MATERIAL SAFETY DATA SHEET

Complies with Approved Code of Practice: Chemical (Hazard Information and Packaging for Supply) Regulations 2002 (UK)and European 91/155/EEC, 67/548/EEC, 1999/45/EC format, Australian NOHSC: 1008 , 10005(1999), 2011(2003), 1003(1995)and ANSI Standard Z400.1 and U.S. Federal OSHA Hazard Communication

Section 1. Identification of Chemical Substance and Company

1.1. PRODUCTS IDENTIFICATION: zp®150 powder

1.2. USE OF SUBSTANCE: Plaster powder for making rapid-prototyping 3D models.

1.3. COMPANY:

Z Corporation
32 Second Ave.
Burlington, MA 01803
Contact Person: Manager of Technical Services
Telephone Number: 781-852-5050
Foreign Contact: +(45) 48 14 11 22
Svanevang 2, 3450 Allerød, Denmark
Date of Preparation: 5/09

1.4. FOR CHEMICAL EMERGENCY: Spill Leak Fire Exposure or Accident Call CHEMTREC Day or Night
DOMESTIC NORTH AMERICAN: 800-424-9300
INTERNATIONAL, CALL 703-527-3887 (collect calls accepted)

Section 2. Hazards Identification

Potential Human Health Effects:

May cause irritation of the eyes, mucous membranes, and respiratory tract. May be harmful by inhalation or ingestion. Eye contact may cause mechanical abrasion with burning, tearing and redness. Ingestion may cause inflammation of the mouth, throat, esophagus and/or stomach.

Target Organs or Systems:

Caution: May cause irritation to the eyes, skin, mucous membranes, upper respiratory tract. Ingestion of large amounts may be harmful.

Route of Exposure:

Skin Contact: When mixed with water, this material hardens. **DO NOT** attempt to make a cast enclosing any part of the body using this material.
Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to the mucous membranes and upper respiratory tract.
Ingestion: May cause gastric disturbances, including inflammation of the mouth, throat, esophagus and/or stomach. Ingestion of a sufficient quantity could lead to mechanical obstruction of the gut, especially the pyloric region.

Acute:

May cause irritation of the eyes, skin, mucous membranes, and respiratory tract. May be harmful by inhalation, ingestion, or skin absorption.

Chronic:

Inhalation: Prolonged or repeated overexposure may cause signs/symptoms which include coughing, sneezing, nasal irritation, nasal discharge, hoarseness, chest pain, chronic rhinitis, laryngitis, pharyngitis,and breathing difficulty. Pre-existing upper respiratory and lung disease may be aggravated by exposure.

Skin: Repeated contact may dry the skin, causing cracking and dermatitis (rash).

Carcinogens Under OSHA, ACGIH, NTP, IARC, OTHER:

All ingredients in this product contain no carcinogens in concentrations of 0.1 percent or greater based on U.S. and European chemical data base information.

Potential Environmental Effects:

No significant environmental hazards are expected if material is released to the environment.

GHS Classification for Mixture: None

Section 3. Composition/Information of Ingredients

Substance is a mixture with following general composition:

Ingredients	Approximate % by weight	C.A.S. No. & EINECS No.
1. Plaster	<90%	Trade Secret
2. Vinyl Polymer	<20%	Trade Secret
3. Carbohydrate	<10%	Trade Secret

Section 4. First Aid Measures

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:

Immediately wash skin with soap and rinse with large amounts of water. Remove and wash contaminated clothing promptly. If symptoms persist, seek medical attention.

Ingestion:

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

Section 5. Fire-Fighting Measures

Flammable Properties

Product is not combustible.

Extinguishing Media:

Use ABC type fire extinguishers.

Special Fire Fighting Procedures

A self-contained breathing apparatus and full protective clothing should be worn in fire conditions.

Unusual Fire & Explosion:

Emits toxic fumes under fire conditions. Avoid conditions, which produce dust.

Section 6. Accidental Release Measures

Procedures of Personal Precautions:

Wear respirator, chemical safety goggles, and chemical gloves.

Environmental Precautions:

No significant environmental hazards identified. Surfaces subject to spills or dusting with this product can become slippery when wet, use care to avoid falls.

Methods of Cleaning Up:

Sweep or vacuum material from spillage into a waste container for disposal. Avoid production of dust. Do not flush down drains. Place in closed containers. Ventilate area and wash spill site after material pickup is complete.

Waste Disposal Method:

Follow safe solid waste disposal guidelines in accordance with federal, state and local regulations. National or regional provisions may also be in force. It is the responsibility of the generator to determine whether the material meets the criteria of a hazardous waste.

