

N-Doped Single Layer Graphene Powder

US Research Nanomaterials, Inc.

Material Safety Data Sheet

acc. to OSHA and ANSI

1 - Identification of substance:

Chemical Name: Graphene N-Doped

Synonyms: natural graphite flakes, graphene sheets, exfoliated graphite, graphite powder

Graphene (CAS# 7782-42-5)

Manufacturer/Supplier:

US Research Nanomaterials, Inc.

3302 Twig Leaf Lane

Houston, Texas 77084, USA

www.us-nano.com

2 - Composition/Data on components:

Chemical characterization:

Description:

Graphene CAS# 7782-42-5

3 - Hazards identification

- Eyes – may cause eye irritation.
- Skin – may cause skin irritation.
- Respiratory tract/inhalation – may cause irritation.
- Ingestion – not hazardous in normal industrial use circumstances.

4 - First aid measures

- **After inhalation**
Remove to 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 immediate medical advice.

5 - Fire fighting measures

- **Suitable extinguishing agents**
CO₂, extinguishing powder or water spray. Fight larger fires with water spray.
- **Special hazards caused by the material, its products of combustion or resulting gases:**
In case of fire, the following can be released: Carbon monoxide (CO)
- **Protective equipment:**
Wear self-contained respirator.
Wear fully protective impervious suit.

6 - Accidental release measures

- **Person-related safety precautions:**
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
- **Measures for environmental protection:**
Do not allow material to be released to the environment.
- **Measures for cleaning/collecting:**
Ensure adequate ventilation.
- **Additional information:**
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:**
This material is stable at room temperature and does not pose a significant risk of combustion. This material should be stored in labeled, closed containers away from sources of ignition or heat. Care should be taken to avoid creating accumulations or concentrations of dust, since any dust can form a potentially explosive mixture in air. Graphite is electrically conductive. Care should be taken, therefore, to avoid accumulations of graphite dusts or powders in places where these accumulations could cause shorting of electrical switches, circuits or components.
- **Storage:** Keep in closed container for storage
- **Information 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:**
No Special Requirements
- **Requirements to be met by storerooms and receptacles:**
No special requirements.
- **Information about storage in one common storage facility:**
Store away from oxidizing agents.
Store away from halogens.
Do not store together with acids.
- **Further information about storage conditions:**
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

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.

Components with limit values that require monitoring at the workplace:

Graphite (CAS no. 7782-42-5) TWA:

ACGIH (TLV): 2.0 mg/m₃ respirable

OSHA (PEL): 2.5 mg/m₃ respirable (US Federal std: mg/m₃ respirable)

- **Additional information:** No data

- **Personal protective equipment**

Respiratory protection: Protect against inhalation. A respiratory protection program that meets applicable OSHA requirements should be maintained in the workplace.

Eye protection: Protect against contact with eyes by wearing suitable safety eyeglasses or chemical protective goggles or other face protection.

Skin protection: Protect against skin contact by wearing protective gloves. Protect against skin contact by wearing suitable clothing.

- **General protective and hygienic measures**

1. The usual precautionary measures for handling chemicals should be followed.
2. Keep away from foodstuffs, beverages and feed.
3. Remove all soiled and contaminated clothing immediately.
4. Wash hands before breaks and at the end of work.
5. Avoid contact with the eyes.
6. Avoid contact with the eyes and skin.

9 - Physical and chemical properties:

- **General Information**

- **Form:** Powder
- **Color:** Black
- **Odor:** Odorless

Value/Range Unit Method

- **Change in condition**

- **Graphene Melting point/Melting range:** Estimated 3600 ° C (subl/vac)
- **Boiling point/Boiling range:** Not determined
- **Sublimation temperature / start:** Not determined
- **Flash point:** Not applicable
- **Ignition temperature:** Not determined
- **Decomposition temperature:** Not determined
- **Danger of explosion:** Product does not present an explosion hazard.

Explosion limits:

- **Lower:** Not determined
- **Upper:** Not determined
- **Vapor pressure:** Not determined
- **Density:** Not determined
- **Solubility in / Miscibility with Water:** Not applicable

10 - Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**
Decomposition will not occur if used and stored according to specifications.
- **Materials to be avoided:**
Oxidizing agents
Acids
Halogens
Interhalogens
Alkali metals
- **Dangerous reactions:** No dangerous reactions known
- **Dangerous products of decomposition:** Carbon monoxide and carbon dioxide

11 - Toxicological information

- **Acute toxicity:**
- **Primary irritant effect:**
- **On the skin:** Irritant to skin and mucous membranes.
- **On the eye:** Irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Subacute to chronic toxicity:**
The inhalation of graphite, both natural and synthetic, has caused pneumoconiosis in exposed workers. The pneumoconiosis found is similar to coal worker's pneumoconiosis.
- **Additional toxicological information:**
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known. No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.
Toxicological information on Graphene Nanoplatelets may be found at the website of the International Council on Nanotechnology at <http://icon.rice.edu/>

12 - Ecological information:

- **General notes:**
Do not allow this material to be released to the environment without proper governmental permits!

Ecological information on Graphene Nanoplatelets may be found at the website of the International Council on Nanotechnology at <http://icon.rice.edu/>.

13 - Disposal considerations

- **Product:** Graphene Nanoplatelets
- **Recommendation**
Consult state, local or national regulations to ensure proper disposal.
- **Uncleaned packagings:**
Consult all state, local or national regulations to ensure proper disposal. Specific care should be taken to insure that no carbon or carbon packaging is released into the environment.
- **Recommendation:**
Disposal must be made according to official regulations. Contact a hazardous materials removal company. Keep all carbon waste, packaging, and contaminated items segregated from other waste and dispose of with a materials removal company such as Saftey Kleen or others.

14 - Transport information

Not a hazardous material for transportation.

- **DOT regulations:**
- **Hazard class:** None
- **Land transport ADR/RID (cross-border)**
- **ADR/RID class:** None
- **Maritime transport IMDG:**
- **IMDG Class:** None
- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** None
- **Transport/Additional information:** Not dangerous according to the above specifications.

15 - Regulations

- **Product related hazard information:**
- **Hazard symbols:** Xi Irritant
- **Risk phrases:** 36/37 Irritating to eyes and respiratory system.
- **Safety phrases:** 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- **National regulations:**
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory.
- **Information about limitation of use:**
For use only by technically qualified individuals.

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.