

Material Safety Data Sheet

acc. to OSHA HazCom 2012

1 Identification of substance:

Trade name: Ruthenium Nanopowder

Manufacturer/Supplier:

Nanostructured & Amorphous Materials, Inc.

16840 Clay Road, Suite #113

Houston, TX 77084, USA

2 Composition/Data on components:

CAS Number: 7440-18-8

EC Number: 231-127-1

3 Hazards identification

Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

GHS02 Flame

Flam. Sol. 2 H228 Flammable solid.

**Classification according to Directive 67/548/EEC or
Directive 1999/45/EC**

Highly flammable

R11: Highly flammable.

**Information concerning particular hazards for human and
environment:** Not applicable

Hazards not otherwise classified: No information known.

Label elements

Labelling according to Regulation (EC) No 1272/2008

The substance is classified and labeled according to the CLP
regulation.

Hazard pictograms



GHS02

Signal word Warning

Hazard statements

H228 Flammable solid.

Precautionary statements

P210 Keep away from heat/sparks/open flames/hot surfaces.
No smoking.

P280 Wear protective gloves/protective clothing/eye protection/face protection.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting/equipment.
P370+P378 In case of fire: Use for extinction: CO₂, powder or water spray.

WHMIS classification

B4 - Flammable solid

Classification system

HMIS ratings (scale 0-4)

(Hazardous Materials Identification System)

Health (acute effects) = 1

Flammability = 2

Reactivity (Physical Hazard) = 1

Other hazards

Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

4 First aid measures

Description of first aid measures

After inhalation

Supply fresh air. If required, provide artificial respiration. Keep patient warm.

Seek immediate medical advice

After skin contact

Immediately wash with water and soap and rinse thoroughly. Seek immediate medical advice.

After eye contact

Rinse opened eye for several minutes under running water. Then consult a doctor.

After swallowing Seek medical treatment.

Information for doctor

Most important symptoms and effects, both acute and delayed

No further relevant information available.

Indication of any immediate medical attention and special treatment needed No further relevant information available.

5 Fire fighting measures

Extinguishing media

Suitable extinguishing agents

Special powder for metal fires. Do not use water.

For safety reasons unsuitable extinguishing agents

Water

Special hazards arising from the substance or mixture

If this product is involved in a fire, the following can be released:

Metal oxide fume

Advice for firefighters

Protective equipment:

Wear self-contained respirator.

Wear fully protective impervious suit.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

Keep away from ignition sources

Environmental precautions:

Do not allow material to be released to the environment without proper governmental permits.

Do not allow product to reach sewage system or any water course.

Do not allow to penetrate the ground/soil.

Methods and material for containment and cleaning up:

Keep away from ignition sources.

Ensure adequate ventilation.

Prevention of secondary hazards:

Keep away from ignition sources.

Reference to other sections

See Section 7 for information on safe handling

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

7 Handling and storage

Handling

Precautions for safe handling

Keep container tightly sealed.

Store in cool, dry place in tightly closed containers.

Ensure good ventilation at the workplace.

Information about protection against explosions and fires:

Protect against electrostatic charges.

Conditions for safe storage, including any incompatibilities

Storage

Requirements to be met by storerooms and receptacles:

Store in a cool location.

Information about storage in one common storage facility:

Store away from oxidizing agents and acids.

Further information about storage conditions:

Keep container tightly sealed.

Store in cool, dry conditions in well sealed containers.

Specific end use(s):

No further relevant information available.

8 Exposure controls and personal protection

Additional information about design of technical systems:

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.

Additional information: No data

Exposure controls

Personal protective equipment

General protective and hygienic measures

The usual precautionary measures for handling chemicals should be followed.

Keep away from foodstuffs, beverages and feed.

Remove all soiled and contaminated clothing immediately.

Wash hands before breaks and at the end of work.

Maintain an ergonomically appropriate working environment.

Breathing equipment:

Use suitable respirator when high concentrations are present.

Protection of hands:

Impervious gloves

Check protective gloves prior to each use for their proper condition.

The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

Penetration time of glove material (in minutes):

Not determined

Eye protection: Safety glasses

Body protection: Protective work clothing.

9 Physical and chemical properties:

Information on basic physical and chemical properties

General Information

Appearance:

Form: Powder
Color: Dark Grey or Black
Odor: Odorless
Odor threshold: Not determined

pH-value: Not applicable.

Change in condition

Melting point/Melting range: 2334 °C
Boiling point/Boiling range: 4150 °C
Sublimation temperature / start: Not determined
Flammability (solid, gaseous): Highly flammable.
Ignition temperature: Not determined
Decomposition temperature: Not determined
Auto igniting: Not determined.

