

US Research Nanomaterials, Inc.

www.us-nano.com

Manganese Oxide (Mn₃O₄) NMP Dispersion

SAFTY DATA SHEET

Revised Date 2/28/2023

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name: Manganese Oxide (Mn₃O₄) 1-Methyl-2-pyrrolidinone dispersion
NMP CAS#: 872-50-4

Manganese Oxide (Mn₃O₄) CAS#: 1317-35-7

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

Identified uses : Research, synthesis of nanomaterial dispersions

1.3 Details of the supplier of the safety data sheet

Company: [US Research Nanomaterials, Inc.](http://www.us-nano.com) 3302 Twig Leaf Lane
Houston, TX 77084
USA

Telephone: +1 832-460-3661 Fax: +1 281-492-8628

1.4 Emergency telephone number

Emergency Phone # : (832) 359-7887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS) Flammable liquids
(Category 4), H227

Eye irritation (Category 2A), H319

Reproductive toxicity (Category 1B), H360

Specific target organ toxicity - single exposure (Category 3), Respiratory system,
H335 For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements



Pictogram

Signal word Danger Hazard statement(s)

H227 Combustible liquid.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H360 May damage fertility or the unborn child.

Precautionary statement(s)

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
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.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : N-Methyl-2-pyrrolidone, 1-Methyl-2-pyrrolidone Formula : C₅H₉NO
Molecular weight : 99.13 g/mol
CAS-No. : 872-50-4

Hazardous components

Component: N-methyl-2-pyrrolidone
Classification: Flam. Liq. 4; Eye Irrit. 2A; Repr. 1B; STOT SE 3; H227, H319, H335, H360

Concentration: 90-100%

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a

physician. In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labeling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media

Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self contained breathing apparatus for firefighting if necessary.

5.4 Further information

Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

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).

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.
Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the buildup of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas. Moisture sensitive.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

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.

Body Protection

Impervious clothing, flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type AXBEK (EN 14387) 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).
Control of environmental exposure
Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance: Form: liquid, clear, colorless b) Odor: No data available
c) Odor Threshold: no data available
d) pH: 7.7 - 8

e) Melting point/freezing point: Melting point/range: -24 °C (-11°F)

f) Initial boiling point and boiling range: 202 °C (396 °F) at 13 hPa (10 mmHg) g) Flash point: 91.0 °C (196 °F) - closed cup

h) Evaporation rate: no data available

i) Flammability (solid, gas): no data available

j) Upper/lower flammability or explosive limits: Upper explosion limit: 9.5 %(V), Lower explosion limit: 1.3 %(V)

k) Vapor pressure: 0.39 - 0.43 hPa (0.29 - 0.32 mmHg) at 20 °C (68 °F) 1.32 hPa (0.99 mmHg) at 40 °C (104 °F)

l) Vapor density: 3.42 - (Air = 1.0)

m) Relative density: 1.028 g/mL at 25 °C (77 °F)

n) Water solubility: No data available

o) Partition coefficient - noctanol/water: log Pow: -0.46 p) Auto-ignition temperature: No data available

q) Decomposition temperature: no data available

r) Viscosity: no data available

s) Explosive properties: no data available

t) Oxidizing properties: no data available

9.2 Other safety information

Surface tension: 40.7 mN/m

10. STABILITY AND REACTIVITY 10.1 Reactivity

no data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Heat, flames and sparks.

10.5 Incompatible materials

Strong acids, Strong oxidizing agents, Strong reducing agents

10.6 Hazardous decomposition products

Other decomposition products - no data available

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NOx) In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects Acute toxicity

LD50 Oral - Rat - 3,914 mg/kg

LDLO Inhalation - Rat - 4 h - > 5100 ppm

LD50 Dermal - Rabbit - 8,000 mg/kg No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

Causes serious eye irritation.

Respiratory or skin sensitization

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

No data available

Reproductive toxicity

No data available

Aspiration hazard

No data available

Additional Information

RTECS: UY5790000

Prolonged or repeated exposure can cause:, Vomiting, Diarrhea, Abdominal pain, Rats exposed to 1- methyl-2- pyrrolidinone at a concentration of 1 mg/L as an aerosol for 10 days showed depletion of hematopoietic cells in the bone marrow and atrophy of the lymphoid tissues of the thymus, spleen, and lymph nodes

12.ECOLOGICAL INFORMATION 12.1 Toxicity

no data available

12.2 Persistence and degradability

Result: 90 % - Readily biodegradable.

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

no data available

13.DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Contact a licensed professional waste disposal service to dispose of this material. Offer surplus and non- recyclable solutions to a licensed disposal company. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14.TRANSPORT INFORMATION DOT (US)

NA-Number: 1993 Class: NONE Packing group: III

Proper shipping name: Combustible liquid, n.o.s. (N-methyl-2-pyrrolidone)

Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG

Not dangerous goods

IATA

Not dangerous goods

15.REGULATORY INFORMATION

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

N-methyl-2-pyrrolidone

CAS-No. 872-50-4

Revision Date 2007-03-01

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit. Eye irritation

Flam. Liq. Flammable liquids

H227 Combustible liquid.

H319 Causes serious eye irritation.

H335 May cause respiratory irritation.

H360 May damage fertility or the unborn child.

Repr. Reproductive toxicity

STOT SE Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:

Chronic Health Hazard: * Flammability: 2

Physical Hazard

NFPA Rating

Health hazard: 2

Fire Hazard: 2

Reactivity Hazard: 0

Health hazard: Fire Hazard: 2 Reactivity Hazard:

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used

only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.