Section 7. Handling and Storage

Handling Precautions:

User Exposure: Avoid handling procedures that produce high levels of dust.

Storage Precautions:

Suitable: Store product in a cool, dry, ventilated area away from sources of heat, moisture, strong oxidizing materials and explosives. Keep containers tightly closed.

Special Requirements:

Under planned use this product should not result in excessive dust or hazards to the user following the recommended processes for creating prototype models.

Section 8. Exposure Controls & Personal Protection

Exposure Limit Values:

The European Member States have different standards for the components in this preparation. These powders are potentially irritant dusts with general exposure standard of 10 mg/m^3. Particulates not otherwise classified (total dust) in Germany are 6 mg/m^3, and 10 mg/m^3 in other European Countries. The respirable dust levels are 5 mg/m^3.

Component	IOELVs (UK)	EC OEL	ACGIH TLV	OSHA PEL
1. Plaster	10 mg/m^3 Inhalable 5 mg/m^3 R	10 mg/m^3	10 mg/m^3 Inhalable 3 mg/m^3 R	15 mg/m^3 Total 5 mg/m^3 R
2. Vinyl Polymer	General Dust 10 mg/m^3 Inhalable 4 mg/m^3 R	10 mg/m^3	10 mg/m^3 Inhalable 3 mg/m^3 R	15 mg/m^3 Total 5 mg/m^3 R
3. Carbohydrate	General Dust 10 mg/m^3 Inhalable 4 mg/m^3 R	10 mg/m^3	10 mg/m^3 Inhalable 3 mg/m^3 R	15 mg/m^3 Total 5 mg/m^3 R

Notations:

IOELVs = Indicative Occupational Exposure Limit Values
OEL = Occupational Exposure Limits
R = Respirable
TWA = time weighted average
PEL = Permissible Exposure Limit
TLV = Threshold Limit Value

Exposure Controls:

Ventilation Controls:

Use mechanical ventilation to prevent dust generation, if necessary.

Respiratory Protection:

Respirators are generally not needed under normal conditions of use. If dust levels exceed the exposure limits use a NIOSH-approved dust respirator (N95 or better). In Europe, the respirator must be CE-marked and filter FFP2 or FFP3 for high efficiency.

Protective Gloves:

Avoid skin contact by use of nitrile, PVC-coated or like type chemical resistant gloves. Equipment should conform to EN 374: level 6 or ANSI standard.

Eye Protection:

Safety goggles for dust are recommended during powder additions and cleaning. Equipment should conform to EN 166 or ANSI standards.

Skin Protection:
Special skin protection is not routinely needed when using the product. If clothing becomes contaminated wash contaminated clothing before reuse.

Other Controls:
Safety shower and eyewash. Wash contaminated clothing before reuse. Always use good personal hygiene and housekeeping practices to minimize dust exposures. Wash thoroughly after handling.

Environmental Exposure Controls:
This product is not known to contain chemical components requiring specific environmental exposure controls. Specific environmental requirements however do vary and each user needs to follow local Community environmental protection requirements.

Section 9. Physical & Chemical Properties

Appearance: White Powder
Flash point: Not Applicable (NA)
Flammability: NA
Vapor pressure: NA
Specific Gravity: (H_2O = 1): Unknown
Auto-ignition temperature: NA

Initial boiling point: NA
Evaporation rate: NA
Upper/lower flammable limits: NA
Relative density: 2.6 – 2.7 g/cm^3
Solubility: 0.83% (3^{0}C)
Melting point/freezing point: 1450^{0}C

Section 10. Stability and Reactivity

Stability: Stable in dry environments. Dew point conditions or other conditions causing presence of liquid will harden the material.
Conditions to Avoid: Avoid wet / high humidity conditions. Avoid generating dust.
Incompatible Products: Acids, strong basis, oxidizing agents, water, and high humidity.
Hazardous Decomposition Products: Oxides of carbon. Irritating and toxic fumes at elevated temperatures.
Hazardous Polymerization: Will not occur.

Section 11. Toxicological Information

Data for product components only, mixture not evaluated.

