

# MATERIAL SAFETY DATA SHEET

Complies with 91/155/EEC, 67/548/EEC, and 1999/45/EC

## Section 1. Identification of Chemical Substance and Company

- 1.1 **PRODUCTS IDENTIFICATION:** ZCast™500 powder
- 1.2 **USE OF SUBSTANCE:** Sand and plaster powder for making rapid-prototyping molds.
- 1.3 **COMPANY:** **Z Corporation**  
20 North Ave.  
Burlington, MA 01803  
Contact Person: Manager of Technical Services  
Telephone Number: 781-852-5005  
Date of Preparation: 6/02
- 1.4 **EMERGENCY TELEPHONE:** 781-852-5005

## Section 2. Composition/Information on Ingredients

Component	Approximate Percentage	ACGIH TLV as TWA
1. Sand	0 - 90%	10 mg/m <sup>3</sup> Total 3 mg/m <sup>3</sup> Respirable
2. Calcium Sulfate Hydrate	0 - 90%	10 mg/m <sup>3</sup> Total 3 mg/m <sup>3</sup> Respirable
3. Vinyl Polymer	0 -10%	10 mg/m <sup>3</sup> Total 3 mg/m <sup>3</sup> Respirable
4. Water Soluble Resin Coagulant	0 - 5%	10 mg/m <sup>3</sup> Total 3 mg/m <sup>3</sup> Respirable
5. Calcium Sulfate Dihydrate	0 - 5%	10 mg/m <sup>3</sup> Total 3 mg/m <sup>3</sup> Respirable
6. Salt	0 - 5%	None

\* See Section 15 Regulatory Information for chemical classifications.

### Notations:

ACGIH TLV = American Conference of Governmental Industrial Hygienist Threshold Limit Values (recommended limits)

TWA = time weighted average

Total = total dust

Respirable = collection of respirable sized particles

## Section 3 Hazard Identification

This product is a preparation and there are no dangerous chemicals per Directive 1999/45/EC.

**Effects of Overexposure:** Excessive exposure can result in irritation of the eyes, nose, skin, throat and/or lungs. Dust may cause coughing, sneezing or nasal irritation.

**Acute:** Eyes, skin, nose, throat, and lung irritant. Contact may dry skin and can be harmful if absorbed through the skin. Eye contact may cause redness and possibly swelling of the conjunctiva. Overexposure may cause respiratory and/or skin sensitization. Ingestion may cause abdominal discomfort, nausea, vomiting and diarrhea. Harmful if swallowed.

**Chronic:** Pre-existing upper respiratory and lung disease may be aggravated by exposure.

**Target Organs:** Lungs

**Routes of Entry:** Inhalation, skin absorption, eye contact, ingestion

## Section 4 Emergency First Aid

**Inhalation:** Remove from area to fresh air. Seek medical attention if respiratory irritation develops or if breathing becomes difficult.

**Eye Contact:** Immediately flush eyes with copious amounts of water for at least 15 minutes. Call physician if irritation continues.

**Skin Contact:** Wash skin with soap and rinse with water after use. Remove and wash contaminated clothing. If skin has become cracked, take appropriate action to prevent infection and promote healing.

**Ingestion:** Wash out mouth with water, provided the person is conscious, and seek medical attention. Plaster hardens when wet, and, if ingested, may result in obstruction.

## Section 5 Fire and Explosion Hazard

Flash point (Method Used)	Flammable limits	LEL	UEL
Not Applicable		Not Applicable	Not Applicable

Note: product is a combustible powder similar to common cooking sugar.

**Extinguishing Media:** Water spray or Class AB fire extinguisher  
If unconfined, ignition of the powder will cause a Class A fire. In case of fire use water streams.

### Special Fire Fighting Procedures

As with all fires, fire fighters should wear full protective gear including supplied air respirators. This material in contact with water may create a slippery walking surface.

**Unusual Fire & Explosion:** Emits toxic fumes under fire conditions. Fine dusts with oxygen can be explosive – keep away from open flame.

## Section 6 Accidental Release Measures

**Steps to be Taken in Case Material is Released or Spilled:** Best method is to use the static proof vacuum cleaner to clean up spills. Wear respirator, chemical safety goggles, and chemical gloves. Sweep or vacuum material from spillage into a waste container for disposal. Avoid production of dust. Do not wash down drains since this may plug the drain and violate wastewater permits. Place in closed containers. Ventilate area and wash spill site after material cleanup is complete.

Avoid contamination of ground and surface waters. Surfaces subject to spills or dusting with this product can become slippery when wet. Use care to avoid falls.

**Waste Disposal Method:** Follow safe solid waste disposal guidelines in accordance with Community requirements and local or national governments.

