

## SAFETY DATA SHEET

valid for the whole range of our carbon nano onions in accordance with regulation (EC)

### SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1 Product identifier and relevant identified uses of the substance or mixture and uses advised against

Identification of the substance: Carbon nano onions (CNO)  $\geq 99\%$ .

CNO consists of spherical and multilateral fullerenes close to each other. The distance between the graphitic layers is 0.335 nm, and it is approximately equal to the distance between two graphitic planes (0.334 nm).

Black powder, particle size 30 – 60 nm. The spherical nature of the material leads to a unique ability to be dispersed in a variety of solvents.

Relevant uses:

Carbon Nano-Onions (CNOs) - nanostructures with exceptional physicochemical properties and a broad range of potential and emerging applications, including:

**Coolants and thermal fluids** (e.g., antifreeze formulations) for improved heat transfer efficiency.

**Tribological and mechanical applications:** Ultralow-friction lubricants and additives; Wear-resistant coatings.

**Water purification** as efficient adsorbents for: Oxo-anions (e.g.,  $\text{MnO}_4^-$ ); Heavy metals ( $\text{Pb}^{2+}$ ,  $\text{Cu}^{2+}$ , etc.); Organic pollutants and oils (e.g., pyridine, diesel). Effective in tap, river, dam, and seawater, with potential for wastewater treatment and oil–water separation.

**Energy storage and conversion:** Electrode materials for lithium-ion and sodium–oxygen batteries; Supercapacitor components; Electrodes for fuel cells.

**Functional materials and manufacturing:** Additive manufacturing (3D printing) as functional fillers;

**Paints and coatings** with enhanced conductivity or durability;

**Polymer composites** with improved mechanical, thermal, or electrical properties;

**Conductive inks** for flexible electronics and printed circuits;

**Elastomers and resins** for advanced engineering applications.

Uses advised against:

No strictly prohibited uses have been identified to date. However, the following uses are advised against unless thoroughly evaluated:

**Medical or pharmaceutical applications involving direct human exposure** without full preclinical and toxicological validation;  
**Use in food-contact materials or dietary supplements**, due to the lack of ingestion safety data;  
**Aerosol or spray forms** that could pose respiratory hazards, especially in unventilated spaces;  
**Consumer products for children or prolonged skin contact items** without certified toxicological assessments.

It is recommended to follow standard nanomaterial safety practices, including using protective equipment and preventing inhalation or skin contact during handling, processing, or disposal.

## 1.2 Details of the supplier of the safety data sheet

PYROHGEN GROUP

United Arab Emirates, Dubai, Deira, Al Masraf Tower, Baniyas Road, Suite 17-08 e-mail:

contact@pyrohgen.com

Website: www.pyrohgen.com

Competent person responsible for the safety data sheet: Department Health, Safety and Environment

e-mail (competent person): muller@pyrohgen.com

## SECTION 2: Hazards identification

### 21 Classification of the substance or mixture

| Section | Hazard class                                                                    | Category | Hazard class and category | Hazard statement |
|---------|---------------------------------------------------------------------------------|----------|---------------------------|------------------|
| 3.3     | Serious eye damage/eye irritation                                               | 2A       | Eye Irrit. 2A             | H319             |
| 3.8R    | Specific target organ toxicity - single exposure (respiratory tract irritation) | 3        | STOT SE 3                 | H335             |

### 22 Hazard statements

H319 Causes serious eye irritation

H335 May cause respiratory irritation

### 23 Other hazards

**Main product risks:** Carbon Nano-Onions (CNOs) are carbon-based nanostructures

that do not pose significant chemical reactivity under normal handling conditions. However, as a nanoform of carbon, they exhibit material-specific physical and biological risks due to their size, morphology, and high surface area. CNOs are not classified as hazardous substances under REACH when unmodified, but their nano-scale nature introduces potential health and environmental concerns.

#### Human health risks:

- **Inhalation hazard:** Due to nanoscale dimensions, airborne CNO particles may deposit in the lungs and cause **inflammatory responses** or **respiratory irritation**.
- **Skin and eye contact:** May cause **mechanical irritation**; no acute toxicity reported but data remains limited.
- **Ingestion:** Not intended for ingestion; limited data available.
- **Chronic exposure:** Long-term effects are **not fully understood**; studies on similar carbon nanomaterials (e.g., CNTs) suggest potential for oxidative stress or granuloma formation in lung tissue.

#### Environmental risks:

- **Persistence:** CNOs are chemically stable and may **persist in the environment**.
- **Aquatic toxicity:** Data is limited. Preliminary studies suggest **low acute toxicity**, but **nanoform mobility** may allow penetration into ecosystems and bioaccumulation.
- **Soil and sediment:** Potential for **adsorption of contaminants**; their behavior in natural systems is complex and may affect microbial activity.

