SAFETY DATA SHEET


Version 1.0, revision date 04/01/13

1.0 IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers

Product name: Carbon Nanotubes, multiwall, free and substrate grown
Product number : N/A
Brand : Vantablack
CAS No : 308068-56-6

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

Identified uses : manufacture of substances and free standing parts

1.3 Details of the supplier of the safety data sheet

Company : Surrey NanoSystems Ltd
24 Corn Hill
London, EC3v 3ND
UNITED KINGDOM

Telephone : +44 (0)1273 515899
Email : enquiries@surreynanosystems.com

1.4 Emergency telephone number

Phone : +44 (0) 7984181146

2.0 HAZARDS IDENTIFICATION

2.1 Classification of the substances or mixture

Classification according to regulation (EC) No 1272/2008 (EU-GHS/CLP

Eye irritation (Cat 2)
Specific target organ toxicity – single exposure (Cat 3)

Classification according to EU Directives67/548/ECC or 1999/45/EC

Irritating to eyes and respiratory system
2.2 Label Elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

Pictogram

Signal word Warning

Hazard statement(s)

H319 Causes serious eye irritation
H335 May cause respiratory irritation

Precautionary statements

P261 Avoid breathing dust/fume/mist/vapours/spray

P305 + P531 + P338 IF IN EYES: rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.

Supplemental Hazard Statements

None

According to European Directive 67/548/ECC as amended

Hazard symbol(s)

R36/37 Irritating to eyes and respiratory system

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S36 Wear suitable protective clothing

Caution – substance not yet tested completely

Other hazards – none

3.0 COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Multiwall carbon nanotubes, MWCNT, Vantablack

Component : CAS-No 308068-56-6

4.0 FIRST AID MEASURES
4.1 Description of first aid measures

General advice
Consult a doctor. Show this MSDS to the doctor in attendance

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

In case of skin contact
Wash off with soap and water. Consult a doctor

In case of eye contact
Rinse well with plenty of water for at least 15 minutes and consult a doctor

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a doctor.

4.2 Most important symptoms and effects, both acute and delayed
To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5.0 FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol resistant foam, dry chemical or carbon dioxide

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for fire-fighters
Wear self contained breathing apparatus for fire fighting if required.

5.4 Further information
No data available

6.0 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use PPE. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

**6.2 Environmental precautions**
Do not let the product enter drains

**6.3 Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in a suitable, closed container for disposal.

**6.4 Reference to other sections**
For disposal see section 13

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**7.0 HANDLING AND STORAGE**

**7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where duct is formed. Normal measures for preventative fire protection.

**7.2 Conditions for safe storage, including any incompatibilities**
Store in a cool dry place. Keep container closed and a dry ventilated place.

**7.3 Specific end uses**
Data not available

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**8.0 EXPOSURE CONTROL/PERSOAL PROTECTION**

**8.1 Control parameters**

**Components with workplace control parameters**
Contains no substances with occupational exposure limit values

**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 the work day.

**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. Inspect gloves prior to use. Use proper glove removal technique to avoid skin contact with this material. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected gloves have to satisfy the specifications of EU directive 89/686/EEC and the standard EN 374 derived from it.

Body protection
Impervious 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
For nuisance exposure use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

9.0 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: solid</td>
</tr>
<tr>
<td>b) Odour</td>
<td>no data available</td>
</tr>
<tr>
<td>c) Odour threshold</td>
<td>no data available</td>
</tr>
<tr>
<td>d) PH</td>
<td>no data available</td>
</tr>
<tr>
<td>e) Melting point</td>
<td>3,652 – 3697 °C – lit</td>
</tr>
<tr>
<td>f) Initial boiling point</td>
<td>no data available</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>no data available</td>
</tr>
<tr>
<td>h) Evaporation point</td>
<td>no data available</td>
</tr>
<tr>
<td>i) Flammability (solid/gas)</td>
<td>no data available</td>
</tr>
<tr>
<td>j) LEL/LFL</td>
<td>no data available</td>
</tr>
<tr>
<td>k) Vapour pressure</td>
<td>no data available</td>
</tr>
<tr>
<td>l) Vapour density</td>
<td>no data available</td>
</tr>
<tr>
<td>m) Relative density</td>
<td>0.05 mg/cm²</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>Insoluble</td>
</tr>
<tr>
<td>o) Auto ignition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>p) Decomposition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>q) Viscosity</td>
<td>no data available</td>
</tr>
</tbody>
</table>
6

9.2 Other safety information
No data available

10.0 STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products – no data available

11.0 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available
Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity – single exposure
Inhalation – May cause respiratory irritation

Specific target organ toxicity – repeated exposure
No data available

Aspiration hazard
No data available

Potential health effects

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>May be harmful if inhaled. Causes respiratory tract irritation</td>
</tr>
<tr>
<td>Ingestion</td>
<td>May be harmful if swallowed</td>
</tr>
<tr>
<td>Skin</td>
<td>May be harmful if absorbed through skin. May cause skin irritation</td>
</tr>
<tr>
<td>Eyes</td>
<td>Causes serious eye irritation</td>
</tr>
</tbody>
</table>

Signs and symptoms of exposure
To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

Additional information
RTECS: not available

12.0 ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
No data available
12.6 Other adverse effects
No data available

13.0 DISPOSAL CONDITIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable material to a licensed disposal company. Contact a licensed waste disposal service to dispose of this material. Dissolve or mix material with a combustible solvent and burn in a suitable incinerator equipped with a post burner and scrubber.

Contaminated packaging
Dispose of as unused product.

14.0 TRANSPORT INFORMATION

14.1 UN Number
ADR/RID: - IMDG: - IATA: -

14.2 UN Proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG: Marine Pollutant: no IATA: no

14.6 Special safety precautions for user
No data available

15.0 REGULATORY INFORMATION
This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
No data available
16.0 OTHER INFORMATION

Further information

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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 regards to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Surrey NanoSystems Ltd shall not be held liable for any damage resulting from handling or from contact with the above product. See Surrey Nanosystems conditions for sale for additional terms.

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