

# 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, and 2001/58/E, ANSI Standard Z400.1 and U.S. Federal OSHA Hazard Communication

## Section 1. Identification of the Substance/Preparation and Company

- 1.1 **PRODUCTS IDENTIFICATION:** zb™58 binder
- 1.2 **USE OF SUBSTANCE:** zb™58 is a liquid to be used to fuse 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: 781-852-5005  
**UK Contact:** +44(0)870 241 6502  
119 Arthur Road, Windsor, Berkshire SL4 1Ru  
Date of Preparation: 6/05
- 1.4 **EMERGENCY TELEPHONE:** 781-852-5005

## Section 2. Composition/Information of Ingredients

Substance is a mixture with following general composition:

Components	Approximate % by weight	C.A.S. No. & EINECS No.	UK/EU Classification
1. Glycerol	1-10%	56-81-5 200-289-5	Irritant Xi S 23 24/25
2. Preservative (Sorbic acid salt)	0-2%	Trade Secret	Irritant Xi R 36/37/38, S 26, S 36
3. Surfactant	<1%	Trade Secret	Irritant Xi R 36, S 24, S 26
4. Pigment	<20%	Trade Secret	R 42/43
5. Water	85-95%	7732-18-5	NA

## Section 3. Hazards Identifications

**Potential Human Health Effects:**

Prolonged and repeated exposure may cause skin and/or respiratory sensitization. May be harmful if swallowed.

**Target Organs or Systems:**

Caution: May cause irritation to the eyes, skin, mucous membranes, upper respiratory tract and ingestion exposures may effect the kidneys, liver or the hepatic system.

**Route of Exposure:**

Skin Contact: May cause skin irritation or skin sensitization which may be seen as redness or inflammation.

Skin Absorption: May be harmful if absorbed through the skin.

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 be harmful if swallowed.

**Signs and Symptoms of Exposure:**

Prolonged exposure can cause: Nausea, headache, and vomiting.

**Acute:**

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

**Chronic:**

Prolonged exposure may cause nausea, headache, and vomiting. Some reactive dyes of the type contained in this product, have induced skin and/or respiratory allergy/sensitization after repeated and/or prolonged exposure to high atmospheric concentrations of dust or aerosol. Symptoms include: cough, tightness in chest, and/or asthmatic wheezing.

**Carcinogens:**

This product contains 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.

**Section 4. Emergency First Aid Measures****Inhalation Exposure:**

Remove from area to fresh air. Seek medical attention if breathing becomes difficult.

**Eye Contact Exposure:**

Immediately flush eyes with copious amounts of water for at least 15 minutes. Call a physician.

**Skin Contact Exposure:**

Remove contaminated clothing, shoes, and leather goods. Immediately wash with soap and rinse with copious amounts of water.

**Oral Exposure (Ingestion):**

Wash out mouth with water provided the person is conscious and seek medical attention.

**Section 5. Fire-Fighting Measures (Fire and Explosion Hazard)****Flash point (Method Used) Flammable limits**

Not Applicable

Not considered to be a fire hazard (primarily water)

**LEL**

Not Applicable

**UEL**

Not Applicable

**Extinguishing Media:**

Water spray, carbon dioxide, dry chemical powder or appropriate foam.

**Special Fire Fighting Procedures**

As with all fires, fire fighters should wear full protective gear including supplied air respirators.

**Unusual Fire & Explosion:**

This product's major component is water, thus it will not readily burn. If the water is boiled off, the remaining components may emit toxic fumes under fire conditions such as carbon monoxide, carbon dioxide, and oxides of nitrogen. Protective fire fighting equipment: self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

**Exposure Hazard(s):** Material: Irritant.

**Section 6. Accidental Release Measures****Procedures of Personal Precautions:**

Exercise appropriate precautions to minimize direct contact with skin or eyes. Wear chemical safety goggles and rubber gloves.

**Environmental Precautions:**

This material poses no significant environmental hazards; however, it is important to minimize contamination of sewage water, soil, groundwater, drainage systems, or bodies of water.

**Methods of Cleaning Up:**

Contain spills immediately with inert materials (e.g. sand, earth). Avoid discharge to natural waters. Place in closed containers for disposal. Wash spill site after material pickup is complete prior to re-occupancy.

**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.

**Section 7. Handling and Storage****Handling Precautions:**

**User Exposure:** Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure. Wash thoroughly after handling.

**Storage Precautions:**

**Suitable:** Keep tightly closed.

**Special Requirements:**

Store in a cool place. Other requirements for handling and storage are found in the Technical Bulletin that describe the use of the product and specific procedures.

**Section 8. Exposure Controls & Personal Protection****Exposure Limits:**

Component	IOELVs (UK)	EC OEL	ACGIH TLV	OSHA PEL
1. Glycerol: inhalable mist particulate	TWA = 10 mg/m <sup>3</sup>	TWA = 10 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> irritation	10 mg/m <sup>3</sup> as a mist
2. Preservative (Sorbic Acid Salt)	None established	None established	None established	None established
3. Surfactant Trade Secret	None established	None established	None established	None established
4. Pigment	None established	None established	None established	None established

**Notations:**

IOELVs = Indicative Occupational Exposure Limit Values  
 OEL = Occupational Exposure Limits  
 TLV = Threshold Limit Value

TWA = time weighted average  
 PEL = Permissible Exposure Limit  
 STEL = short term exposure limit

**Ventilation Controls:**

Use in well-ventilated areas.