#### Supplemental hazard risks

- **Nanomaterial classification:** CNOs should be handled as **engineered nanomaterials** with appropriate containment, PPE, and control measures.
- **Lack of long-term toxicological data:** Precautionary principles apply.
- **Not biodegradable**, and long-term accumulation in biological systems is uncertain.
- **Interference with analytical and biological assays** due to high surface activity and adsorption properties.

#### Specific risks:

**Dust formation:** Risk of **dust explosion** when airborne concentrations are high.

### SECTION 3: Composition/information on ingredients

### 3.1 Substances

|                   |                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name of substance | Carbon nano onion (CNO)                                                                                                                                                           |
| Molecular formula | $C_{x(n)} = C_{60} \cdot n^2$ <p>where <i>n</i> is the subsequent number of the corresponding layer;<br/> <i>x(n)</i> defines the number of carbon atoms comprising the layer</p> |
| Cas number:       | <p>N/A (Carbon-based nanomaterial)</p> <p><b>C<sub>60</sub> CAS number</b> - 99685-96-8</p>                                                                                       |

## SECTION 4: First aid measures

### 4.1 Description of first aid measures



**General notes:** Take off contaminated clothing.

**Following inhalation:** Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

**Following skin contact:** Rinse skin with water/shower. In all cases of doubt, or when symptoms persist, seek medical advice.

**Following eye contact:** Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart. In case of eye irritation consult an ophthalmologist.

**Following ingestion:** Rinse mouth. Call a doctor if you feel unwell.

### 4.2 Most important symptoms and effects, both acute and delayed

Irritation, Cough, Dyspnoea

### 4.3 Indication of any immediate medical attention and special treatment needed

none

## SECTION 5: Firefighting measures

### 5.1 Extinguishing media



**Suitable extinguishing media:** co-ordinate firefighting measures to the fire surroundings! water, foam, dry extinguishing powder, ABC-powder

**Unsuitable extinguishing media:** water jet

## **5.2 Special hazards arising from the substance or mixture**

Combustible.

**Hazardous combustion products In case of fire may be liberated:** Carbon monoxide (CO), Carbon dioxide (CO<sub>2</sub>)

## **5.3 Advice for firefighters**

In case of fire and/or explosion do not breathe fumes. Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus.

# **SECTION 6: Accidental release measures**

## **6.1 Personal precautions, protective equipment and emergency procedures**



**For non-emergency personnel:** Avoid contact with skin, eyes and clothes. Do not breathe dust.

## **6.2 Environmental precautions**

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

## **6.3 Methods and material for containment and cleaning up**

**Advice on how to contain a spill:** Covering of drains. Take up mechanically.

**Advice on how to clean up a spill:** Take up mechanically. Control of dust.

**Other information relating to spills and releases:** Place in appropriate containers for disposal. Ventilate affected area.

## **6.4 Reference to other sections**

Hazardous combustion products: see section 5. Personal protective equipment: see section 8.

Incompatible materials: see section 10. Disposal considerations: see section 13.

# **SECTION 7: Handling and storage**

## **7.1 Precautions for safe handling**

Provision of sufficient ventilation. Avoid dust formation.

## **Measures to prevent fire as well as aerosol and dust generation**

Removal of dust deposits.

## **Advice on general occupational hygiene**

Wash hands before breaks and after work. Keep away from food, drink and animal feedingstuffs.

## **7.2 Conditions for safe storage, including any incompatibilities**

Store in a dry place.

### Incompatible substances or mixtures

Observe hints for combined storage. Incompatible materials: see section 10.

### Consideration of other advice:

#### Ventilation requirements

Use local and general ventilation.

#### Specific designs for storage rooms or vessels

Recommended storage temperature: 15 – 25 °C

### 7.3 Specific end use(s)

No information available.

## SECTION 8: Exposure controls/personal protection

### 8.1 Exposure controls

Individual protection measures (personal protective equipment)

Eye/face protection



Use safety goggle with side protection.

Skin protection



#### hand protection

Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves. The times are approximate values from measurements at 22 ° C and permanent contact. Increased temperatures due to heated substances, body heat etc. and a reduction of the effective layer thickness by stretching can lead to a considerable reduction of the breakthrough time. If in doubt, contact manufacturer. At an approx. 1.5 times larger / smaller layer thickness, the respective breakthrough time is doubled / halved. The data apply only to the pure substance. When transferred to substance mixtures, they may only be considered as a guide.

#### type of material

NBR (Nitrile rubber)

#### material thickness

>0,11 mm

#### breakthrough times of the glove material

>480 minutes (permeation: level 6)

#### other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended.

#### Respiratory protection



Respiratory protection necessary at: Dust formation. Particulate filter device (EN 143). P2 (filters at least 94 % of airborne particles, colour code: White).

#### Environmental exposure controls

Keep away from drains, surface and ground water.

## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

|                                                          |                      |
|----------------------------------------------------------|----------------------|
| Physical state                                           | Solid                |
| Particle size                                            | 30-60 nm             |
| Form                                                     | Powder               |
| Colour                                                   | Black                |
| Odour                                                    | Not determined       |
| Boiling point or initial boiling point and boiling range | Not determined       |
| Lower and upper explosion limit                          | Not relevant (solid) |
| Auto-ignition temperature                                | Not determined       |
| Decomposition temperature                                | Not relevant         |
| pH (value)                                               | Not applicable       |
| Kinematic viscosity                                      | Not relevant         |

## SECTION 10: Stability and reactivity

### 101 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

### 102 Possibility of hazardous reactions

Violent reaction with: strong oxidiser

### 103 Conditions to avoid

There are no specific conditions known which have to be avoided.

#### 10.4 Incompatible materials

There is no additional information.

#### 10.5 Hazardous decomposition products

Hazardous combustion products: see section 5.

### SECTION 11: Toxicological information

#### 111 Information on toxicological effects

##### Classification acc. to GHS

##### Acute toxicity

Shall not be classified as acutely toxic.

##### Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

##### Serious eye damage/eye irritation

Causes serious eye irritation.

##### Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

##### Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

##### Carcinogenicity

Shall not be classified as carcinogenic.

##### Reproductive toxicity

Shall not be classified as a reproductive toxicant.

##### Specific target organ toxicity - single exposure

May cause respiratory irritation.

##### Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

##### Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

##### Symptoms related to the physical, chemical and toxicological characteristics:

- If swallowed: Data are not available.
- If in eyes: Causes serious eye irritation
- If inhaled: Irritation to respiratory tract, cough, Dyspnoea
- If on skin: Data are not available.
- Other information: none

#### 112 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of  $\geq 0,1\%$ .

## SECTION 12: Ecological information

### 121 Toxicity

Shall not be classified as hazardous to the aquatic environment.

### 122 Bioaccumulative potential

Data are not available.

### 123 Mobility in soil

Data are not available.

### 124 Results of PBT and vPvB assessment

Data are not available.

### 125 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of  $\geq 0,1\%$ .

### 126 Other adverse effects

Data are not available.

## SECTION 13: Disposal considerations

### 131 Waste treatment methods

Dispose of contents/container in accordance with local/regional/national/international regulations.  
**Sewage disposal-relevant information:** Do not empty into drains.

### 132 Remarks

Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities. Please consider the relevant national or regional provisions. Non-contaminated packages may be recycled.

## SECTION 14: Transport information

**141 UN number:** not subject to transport regulations

**142 UN proper shipping name:** not assigned

**143 Transport hazard class(es):** not assigned

**144 Packing group:** not assigned

**145 Environmental hazards:** non-environmentally hazardous acc. to the dangerous goods regulations

**146 Special precautions for user:**

There is no additional information.

**147 Transport in bulk according to IMO instruments:** The cargo is not intended to be carried in bulk.

### **148 Information for each of the UN Model Regulations**

**Transport information National regulations Additional information(UN RTDG):** Not subject to transport regulations. UN RTDG.

**International Maritime Dangerous Goods Code (IMDG) - Additional information:** Not subject to IMDG.

**International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information:** Not subject to ICAO-IATA.

## SECTION 15: Regulatory information

**151 Safety, health and environmental regulations/legislation specific for the substance or mixture:** There is no additional information.

**Other information:** Directive 94/33/EC on the protection of young people at work. Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.

**152 Chemical Safety Assessment:** No Chemical Safety Assessment has been carried out for this substance.

## SECTION 16: Other information

### Abbreviations and acronyms

| Abbr.     | Descriptions of used abbreviations                                                                        |
|-----------|-----------------------------------------------------------------------------------------------------------|
| CAS       | Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)    |
| Ceiling-C | Ceiling value                                                                                             |
| DGR       | Dangerous Goods Regulations (see IATA/DGR)                                                                |
| ED        | Endocrine disruptor                                                                                       |
| GHS       | "Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations |
| IATA      | International Air Transport Association                                                                   |
| IATA/DGR  | Dangerous Goods Regulations (DGR) for the air transport (IATA)                                            |
| ICAO      | International Civil Aviation Organization                                                                 |
| IMDG      | International Maritime Dangerous Goods Code                                                               |
| PBT       | Persistent, Bioaccumulative and Toxic                                                                     |
| STEL      | Short-term exposure limit                                                                                 |
| TWA       | Time-weighted average                                                                                     |
| UN RTDG   | UN Recommendations on the Transport of Dangerous Good                                                     |
| vPvB      | Very Persistent and very Bioaccumulative                                                                  |



**List of relevant phrases (code and full text as stated in section 2 and 3)**

| Code | Text                              |
|------|-----------------------------------|
| H319 | Causes serious eye irritation.    |
| H335 | May cause respiratory irritation. |

**!!! Disclaimer**

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product