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

1.1 Product identifier:

Product identifier used on the label: PLASTICYL™ TPU1001
Other means of identification: Carbon/Thermoplastic polyurethane mixture.
REACH Registration Number (RRN): Not applicable.
Belgium Nanoregister Number: Please consult Nanocyl S.A.

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

General use: Raw material for plastics industry
Identified Uses: Extrusion; Injection
For Industrial and Professional use only.
Uses Advised against: Not intended for food contact applications, toys or medical devices.

1.3 Details of the supplier of the safety data sheet

Manufacturer: Nanocyl S.A.
Rue de l'Essor, 4 - B-5060 Sambreville - Belgium
Phone: + 32 71 750 380 (office hours) - Fax: + 32 71 750 390
E-mail: info@nanocyl.com

1.4 Emergency telephone number

Phone: + 32 71 750 380 (office hours, English and French)

SECTION 2. Hazards identification

2.1 Classification of the substance or mixture

2.1.1 Classification according to Regulation (EC) No 1272/2008 (CLP)

This mixture does not meet the criteria for classification according to Regulation (EC) 1272/2008 [CLP].
This product is not classified as hazardous according to Regulation OSHA GHS 29 CFR 1910.1200.
2.1.2 Additional information:

None.

2.2 Label elements

* Pictograms: not applicable
* Signal words: not applicable
* Hazard statements: not applicable
* Precautionary statements: not applicable

2.3 Other hazards

Explosion hazard: dust generated during processing/handling may form explosive mixture with air. When ground to a fine powder, the product may be classified as Combustible Dust in accordance with regulation OSHA GHS 29 CFR 1910.1200.

If dust is generated, it could scratch the eyes and cause minor irritation to the respiratory tract. When heated, the vapors/fumes given off may cause respiratory tract irritation.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

<table>
<thead>
<tr>
<th>Substances</th>
<th>EC Number / List number</th>
<th>CAS Number</th>
<th>Reach Registration Number</th>
<th>% (wt.)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermoplastic polyurethane (TPU) polymer</td>
<td></td>
<td>Not available</td>
<td>-</td>
<td>~ 90</td>
<td>-</td>
</tr>
</tbody>
</table>
| Short tangled Multi-walled carbon nanotubes (MWCNTs) obtained by catalytic chemical vapour deposition-
  Synthetic graphite in tubular shape*                                   | - / 936-414-1           | -          | 01-2119879048-26          | ~ 10    | -              |

SECTION 4. First aid measures

4.1 Description of first aid measures

After skin contact: In case of contact with molten product, immediately flood the affected area with cold water. Do not pull solidified product away from the skin. Transport to nearest medical facility for additional treatment.
After eye contact: Hold the eyes open and rinse with water for a sufficiently long period of time (at least 10 minutes). Obtain medical attention if pain, blurred vision, swelling, burning or redness persist.

After inhalation: If vapours are inhaled, move the person into fresh air, keep warm and allow to rest. If breathing is difficult, oxygen may be administered and medical attention should be obtained.

Ingestion: Get medical if necessary. No specific measures have to be taken if the product is swallowed. Do not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.

4.2 Most important symptoms and effects, both acute and delayed: See Section 2.

4.3 Indication of any immediate medical attention and special treatment needed
Treat symptomatically.

SECTION 5. Firefighting measures

5.1 Extinguishing media
Suitable media: Water fog, Foam, Carbon Dioxide, Dry Chemical.

Unsuitable media: High volume water jet

5.2 Special hazards arising from the substance or mixture
Specific hazards: Dust can form explosive mixture with air.

Hazardous combustion products: May form toxic fumes, carbon monoxide, carbon dioxide, hydrocarbons, nitrogen oxides, hydrogen cyanide and isocyanates.

5.3 Advice for firefighters
Protective equipment's: Wear self-contained breathing apparatus. Wear suitable protective clothing.

Further information: Water used to extinguish fire should not enter drainage systems, soil or stretches of water. Ensure that there are sufficient retaining facilities for media used to extinguish fire.