## Section 7 Storage and Handling

- 7.1. **Handling Precautions:** Avoid handling procedures which produce high levels of dust. Use mechanical ventilation to prevent dust generation. Take precautionary measures against static discharge. Use proper bonding and grounding during product transfer as described in National Fire Protection Association Document NFPA 77. If dust collection systems are used they should be provided with explosion venting and automatic fire protection.
- 7.2. **Storage Precautions:** Store product in a cool, dry, ventilated area away from sources of heat, moisture, strong oxidizing materials and explosives. Keep containers tightly closed.
- 7.3. **Specific Use:** Under planned use this product should not result in excessive dust or hazards to the user following the recommended processes for creating prototype models. During cleanup with vacuum cleaner only use the static-free vacuum cleaner provided with the equipment. Explosive dust levels can be generated in the vacuum cleaner, therefore it is recommended that the unit be cleaned frequently.

## Section 8 Exposure Controls & Personal Protection

- 8.1 **Exposure Limit Values:** See Section 2 for Threshold Limit Value (exposure limits). The European Member States have different standards for the components in this preparation. These powders are potentially irritant dusts with a general exposure standard of 10 mg/m<sup>3</sup>. Particulates not otherwise classified (total dust) in Germany are 6 mg/m<sup>3</sup>; and 10 mg/m<sup>3</sup> in other European Countries. The respirable dust levels are 5 mg/m<sup>3</sup>.
- 8.2. **Exposure Controls:**
- 8.2.1. **Occupational Exposure Controls:** Mechanical ventilation needs to be adequate to handle low levels of dust when adding product or when there is a spill.
- 8.2.1.1. **Respiratory Protection:** Respirators are generally not needed under normal conditions of use. If dust levels exceed the exposure limits use an approved dust respirator of at least an N95 (NIOSH) approval. Certain tasks, such as adding powder or cleaning up a spill may require the use of a dust (N95) respirator.
- 8.2.1.2 **Hand Protection:** Avoid skin contact by use of neoprene, butyl, PVC-coated or like type chemical resistant gloves.
- 8.2.1.3. **Eye Protection:** Safety goggles for dust are recommended during powder additions and machine cleaning. An eyewash station is recommended. Always use good personal hygiene and housekeeping practices to minimize dust exposures.
- 8.2.1.4. **Skin Protection:** Special skin protection is not routinely needed when using the product. If clothing becomes contaminated wash before reuse.

**8.2.2. Environmental Exposure Controls:** No special waste code requirements. Follow local community standards when handling wastes.

## Section 9. Physical & Chemical Properties

**9.1 General information:** This product is a powder with a slight odor.

**9.2 Important health, safety, and environmental information and 9.3 Other related information:**

**Boiling Point (F°):** Not applicable

**Vapor Pressure (MM Hg):** Not applicable

**Vapor Density (air -1):** Not applicable

**pH:** 4 - 8 (aqueous solution)

**Melting Point:** Minimum 1450° C

**Spec Gravity (H<sub>2</sub>O=1):** 1.3 - 3.0

**Color:** White/Off-White Powder

**Odor:** Slight odor

**Clarity:** Not applicable

**Solubility:** 0.2%

## Section 10. Stability and Reactivity

**Stability:** Stable

**Incompatible:** Acids and oxidizing agents

**Hazardous Decomposition Products:** Aldehydes, carbon monoxide and carbon dioxide. Temperatures above 1450°C calcium oxide and sulfur dioxide. Irritating and toxic fumes at elevated temperatures.

## Section 11 Toxicological Information

This preparation is not listed as dangerous per Directive 1999/45/EC. To the best of our knowledge, the chemical, physical, and toxicological properties of this mixture have not been thoroughly investigated. The following is RTEC data summary. Data not available for the mixture.

### (1) Sand):

The following information pertains to nickel that is ≤0.3% of this ingredient:

*Oncogenic Transformation-Hamster: kidney 400 mg/L*

*Oncogenic Transformation-Hamster:embryo 5 mmol/L*

*Oral-Rat TDLo:158 mg/kg (MGN):Teratogenic effects*

*Subcutaneous-Rat TDLo:3000 mg/kg/6W-I:Equivocal tumorigenic agent*

*Intramuscular-Rat TDLo:56 mg/kg:Carcinogenic effects*

*Intraleural-Rat TDLo:100 mg/kg/21W-I:Equivocal tumorigenic agent*

*Parenteral-Rat TDLo:40 mg/kg/52W-I:Equivocal tumorigenic agent, Teratogenic effects*

*Implant-Rat TDLo:250 mg/kg:Carcinogenic effects*

*Intramuscular-Mouse TDLo:200 mg/kg:Neoplastic effects*

*Implant-Rabbit, adult TDLo:165 mg/kg/2Y-I:Neoplastic effects, Teratogenic effects*