**Respiratory Protection:**

Generally would not be needed for designed usage. Use a NIOSH/MSHA approved organic vapor, P95 to 100 cartridge respirator if there is possible exposure above applicable threshold limits in air.

**Protective Gloves:**

Chemical resistant gloves, butyl rubber, and nitrile rubber have greater than 8 hour breakthrough time for the hazardous components.

**Eye Protection:**

Chemical safety goggles.

**Skin Protection:**

Additional skin protection including aprons or coveralls is generally not needed for the designed usage.

**Other Controls:**

Safety shower and eyewash. Wash contaminated clothing before reuse. Wash thoroughly after handling.

**Environmental Exposure Controls:**

This product is not known to have 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:** Liquid (mostly water)

**Boiling Point (F°):** 212° F water

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

**Vapor Density (air = 1):** >1

**pH:** 5.5-8

**Melting Point:** NA

**Flash Point:** NA

**Flammability (solid, gas):** NA

**Explosive Properties:** NA

**Oxidizing Properties:** NA

**Bulk Density:** NA

**Water/Oil Distribution:** NA

**VOC by Weight** = 0% (EPA Method 24)

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

**Color:** Depends on which dye is used

**Odor:** Slight odor

**Clarity:** Depends on which dye is used

**Solubility:** Water

**Solubility Fat:** NA

**Evaporation Rate:** Water

**Partition coefficient: n octanol/water:** NA

**Density:** Not known

**Viscosity:** Not Determined

**Section 10. Stability and Reactivity****Stability:**

**Stable:** Stable

**Conditions to Avoid:** Store in cool place

**Materials to Avoid: Incompatible:** Strong oxidizers, strong acids, strong bases

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide

**Hazardous Polymerization:** Will not occur

**Section 11. Toxicological Information**

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated for the mixture. The following is for the product components.

1. **Glycerol:** Primary Irritant; Food Additive; Reproductively Active: Pure glycerol has had extensive testing. The following is summary of the primary test data which show mildly toxic by ingestion. Human systemic effects by ingestion: headache and nausea or vomiting.

Experimental reproductive effects. Human mutation data reported. A skin and eye irritant. In the form of a mist it is a nuisance particulate and inhalation irritant. Thorough toxicity data is available from EC existing chemical data bases (<http://ecb.jrc.it/UCLID-Data-Sheet/56815.pdf>) or from RTEC register number (MA805000)

Toxicity Data:

*Skin-Rabbit, adult 500mg/24H Mild irritation effects*  
*Eye effects-Rabbit, adult 126 mg Mild irritation effects*  
*Eye effects-Rabbit, adult 500 mg/24H Mild irritation effects*  
*DNA Inhibition-Human:lymphocyte 200 mmol/L*  
*Intratesticular-Rat TDLo: 1600 mg/kg (male ID pre):Reproductive effects*  
*Oral-Human TDLo: 1600 mg/kg (male ID pre):Reproductive effects*  
*Oral-Rat LD50: 12600 mg/kg*  
*Intraperitoneal-Rat LD50: 4420 mg/kg*  
*Subcutaneous-Rat LD50: 100 mg/kg*  
*Oral-Mouse LD50: 4090 mg/kg*  
*Intraperitoneal-Mouse LD50: 8700 mg/kg*  
*Subcutaneous-Mouse LD50: 91 mg/kg*  
*Intravenous-Mouse LD50: 4250 mg/kg*  
*Intravenous-Rabbit, adult LD50: 53 g/kg*  
*Oral-Guinea Pig, adult LD50: 7750 mg/kg*  
*Inhalation-Rat LC50: >570 mg/m<sup>3</sup>*  
*Intravenous -Rat LD50: 5566 mg/kg*  
*Oral-Mous LD50: 4090 mg/kg*  
*Oral-Rabbit LD50: 27 gm/kg*  
*Skn-Rabbit LD50: >10 gm/kg*  
Chronic Exposure – Mutagen *Species: Human. Dose: 200 mmol/L, Cell Type: lymphocyte, Mutation test: DNA inhibition*

**2. Preservative Sorbic acid salt:**

Toxicity Test Data:  
*Oral-Rat LD50: 4340 mg/kg*  
*Oral-Mouse LD50: 3800 mg/kg*  
*Intraperitoneal-Mouse LD50: 1300 mg/kg*  
Chronic Exposure – Mutagen  
*Species: Hamster*  
*Dose: 4 gm/L*  
*Cell Type: fibroblast*  
*Mutation test: Cytogenetic analysis*

**3. Surfactant:**

Toxicity Data:  
*Oral-Rat LD50: 6300 mg/kg*  
*Skin-Rabbit LD50: >2000 mg/kg*  
*Inhalation–Rat: LC50 1-hr: >2 mg/L*  
Eye Irritation/Corrosion: *Severe eye irritation*  
Acute Dermal Irritation/Corrosion: *Mild skin irritation*