SECTION 6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Equip cleanup crew with proper protection (see chapter 8).
Avoid contact with skin, eyes and clothing with molten product. Do not inhale vapours and dust.

Avoid dust formation.

6.2 Environmental precautions:
Collect for disposal. Avoid discharge to natural waters, sewers and biological waste water treatment plants.

6.3 Methods and material for containment and cleaning up:
Collect spilled polymer, pellets; it could cause falls (danger of slipping).

If molten, allow material to cool and place into an appropriate marked container for disposal.

Avoid dust formation.

6.4 Reference to other sections: See Sections 8 and 13.

SECTION 7. Handling and storage

7.1 Precautions for safe handling
No specific requirements necessary, if handled at room temperature.

Avoid spilling the product, as it might cause falls.

When bringing the material to processing temperatures gases might develop. Provide appropriate ventilation for such processing conditions.

Take precautionary measures against explosion risks, as all type of polymers may develop dust during transporting or grinding of pellets. Avoid dust formation. Dust can be ignited by static discharge. Open flames prohibited. Do not smoke.

7.2 Conditions for safe storage, including any incompatibilities
Keep only in the original closed container in a dedicated place. Keep containers in a cool, dry place with adequate ventilation. Keep away from open flames and high temperature. Avoid dust formation.

| Storage class: 11 Combustible solids

7.3 Specific end use(s): Not applicable.

SECTION 8. Exposure controls / Personal protection

8.1 Control parameters

| Apply technical measures to comply with the Occupational Exposure Limits. The Occupational Exposures...
Limits values are country or region specific. Please check which values are applicable at your workplace.

<table>
<thead>
<tr>
<th>Particulates, not otherwise regulated</th>
<th>Limit value - 8 hours ppm</th>
<th>Limit value - Short term ppm</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>10</td>
<td>3</td>
<td>Respirable fraction</td>
</tr>
<tr>
<td>Canada - Québec</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>10</td>
<td></td>
<td>Inhalable aerosol</td>
</tr>
<tr>
<td>New Zealand</td>
<td>3</td>
<td>Respirable aerosol</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Korea</td>
<td>10</td>
<td>Respirable fraction</td>
<td></td>
</tr>
<tr>
<td>USA - OSHA</td>
<td>15</td>
<td>total dust</td>
<td></td>
</tr>
<tr>
<td>USA - OSHA</td>
<td>5</td>
<td>respirable dust</td>
<td></td>
</tr>
</tbody>
</table>

Worker exposure to dust should be evaluated taking into account all activities carried out on site. The type of dust (respirable / breathable, organic / inorganic, ...) depends on these activities.

No official Occupational Exposure Limit has yet been established for carbon nanotubes. Obtain special instructions before use.

Derived No Effect Level (DNEL) for MWCNT – Inhalation - long term exposure of workers: 0.05 mg/m³

8.2 Exposure controls

8.2.1 Appropriate engineering controls:

Technical measures to prevent exposure: Ensure good ventilation and/or provide local exhaust ventilation appropriate to the product decomposition risk. The following substances are contained only in traces in the product: 4,4’-methylenediphenyl diisocyanate (CAS 101-68-8).

8.2.2 Personal protection equipment:

8.2.2.1 Eye and face protection: Chemical goggles or safety glasses. Recommended: Use eye protection according to EN 166.

8.2.2.2 Skin protection:

Hand protection: Wear heat resistant gloves when handling molten material.
Body protection: No special skin protection requirements during normal handling and use.

8.2.2.3 Respiratory protection:

Dust formation: In case of inadequate ventilation wear respiratory protection. Use appropriate respiratory protection. Recommended: P filter (EN 143 or NIOSH approved respirator).
Elevated temperature: In case of inadequate ventilation wear suitable respiratory protection.
8.2.2.4 Thermal hazards:
Elevated temperature: Wear heat resistant gloves when handling molten material.