*Inhalation-Guinea Pig, adult TCLo:15 mg/m<sup>3</sup>/91W-I:Equivocal tumorigenic agent*

*Intramuscular-Hamster TDLo:200 mg/kg/21W-I:Equivocal tumorigenic agent*

*Intramuscular-Rat TD:58 mg/kg:Equivocal tumorigenic agent*

*Implant-Rat TD:23 mg/kg:Equivocal tumorigenic agent*

*Intramuscular-Rat TD:125 mg/kg/13W-I:Neoplastic effects*

*Intramuscular-Mouse TD:800 mg/kg/13W-I:Neoplastic effects*

*Intramuscular-Rat TD:889 mg/kg:Equivocal tumorigenic agent*

*Intraleural-Rat TD:1250 mg/kg/17W-I:Equivocal tumorigenic agent*  
*Intraleural-Rat TD:125 mg/kg/21W-I:Equivocal tumorigenic agent*  
*Intramuscular-Rat TD:200 mg/kg/21W-I:Neoplastic effects*  
*Intramuscular-Rat TD:1 g/kg/17W-I:Carcinogenic effects*  
*Oral-Rat LDLo:5 g/kg*  
*Intratracheal-Rat LDLo:12 mg/kg*  
*Intravenous-Mouse LDLo:50 mg/kg*  
*Intravenous-Dog, adult LDLo:10 mg/kg*  
*Subcutaneous-Rat LDLo:12,500 mg/kg*  
*Intraperitoneal-Rabbit, adult LDLo:7 mg/kg*  
*Subcutaneous-Rabbit, adult LDLo:7500 mg/kg*  
*Oral-Guinea Pig, adult LDLo:5 mg/kg*

The following information pertains to chromium that is ≤0.4% of this ingredient:

*Intravenous-Rat TDL0:2160 mg/kg/6W-I:Equivocal tumorigenic agent*  
*Implant-Rat TDL0:1200 mg/kg/6W-I:Equivocal tumorigenic agent*  
*Implant-Rabbit, adult TDL0:75 mg/kg:Equivocal tumorigenic agent*

## **(2) Calcium Sulfate Hydrate: Food Additive**

### **(3) Vinyl Polymer:**

*Acute Toxicity Effects Data: Oral LD50 (rat) 23,854 mg/kg*  
*Dermal LD50 (rabbit): >7,490 mg/kg,*  
*Inhalation LC50 (rat): 64,000 ppm/4 hr.*  
*Oral-Mouse LD50: 14,270 mg/kg*  
*Oral-Guinea Pig, adult LD50:18,750 mg/kg*  
IARC Cancer Review: Group 3 IMEMDT 7,56,87; Animal Limited Evidence IMEMDT 19,341,79; Human Inadequate Evidence IMEMDT 19,341,79. All other ingredients not listed by NTP, IARC, or OSHA as probable or possible human carcinogens.

### **(4) Water Soluble Resin Coagulant:**

The following information is based on analogy with a similar material.

*Peroral: rat LD50 female >4.0 g/kg*  
*Percutaneous: rat LD50 4hr occluded contact female >2.0 g/kg*  
*Skin-Rabbit: 4 hr occluded contact moistened with water 0.5 g no irritation*  
*Eye-Rabbit: 5% in water 0.5 ml no irritation*  
*Repeated Exposure: 14 days of inclusion in diet of rats at 50,000 ppm resulted in only the presence of loose feces. No effects were seen at 20,000 ppm.*  
*Chronic Toxicity and Carcinogenicity: Inclusion in the diet of rats for 2 years at 20,000 ppm (1000-1300 mg/kg/day) did not result in treatment-related effects or evidence of oncogenicity.*

#### *Pharmacokinetics and Metabolism:*

*In Vitro – Pharmacokinetic and material balance studies conducted with a radiocarbon labeled water soluble resin showed nearly total quantitative recovery of the material in feces, with insignificant amounts in blood and tissues, indicating the material is not absorbed from the gastrointestinal tract.*

*In Vivo – Pharmacokinetic and material balance studies conducted with a radiocarbon labeled water soluble resin showed nearly total quantitative recovery of the material in feces, with insignificant amounts in blood and tissues, indicating the material is not absorbed from the gastrointestinal tract.*

*Significant Data with Possible Relevance to Humans: Pharmacokinetic and material balance studies conducted with a radiocarbon labeled water soluble resin showed nearly total quantitative recovery of the material in feces, with insignificant amounts in blood and tissues, indicating the material is not absorbed from gastrointestinal tract.*

### **(6) Salt:**

Oral-Wmn LDLo: 750 mg/kg  
Oral – Rat LD50: 6600 mg/kg

The registry of toxic effects of chemical substances (RTECS) contains comprehensive exposure health data for chemicals. Only selected registry of toxic effects of chemical substances data is presented here. See actual entry in RTECS for complete information.