Danger of explosion: Not determined.

Explosion limits:

Lower: Not determined

Upper: Not determined

Vapor pressure: not applicable

Density at 20 °C: 12.45 g/cm³

Relative density: Not determined.

Vapor density: Not applicable.

Evaporation rate: Not applicable.

Solubility in / Miscibility with

Water: Not determined

Partition coefficient (n-octanol/water): Not determined.

Viscosity:

Dynamic: Not applicable.

Kinematic: Not applicable.

Other information:

No further relevant information available.

10 Stability and reactivity

Reactivity: No information known.

Chemical stability:

Stable under recommended storage conditions.

Thermal decomposition / conditions to be avoided:

Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions:

No dangerous reactions known

Conditions to avoid:

No further relevant information available.

Incompatible materials:

Acids and oxidizing agents

Hazardous decomposition products: Metal oxide fume

11 Toxicological information

Information on toxicological effects

Acute toxicity: No effects known.

LD/LC50 values that are relevant for classification:

No data

Skin irritation or corrosion: May cause irritation

Eye irritation or corrosion: May cause irritation

Sensitization: No sensitizing effects known.

Germ cell mutagenicity: No effects known.

Carcinogenicity:

No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

Reproductive toxicity: No effects known.

Specific target organ system toxicity - repeated exposure:

No effects known.

Specific target organ system toxicity - single exposure:

No effects known.

Aspiration hazard: No effects known.

Subacute to chronic toxicity:

The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.

Additional toxicological information:

To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

12 Ecological information:

Toxicity

Aquatic toxicity: No further relevant information available.

Persistence and degradability:

No further relevant information available.

Bioaccumulative potential:

No further relevant information available.

Mobility in soil: No further relevant information available.

Additional ecological information:

General notes:

Do not allow material to be released to the environment without proper governmental permits.

Avoid transfer into the environment.

Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

Other adverse effects:

No further relevant information available.

13 Disposal considerations

Waste treatment methods

Recommendation:

Consult state, local or national regulations to ensure proper disposal.

Uncleaned packagings:

Recommendation:

Disposal must be made according to official regulations.

14 Transport information

UN-Number

DOT, IMDG, IATA: UN3089

UN proper shipping name

DOT: Metal powders, flammable, n.o.s. (Ruthenium powder)

IMDG, IATA: METAL POWDER, FLAMMABLE, N.O.S. (Ruthenium powder)

Transport hazard class(es)

DOT:

Class: 4.1 Flammable solids, self-reactive substances and solid desensitised explosives.

Label: 4.1

Class: 4.1 (F3) Flammable solids, self-reactive substances and solid desensitized explosives

Label

IMDG, IATA:

Class: 4.1 Flammable solids, self-reactive substances and solid desensitised explosives.

Label: 4.1

Packing group

DOT, IMDG, IATA: III

Environmental hazards: Not applicable.

Special precautions for user:

Warning: Flammable solids, self-reactive substances and solid desensitized explosives

EMS Number: F-G, S-G

Segregation groups: Heavy metals and their salts (including their organometallic compounds), powdered metals

Transport in bulk according to Annex II of MARPOL73/78 and

the IBC Code: Not applicable.

Transport/Additional information:

DOT

Marine Pollutant (DOT): No

UN "Model Regulation":

UN3089, Metal powders, flammable, n.o.s. (Ruthenium powder),
4.1, III

15 Regulations

**Safety, health and environmental regulations/legislation
specific for the substance or mixture**

National regulations

All components of this product are listed in the U.S.
Environmental Protection Agency Toxic Substances Control Act
Chemical substance Inventory.

All components of this product are listed on the Canadian
Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings):

Substance is not listed.

California Proposition 65

Prop 65 - Chemicals known to cause cancer:

Substance is not listed.

Prop 65 - Developmental toxicity:

Substance is not listed.

Prop 65 - Developmental toxicity, female:

Substance is not listed.

Prop 65 - Developmental toxicity, male:

Substance is not listed.

Information about limitation of use:

For use only by technically qualified individuals.

Other regulations, limitations and prohibitive regulations

**Substance of Very High Concern (SVHC) according to the REACH
Regulations (EC) No. 1907/2006:**

Substance is not listed.

**The conditions of restrictions according to Article 67 and
Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for
the manufacturing, placing on the market and use must be
observed:**

Substance is not listed.

**Annex XIV of the REACH Regulations (requiring Authorization
for use):**

Substance is not listed.

REACH - Pre-registered substances:

Substance is listed.

Chemical safety assessment:

A Chemical Safety Assessment has not been carried out.

16 Other information:

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement 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 Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.