**4. Pigment:**

Toxicity Data:  
*Oral-Rat LD50: >5000 mg/kg*  
*Eye Irritation: (Rabbits) Not an irritant*  
*Skin Irritation: (Rabbits) Not an irritant*  
*Skin Sensitization: (Guinea Pig) Sensitizer*

## Section 12. Ecological Information

### 1. Glycerol:

#### Acute Ecotoxicity Tests

Test Type: LC50 Fish

Species: other fish

Value: >100,100 mg/L

Test Type: LC50 Fish

Species: Pimephales promelas (Fathead minnow)

Value: 44,000 mg/L

Test Type: LC50 Fish

Species: Carassius auratus (Goldfish)

Value: >5,000 mg/L

### 2. Preservative (Sorbic acid salt):

#### Biodegradability: Readily Biodegradability:

Not readily biodegradable (11% in 28 days)

#### Aquatic Toxicity:

Juvenile Turbot: 96-hr. LC50 >1,000 mg/L

Corphium Volutatar: 10-Day LC50 >1,000 mg/L

Marine Algae: 72-hr. EC50 >1,000 mg/L

Salmon: Polymer at up to 5% in the diet during smolt produced no signs of toxicity.

Salmon: Polymer at up to 5% in the diet for 112 days did no produce any signs of toxicity.

#### Germany VCI Assigned Classification into Water Endangering Classes (WGK) List:

This polymer product and/or its components is listed on or has been reviewed by WGK

### 3. Surfactant:

#### Aquatic Toxicity:

Selenastrum Capricornutum EC50: 72-hr.: 93 mg/L

Microtox (Luminescent bacteria) EC50: 5 minutes 1870 mg/L

#### Persistence and Degradability:

Mobility: No data available

Bioaccumulation: No data available

### 4. Pigment:

#### Toxicity to Fish:

(Zebra Fish) LC50: >1,000 mg/L 96 hour

(Rainbow Trout) LC50: > 500 mg/L 96 hour

#### Toxicity to Algae:

(Algae Growth Inhibition) EC50: > 100 mg/L (72 hr)

#### Toxicity to Sewage Bacteria:

Inhibition > 300 mg/L

Biochemical Oxygen Demand (BOD): 0 mg/g

Chemical Oxygen Demand (COD): 770.0 mg/g

### 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 drainage systems. Material may be dissolved or mixed with a combustible solvent and burned in a chemical incinerator equipped with an afterburner and scrubber if approved by the governmental authority.

### Section 14. Transportation Information

This is not a regulated material for transportation.

### Section 15. Regulatory Information

Ingredient	EPA TSCA	European Economic Community (EEC)				Canada Regs	
		EINECS	European Community Standards	Listed as dangerous chemicals	EEC Symbol	DSL	NDSL
1. Glycerol	Yes	Yes	Yes – See Section 2	S 23 24/25	Irritant (Xi)	Yes	No
2. Preservative	Yes <sup>1</sup>	Yes	OEL = MAK	R36/37/38 S26 S36	Irritant (Xi)	Yes	No
3. Surfactant	Yes	Yes	None	R36 S24, S26	Irritant (Xi)	Yes	No
4. Pigment	Yes	No	None	R42/43	None	No	No

Relevant European R and S phrases: **Irritant Mixture Xi**



#### Risk Phases:

R25: Toxic if swallowed.

R36/37/38: Irritating to the eyes, respiratory system, and skin.

R42/43: May cause sensitization by inhalation and skin contact.

#### Safety Phases:

S2: Keep out of reach of children.

S7: Keep container tightly closed.

S23 Do not breathe vapor.

S24/25: Avoid contact with skin and eyes.

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

S36: Wear suitable personal protective equipment.

S38: In case of insufficient ventilation, wear suitable respiratory equipment.

S37/39: Wear suitable gloves and eye/face protection.

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

<sup>1</sup> TSCA Genetox Program 1988, Inconclusive: In Vitro Sce-Nonhuman  
EPA TSCA Section 8 (B) Chemical Inventory

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

Reactivity 0

Personal Protective Equipment B

\*additional chronic hazards present

## References

- 1) 2005 Threshold Limit Values and Biological Exposure Indices. American Conference of Governmental Industrial Hygienists.
- 2) Chemical (Hazard Information and Packaging for Supply) Regulation 2002 (UK).
- 3) MSDS + Cheminfo (2005-1) CD-ROM expires 6/05, Canadian Centre for Occupational Health and Safety.
- 4) SAX'S Dangerous Properties of Industrial Materials, Tenth Edition.
- 5) ESIS:European Chemical Substance Information System, <http://ecb.jrc.it/esis>.
- 6) TSCA & SARA Title III, CD-ROM, January 2005 Version 9.2 Produced by the U.S. Environmental Protection Agency and the National Technical Information Services.
- 7) Raw Material Manufacturers Material Safety Data Sheets.
- 8) US National Institute of Medicines Toxnet current 2005.

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