1. Plaster	
Human	Oral LD50 – >5,000 mg/kg: Skin LD50 – not determined: Eye Irritation – not determined: Dermal LD50 – not determined The sulfate ion has caused gastro-intestinal disturbance in humans following large oral doses.
Monkeys, Rats, Hamsters	Limited studies involving the repeated inhalation of an (unspecified) calcium sulfate failed to identify any particular target organs in monkeys, rats and hamsters
Rat	LD50 - >2,000 mg/kg (oral); LD50 - >2,000 mg/kg (skin) Sub acute toxicity (1 ml of 5% PVA and 0.9% NACl solution, 25 days): PVA-treated rats became hypersensitive. There were enlargements of adrenals, and hearts, and kidneys.
Rabbit	Eye Irritation – Slightly: Skin Irritant – No
Other	Ames bacterial Test – no mutagenicity
2. Vinyl Polymer	
Human	Eye Irritation – Severe: Skin Irritant – Mild
Rabbit	Skin nonirritating as powder, slight irritation in aqueous solution and LD50 >1,000 mg/kg Eye slight irritation which subsided by 48 hrs after exposure
Rat	Oral LD50 >5000 mg/kg: Inhalation LC50 >20.0 mg/l 1 hour practically nontoxic to animals by acute inhalation
Mouse	Oral LD50 – 14,270 mg/kg
Adult Guinea Pig	Not a skin sensitizer with 10% aqueous solution, Oral LD50 18,750 mg/kg
Mutagenicity	Not mutagenic in vitro (Ames Test), Not mutagenic in vivo mouse assay.
Reproductive	No information available
Cancer	IARC Cancer Review: Group 3 “not classifiable as it its carcinogenicity in humans”
3. Carbohydrate	
Human	Skin – 300 ug/3D-I Mild
Mouse	Intraperitoneal LD50 – 6600 mg/kg

Section 12. Ecological Information

Data for product components only, mixture not evaluated.

1. Plaster	
Red Killfish	LC50 1000 mg/L
Biodegradability	Degraded by bacteria such as *Pseudomonas sp.*
2. Vinyl Polymer	
Fish Pimephales promelas	LC50 >40,000 mg/l 96 hr
Fish Lepomis macrochirus	LC50 >10,000 mg/l 96 hr
Crustacean Ceriodaphnia	LC50 7,850 ppm 48 hr
Crustacean Daphnia magna	LC50 8,300 ppm 48 hr
Bacteria Photobacterium phosphoreum	EC50 >50,000 ppm
Bioaccumulation	Biodegradability 90% (Zahn-Wellens test)
Biodegradability	Biological Oxygen Demand (BOD): BOD5 = 0-5%; BOD30 = 100%
3. Carbohydrate	No data available

Section 13. Disposal Considerations

Follow safe solid waste disposal guidelines in accordance with governmental regulations (community, national or regional). Contact a licensed professional waste disposal service to dispose of this mixture. As with all foreign substances do not allow to enter the storm or sewer drainage systems.
Contaminated Packaging: Dispose of as unused product.

Section 14. Transportation Information

This is not a regulated material for transporation.

Section 15. Regulatory Information

The following provides a summary of the legal requirements. All ingredients are listed on the chemical inventories as listed below or qualify for an exemption.

Ingredient	EPA TSCA	CA Prop 65	European Economic Community (EEC)				Canada Regs	
			EINECS	European Community Standards	Listed as dangerous chemicals	EEC Symbol	DSL	NPRI
(1) Plaster	Yes	No	Yes	Nuisance dust 6 to 10 mg/m^3	No	None	Yes	No
(2) Vinyl Polymer	Yes	No	Yes	Nuisance dust 10 mg/m^3	No	None	Yes	No
(3) Carbohydrate	Yes	No	Yes	Nuisance dust 10 mg/m^3	No	None	Yes	No

DSL = Canadian Domestic Substance List
NPRI = National Pollutant Release Inventory

Relevant European R and S phrases for the mixture/preparation: None

Pursuant to Title lll of the Superfund Amendments and Reauthorization Act of 1986, (SARA) and 40 CFR 372 Part 372, this product does not contain any chemicals subject to the reporting requirements under Section 313.

This product does not contain chemicals subject to the reporting requirements under the Canadian National Pollutant Release Inventory (NPRI).

California Proposition 65: This product does not contain chemicals which are known to the state of California to cause cancer.

Section 16. Other Information

HMIS (Hazardous Materials Information System) for secondary labeling:

Health 1*
Fire Hazard 0
Physical Hazard 1
Personal Protective Equipment B
*additional chronic hazards present

References

1) 2009 Threshold Limit Values and Biological Exposure Indices. American Conference of Governmental Industrial Hygienists.
2) MSDS + Cheminfo CD-ROM, Canadian Centre for Occupational Health and Safety
3) SAX'S Dangerous Properties of Industrial Materials, Tenth Edition
4) TSCA & SARA Title III, U.S. Environmental Protection Agency and the National Technical Information Services
5) Raw Material Manufacturers Material Safety Data Sheets
6) US National Institute of Medicines Toxnet current edition

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