## Section 12 Ecological Information

As with all foreign substances, do not allow to enter storm drainage systems. The only ecological data available is on Vinyl Polymer.

### 12.1. Ecotoxicity: Vinyl Polymer:

LC50 Bluegill sunfish (*Lepomis macrochirus*): >10,000 mg/L 96 hour  
LC50 Cerio Daphnia: 7.9 g/L 48 hour  
LC50 Fathead Minnows: >40 g/L 96 hour  
LC50 Daphnia magna: 8300 mg/L 96 hour

Water Soluble Resin Coagulant: The following information is based on an analogy with a similar material.

Ecotoxicity to Aquatic Invertebrates: Daphnia LC50 48 h 7550 mg/l.  
Ecotoxicity to Fish: Fathead Minnow LC50 96 h >10000 mg/l.

### 12.2 Mobility: Vinyl Polymer: Chemical oxygen demand (COD): 1800 mg/g

### 12.3 Persistence and degradability: Vinyl Polymer: Biochemical oxygen demand: BOD5 = 0-5%; BOD30 = 100%

### 12.4 Bioaccumulation potential: Vinyl Polymer Biodegradability: >90% (Zahn-Wellens Test)

### 12.5 Other adverse effects: No other data available to address these issues.

## Section 13 Waste Disposal

Follow safe solid waste disposal guidelines in accordance with relevant Community provisions. For proper disposal, an assessment must be completed to determine the proper waste management options permissible under applicable rules, regulations, and/or laws governing your location.

## Section 14 Transportation Information: Not regulated

## Section 15 Regulatory Information

The following provides a summary of the legal requirements.

Ingredient	European Economic Community (EEC)				Canada Regs	
	EINECS	European Community Standards	Risk & Safety Phrases	EEC Symbol	DSL	NPRI
Sand	Yes	Nuisance dust 6 to 10 mg/m <sup>3</sup>	None listed	None	Yes	No
Calcium Sulfate Hydrate	Yes	DFG MAK: 6 mg/m <sup>3</sup>	None listed	None	Yes	No
Vinyl Polymer	Yes	Nuisance dust 6 to 10 mg/m <sup>3</sup>	None listed	None	Yes	No
Water Soluble Resin Coagulant	Yes	Nuisance dust 6 to 10 mg/m <sup>3</sup>	Not listed	None	Yes	No
Calcium Sulfate Dihydrate	Yes	Nuisance dust 6 to 10 mg/m <sup>3</sup>	None	None	No	No
Salt	Yes	OEL = MAK	R 22 S 36	None	Yes	No

### Product Label Information per Directives 67/548/EEC: Label Precautionary Statements:

#### Irritant

Dust may cause irritation to eyes, respiratory system, and skin. Avoid inhalation of dust and eye contact. Provide good general ventilation and/or local exhaust to reduce dust exposure. If dusty conditions exist, use approved respiratory equipment. Wear eye protection to avoid particulate irritation to eyes.

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

## Section 16. Other Information

Pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986, (SARA) and 40 CFR 372 Part 372, this product does contain the following chemicals subject to the reporting requirements under Section 313: Nickel Compounds < 0.3% and Chromium Compounds <0.4%.

**Relevant R phrases:** While there are no R phrases listed for the preparation the following best apply.

R 22: Harmful if swallowed

R 36/37/38: Irritating to the eyes, respiratory system, and skin.

S26: In case of contact with the eyes, rinse immediately with plenty of water and seek medical advice.

S36: Wear suitable personal protective equipment.

### Training Advice:

As with all chemical products, employees must be trained in the proper use of the product by following Z Corporation technical equipment operations. Employees should understand the basic hazards and required precautions including use of personal protective equipment prior to handling the product.

**References**

- 1) EINECS Plus 2001:2: by Silver Platter copyright 2001
- 2) TLV's Threshold Limit Values and Biological Exposure Indices for 2002. American Conference of Governmental Industrial Hygienists
- 3) Patty's Industrial Hygiene & Toxicology CD-ROM Version 2.0 1997
- 4) RTECS, produced by NIOSH, provided by Canadian Centre for Occupational Health and Safety
- 5) CHEMINFO, Canadian Centre for Occupational Health and Safety, Issue: May 2002
- 6) SAX'S Dangerous Properties of Industrial Materials, Tenth Edition
- 7) TSCA and SARA Title III: National Technical Information Service #SUB-5423, Jan. 2002, Version 8.1

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