates. Explodes when mixed with cyanides, boron phosphide, sodium hypophosphite or powdered metals + water. DO NOT add any other material to CF4.
Hazardous decomposition products	Hazardous decomposition products formed under fire conditions. - Nitrogen oxides (NOx), Sodium oxides, potassium oxides, sulpher oxides, magnesium oxides
TSCA Listing	All ingredients are on the TSCA inventory, or exempt.

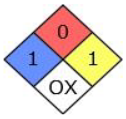
SECTION 11 — TOXICOLOGY INFORMATION

Information on toxicological effects	No toxicological effects acute and / or chronic known as a result of exposure to the product. Contact with eyes may cause mechanical irritation. The frequent and prolonged contact with skin may cause irritation and defatting.

SECTION 12 - ECOLOGICAL INFORMATION

Toxicity	**Toxicity (KNO3)** **Ecology - Water:** Mild water pollutant (surface water). Ground water pollutant. Maximum concentration in drinking water: 50mg/l (nitrate). Not harmful to fishes. Slightly harmful to invertebrates. May cause eutrophication. Slightly harmful to plankton. LC50 fishes 1 162 mg/l (96 h; Pisces; Lethal) LC50 other aquatic organisms 1 39 mg/l (96 h; Daphnia magna) EC50 other aquatic organisms 1 200 - 1000 mg/l (Plankton; Nocivity test) LC50 fish 2 1378 mg/l (Poecilia reticulata) LC50 other aquatic organisms 2 490 mg/l (48 h; Daphnia magna) TLM fish 1 3000 mg/l (96 h; Lepomis macrochirus) TLM fish 2 162 mg/l (96 h; Gambusia affinis) Threshold limit other aquatic organisms 1 39 mg/l (96 h; Daphnia magna) Threshold limit other aquatic organisms 2 490 mg/l (48 h; Daphnia magna) **Persistence and degradability:** Unavailable **Bioaccumulative potential:** Unavailable **Mobility in soil:** This product is water soluble and so may spread in water systems. **Results of PBT and vPvB assessment:** Unavailable **Other adverse effects:** Harmful to aquatic organisms.None. **Toxicity (NaNO3)** LC50 - Gambusia affinis (mosquito fish) - 6650 mg/l - 96hr EC50 - Daphnia magna (water flea) - 6000 mg/l - 24hr **Persistence and degradability:** No data available **Bioaccumulative potential:** No data available **Mobility in soil:** No data available **Results of PBT and vPvB assessment:** No data available (not required/not conducted) **Other adverse effects:** No data available Toxicity Toxicity to fish flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 0.94 - 1.92 mg/l - 96.0 h mortality NOEC - Oncorhynchus mykiss (rainbow trout) - 0.54 mg/l - 96.0 h Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 12.5 mg/l - 48 h

Toxicity	12.2 Persistence and degradability The methods for determining biodegradability are not applicable to inorganic substances. 12.3 Bioaccumulative potential no data available 12.4 Mobility in soil no data available 12.5 Results of PBT and vPvB assessment PBT/vPvB assessment not available as chemical safety assessment not required/not conducted 12.6 Other adverse effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life.NaNO2 LC50 - Oncorhynchus mykiss (rainbow trout) - 0.94 - 1.92 mg/l - 96.0 h mortality NOEC - Oncorhynchus mykiss (rainbow trout) - 0.54 mg/l - 96.0 h EC50 - Daphnia magna (Water flea) - 12.5 mg/l - 48 h Persistence and degradability The methods for determining biodegradability are not applicable to inorganic substances. Bioaccumulative potential no data available Mobility in soil no data available Results of PBT and vPvB assessment PBT/vPvB assessment not available as chemical safety assessment not required/not conducted Other adverse effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life.
Persistence and degradability	Information not available.
Bioaccumulative potential	Information not available.
Mobility in Soil	Information not available.
Other adverse effects	Information not available.
Other Information	Discharge into the environment must be avoided.
SECTION 13 - DISPOSAL CONSIDERATIONS	
Waste treatment methods	Contact a licensed professional waste disposal service to dispose of this material. Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable.
SECTION 14 - TRANSPORT INFORMATION	
	Hazardous. Oxidizer
UN Number	1487
UN Proper shipping name	Potassium Nitrate and Sodium Nitrite Mixture
Transport hazard class(es)	5.1
Packing group	III
Environmental hazards	Oxidizer
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Unknown
SECTION 15 - REGULATORY INFORMATION	
Safety, health and environmental regulations / legislation specific for the substance or mixture	**Pennsylvania Right To Know Components:** Chemical name: Nitric acid, potassium salt CAS number: 7757-79-1 **New Jersey Right To Know Components** Common name: POTASSIUM NITRATE CAS number: 7757-79-1 **SARA 302 Components** No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302 **SARA 311/312 Hazards** Reactivity hazard **SARA 313 Components** The following components are subject to reporting levels established by SARA Title III, Section 313: Sodium Nitrate CAS-7631-99-4 **Pennsylvania Right To Know Components** Chemical name: Nitric acid, sodium salt CAS number: 7631-99-4 **Massachusetts Right To Know Component**s Sodium Nitrate CAS-7631-99-4 **New Jersey Right To Know Components** Sodium Nitrate CAS-7631-99-4 **California Prop. 65 Components** This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.
Chemical Safety Assessment	Not available.



SECTION 16 — OTHER INFORMATION

Last Revision Date	12/12/2023
Preparation Date	9/9/2021
Key literature references and sources for data:	

- 29 CFR 1910.1200(f) and Appendix C of 29 CFR 1910.1200 (and subsequent amendments and adjustments)
- OSHA GHS (and subsequent amendments and adjustments)
- OSHA Hazard Communication Standard (HCS) (and subsequent amendments and adjustments)
- 1910 Subpart G - Occupational Health and Environmental Control (and subsequent amendments and adjustments)
- Safety data sheet of the supplier of the product

Acronyms:

ACGIH:	American Conference of Governmental Industrial Hygienists
ADR:	European Agreement concerning the International Carriage of Dangerous Goods by Road
CAS:	Chemical Abstracts Service
CFR:	Code of Federal Regulations
CLP:	Classification, Labeling and Packaging
EINECS:	European Inventory of Existing Chemical Substances
GHS:	Globally Harmonized System
HCS:	Hazard Communication Standard
IATA:	International Air Transport Association
IMDG Code:	International Maritime Code for Dangerous Goods
OSHA:	Occupational Safety and Health Administration
PBT:	Persistent, Bioaccumulative, Toxic
PEL:	Permissible Exposure Limit
PNOS:	Particles Not Otherwise Specified
REACH:	Registration, Evaluation, Authorization and Restriction of Chemicals
RID:	Regulation on the Inland transport of Dangerous goods by rail
TLV:	Threshold Limit Value
TSCA:	Toxic Substances Control Act
TWA:	Time-Weighted Average
vPvB:	very Persistent, very Bioaccumulative
Disclaimer/Statement of Liability	The information contained herein is believed to be accurate. However, it is provided solely for the customer's consideration, investigation and verification. Advanced Ceramics Manufacturing hereby specifically disclaims any and all warranties, express or implied, regarding the accuracy and completeness of such information, and makes no representations with respect thereto.