

# Material Safety Data Sheet: Dimethyl Sulfoxide (Diluent Component of the XF Mito Stress Test Kit)

## Section I – Chemical Product Identification

**Synonyms:** (DMSO)  
**Molecular formula:** c2h6os  
**Molecular weight:** 78.13

## Section II – Composition/Information on Ingredients

**Hazardous ingredients:** dimethyl sulfoxide  
**CAS number:** 67-68-5  
**EINECS:** 200-664-3  
**Weight:** >99%  
**OSHA PEL:** not established

## Section III – Hazardous Identification

**Warning!** Combustible liquid & vapor.

**Physical appearance:** clear liquid

**Odor:** essentially odorless

**Effects of overexposure:**

**General:** DMSO has shown very few toxic symptoms in humans. The most common are nausea, skin rashes & an unusual garlic-onion-oyster smell on body & breath.

**Inhalation:** high vapor concentrations may cause headache, dizziness & sedation.

**Eyes:** low hazard for usual industrial/commercial handling by trained personnel.

**Skin:** stinging & burning of the skin as well as rashes & vesicles have been seen. A heat reaction may occur if applied to wet skin. Avoid contact with DMSO solutions containing toxic material or materials whose toxicological properties are not known. DMSO easily penetrates the skin and may enhance the rate of skin absorption of skin-permeable substances. But substances with it through the skin, it can be concluded that DMSO does not pose a significant threat by skin absorption.

**Ingestion:** a low ingestion hazard.

**HMIS & NFPA hazard ratings:** health–1, flammability–1, Chemical reactivity–0.

## Section IV – First Aid Measures

Never give fluids or induce vomiting if patient is unconscious or is having convulsions.

**General advice:** remove contaminated clothing promptly (launder before reuse)

**Eye contact:** flush thoroughly with running water (including under eyelids) for at least 15 minutes. If irritation persists after flushing, seek medical attention.

**Skin contact:** wash contaminated skin with water. Seek medical attention if irritation persists.

**Ingestion:** seek immediate medical care. Do not induce vomiting.

**Inhalation:** remove to fresh air. If breathing has stopped, provide

artificial respiration, keep the victim warm and seek medical attention.

**Special advice:** in general, DMSO is not dangerous to people, but like any other chemical, it should be treated with care, respect, & common sense.

## Section V – Fire Fighting Measures

**Combustible liquid & vapor!**

**Extinguishing media:** foam, carbon dioxide, dry powder & water spray.

**Special protective equipment for fire-fighters:** wear a self-contained breathing apparatus (SCBA).

**Special exposure hazards:** burning dimethyl sulfoxide produces poisonous gases (sulfur oxides) wear rubber gloves, scba, & rubber suit.

**Flashpoint & method:** 89°C (192°F) closed cup, 95°C (203°F) open cup.

**Flammable limits (% in air)**

**Lel:** 3.0-3.5% By volume

**Uel:** 42-63% by volume

**Auto ignition temperature:** 300-302°C (572-575°F)

## Section VI – Accidental Release Measures

**Personal precautions:** in case of mist formation, use a respirator or self-contained breathing apparatus (SCBA).

**Environmental precautions:** if a spill or leak occurs, immediately consult your environmental supervisor. Remove ignition if a spill or leak occurs, remove ignition sources. Ventilate the area. Do not breathe the vapor or get liquid in eyes or on skin/clothing.

**Spill clean-up methods:** dilute & flush to wastewater treatment or absorb with inert material. Do not allow the material to enter streams or waterways.

**Recommended decontamination facilities:** eye, bath, water washing facilities.

## Section VII – Handling & Storage

**Usage/handling precautions:** keep away from sources of ignition. No smoking. Do not breathe vapor or mist. Avoid contact with skin, eyes, or clothing.

**Storage precautions:** keep container tightly closed, in a well-ventilated place. Freezes (solidifies) at 18°C (64°F).

## Section VIII – Exposure Controls/Personal Protection

**Exposure limits:**

**ACGIH threshold limit value (TLV):** not established

**OSHA (USA) permissible exposure limit (peI, 1989 table z-1-a values or section specific standards):** not established

**AIHA workplace environmental exposure level “weel” guideline for airborne concentrations in the workplace:** 250 ppm (8-hr TWA)

**Ventilation:** good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. Use process enclosures, local exhaust ventilation, or other engineering controls to maintain ventilation.

**Respiratory protection:** in case of mist formation use a respirator of SCBA. Respirator type: organic vapor. If respirators are used, a program should be instituted to assure compliance with OSHA standards.  
**Hand protection:** butyl rubber or nitrile (NBR) rubber gloves.  
**Eye protection:** tightly fitting safety goggles.

### Section IX – Physical & Chemical Properties

**Appearance:** colorless liquid  
**Odor:** essentially odorless  
**Odor threshold:** N/A  
**pH:** 8.5 (50/50 In water)  
**Boiling point:** 189°C (372°F)  
**Flashpoint & method:** 89°C (192°F) closed cup, 95°C (203°F) open cup.  
**Flammable limits (% in air):** LEL: 3.0-3.5% By volume  
**UEL:** 42-63% by volume  
**Autoignition temperature:** 300-302°C (572-575°F)  
**Vapor pressure:** 0.55 mbar (0.46 mmhg) at 20°C (68°F)  
**Specific gravity:** 1.1 At 20°C (68°F)(water=1)  
**Solubility in water at 20°C:** miscible  
**Melting point:** 18°C (64°F)  
**Sensitivity to static discharge:** material is unlikely to accumulate a static charge, which could act as an ignition source.

### Section X – Stability & Reactivity

**Stability:** stable  
**Conditions to avoid:** prolonged heating above 150°C (302°F) can cause rapid, exothermic decomposition.  
**Materials to avoid:** organic & inorganic acid chlorides, strong oxidizing agents, alkali metals, hydrobromic acid, acidic solutions of alkali bromides.  
**Hazardous decomposition products:** sulfur dioxide, formaldehyde, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, and bis (methylthio) methane.  
**Hazardous polymerization:** will not occur. No stabilizers are needed or present.

### Section XI – Toxicological Information

**Acute toxicity data:**  
**Oral Id-50 (male rat):** 14,500-28,300mg/kg  
**Inhalation (rat):** no mortality rate at 2,900 mg/m<sup>3</sup> (900 ppm)/24 hrs.  
**Dermal Id-50 (rat):** 40,000 mg/kg  
**Skin irritation (human):** mild  
**Repeated skin application (human):** slight irritation  
**Skin sensitization (human):** none by EC protocols  
**Eye irritation (human):** none by EC protocols  
**Developmental toxicity data:** DMSO is not considered to be directly embryotoxic & has been shown to be a successful cryoprotectant for mammalian semen & embryos.  
**Mutagenicity/genotoxicity data:** salmonella typhimurium assay  
**Ames test:** negative (+/- activation) DMSO is used as a neutral solvent in the ames mutagen test.

### Section XII – Ecological Information

**Introduction:** this environmental effects summary is written to assist in addressing emergencies created by an accidental spill which might occur during shipment or handling of this material. It is not meant to address discharges to sanitary sewers or publicly owned treatment works.  
**Aquatic toxicity:** the lc50 (96 hrs) for ten species of fish range from 32,500, to 43,000 ppm. The lc50 for two species of protozoans are 32,000 & 38,000 ppm. The concentration required to inhibit growth (ec50) for five species of blue -green algae & one green algae species is ranged from 0.4 To 4.0% DMSO is non-bio-accumulating since the log of the octanol/water partition coefficient is -2.03.  
**Phytotoxicity:** soaking tomato, cucumber, & bean seeds for 18hrs in up to 8% DMSO solutions had no effect on germination rate. DMSO has no effect on the growth rate of corn when sprayed on at rates up to 30 gallon/acre. When diluted with a large amount of water, release of DMSO, directly or indirectly, to the environment is not expected to have significant effect.  
**Biological oxygen demand:**  
**Theoretical oxygen demand at 10ppm:** 123 mg oxygen  
**Chemical oxygen demand at 10ppm:** 107 mg/l  
**Biological oxygen demand-5 at 10ppm:** <1.0Mg/l

### Section XIII – Disposal Considerations

**Waste disposal:** dilute & flush to an approved wastewater treatment system. Bacterial decomposition of dimethyl sulfoxide during wastewater treatment can result in the release of dimethyl sulfide (a volatile substance with a strong disagreeable odor). Waste DMSO can also be incinerated in an approved furnace where permitted. Consult federal, state or local authorities for proper disposal procedures.  
**Empty containers:** should be transported/delivered using a registered waste carrier for recycling or waste disposal in accordance with local regulations.

### Section XIV – Transportation Information

**Dot USA status:** bulk  
**Proper shipping name:** combustible liquid, N.O.S. (dimethyl sulfoxide)  
**Hazard class:** combustible liquid  
**ID Number:** NA 1993  
**Packing group:** iii  
**Reportable quantity:** N/A  
**Placards:** 1993 (combustible)  
**Quantity limitations:** drum (<119 gallons per container)  
**Label(s):** none  
**TDG (Canada) status:** unregulated  
**ID number:** none  
**Packing group:** none  
**Label(s):** none  
**ICAO–international civil aviation organization status:** unregulated  
**IATA–international air transport agency status:** unregulated  
**ADR & IMDG–international dangerous goods status:** unregulated.

## Section XV – Regulatory Information

This document has been prepared in accordance with the MSDS requirements of the OSHA hazard communication standard 29 CFR 1910.1200.

**Occupational safety & health administration “OSHA” hazardous chemical(s):** dimethyl sulfoxide.

**Material(s) known to the state of California to cause cancer:** none.

**Material(s) known to the state of California to cause adverse reproductive effects:** none

**Massachusetts substance list:** none

**New Jersey workplace hazardous substance list:** none

**Pennsylvania hazardous substance list:** none

This document has been prepared in accordance with the MSDS requirements of the WHMIS controlled products regulation.

**WHMIS (Canada) ingredient disclosure list:** listed

**WHMIS (Canada) status:** regulated

**WHMIS (Canada) hazard classification:** none

**IARC–international agency for research on cancer carcinogenicity classification (components present at 0.1% or more):** not listed

**ACGIH–american conference of governmental industrial hygienists:** not listed.

**NTP–national toxicology program:** not listed

**Reporting requirements of section 313 or title iii of the super-fund amendments & reauthorization act (SARA) of 1986 & 40 cfr part 372:** none

**SARA (USA) sections 311 & 312 hazard classification(s):** fire hazard

**TSCA–us toxic substances control act:** this product is listed on the TSCA inventory

**CEPA/DSL–Canadian environmental protection act/domestic substances list:** listed.

**EINECS–European inventory of existing commercial chemical substances:** no. 200-664-3.

**AICS/NICNAS–Australian inventory of chemical substances/ national industrial chemical notification & assessment scheme:** this product is listed on AICS.

**Japanese handbook of existing & new chemical substances:** listed

**EC classification & user label information (council directive 67/548/ eec & 1999/45/ec):** hazard symbols & risk phrases – none required

**ICH (international council on harmonization):** class iii – solvent with low toxic potential.

## Section XVI – Other Information

**US/Canadian label statements:** Warning! Combustible liquid & vapor. High vapor concentration may cause drowsiness. Store away from heat & light. Distill with caution. Keep away from heat & flame. Avoid breathing high vapor concentrations. Keep container closed. Use with adequate ventilation & proper protective equipment given elsewhere in this MSDS.

**First aid:** if inhaled, move to fresh air. Treat symptomatically. Get medical attention if symptoms persist.

**In case of fire:** eliminate all ignition sources. Flush spill area water spray. Prevent runoff from entering drains, sewers, & streams. Since emptied containers retain product residue, follow label warnings even after container is emptied.

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