8.2.3 Environmental exposure controls:
Collect for disposal. Avoid discharge to natural waters, sewers and biological waste water treatment plants.
In case of contact, ensure prompt removal from eyes, skin and clothing. Wash hands and other exposed areas with mild soap and water before eat, drink or smoke and leaving work. Facilities storing or using this material should be equipped with an eyewash facility. Immediately change clothing when contaminated with molten product.

SECTION 9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance: solid; black pellets, granules or powder
Odour/Odour threshold: odorless
pH: Not applicable.*
Solubility in water: insoluble
Melting point/freezing point: 135-145°C / 275-293°F (estimated)
Initial boiling point and boiling range: Not applicable.
Flash point: Not applicable.*
Decomposition temperature: > 230°C / 446°F (estimated)
Smouldering temperature: No data available.
Auto-ignition temperature: > 400°C / 752°F (estimated)
Evaporation rate Not applicable.*
Viscosity: Not applicable.*
Vapour pressure: Not applicable.*
Vapour density: Not applicable.*
Density: 1.2 g/cm³ (estimated)
Flammability (solid, gas): Not fulfilling GHS/CLP criteria.
Oxidising properties Not fulfilling GHS/CLP criteria.
Explosive properties Not fulfilling GHS/CLP criteria.

* Testing can be waived because substance is a solid.

9.2 Other information

Bulk density: No information available.

NOTE: The physical data presented above are typical values and should not be construed as a specification.
SECTION 10. Stability and Reactivity

10.1 Reactivity: No hazardous reaction when handled and stored according to provisions.

10.2 Chemical stability: Stable under normal handling and storage conditions.

10.3 Possibility of hazardous reactions: Hazardous polymerization will not occur.

10.4 Conditions to avoid:
Avoid heating up to thermal decomposition temperature (see Section 9.1).
Avoid exposure to moisture, direct sunlight and/or heat and accumulation of electrostatic charges.
Avoid dust formation.

10.5 Incompatible materials: Strong oxidizing and reducing agents. Strong acids and strong bases.

10.6 Hazardous decomposition products:
No hazardous decomposition products known at room temperature.
May form hazardous decomposition products when exposed to high temperatures (see also Section 5.2).

SECTION 11. Toxicological information

11.1 Information on toxicological effects
No data available on the product itself.

Acute toxicity:

<table>
<thead>
<tr>
<th>Test material</th>
<th>Route of exposure</th>
<th>LD50</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWCNT</td>
<td>Oral</td>
<td>&gt; 5000 mg/kg</td>
</tr>
<tr>
<td>MWCNT</td>
<td>Dermal</td>
<td>&gt; 2000 mg/kg</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation - Serious eye damage/irritation:

<table>
<thead>
<tr>
<th>Test material</th>
<th>Organ</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWCNT</td>
<td>skin</td>
<td>Not irritant</td>
</tr>
<tr>
<td>MWCNT</td>
<td>eye</td>
<td>Not irritant</td>
</tr>
</tbody>
</table>

Respiratory or skin sensitization: No data available.

<table>
<thead>
<tr>
<th>Test material</th>
<th>Method</th>
<th>Result</th>
</tr>
</thead>
</table>
Germ cell mutagenicity:

<table>
<thead>
<tr>
<th>Test material</th>
<th>Method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWCNT</td>
<td>In vitro, AMES test</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Carcinogenicity:

<table>
<thead>
<tr>
<th>Test material</th>
<th>Exposure</th>
<th>Species</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWCNT</td>
<td>2-years, intraperitoneal</td>
<td>rat</td>
<td>No carcinogenic response</td>
</tr>
</tbody>
</table>

Reproductive toxicity: No data available.

Summary of evaluation of the CMR properties: Practical experiences do not give any evidence for CMR activity of categories 1 or 2.

STOT-single exposure: No data available.

<table>
<thead>
<tr>
<th>Test material</th>
<th>Method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWCNT</td>
<td>Possible hazard</td>
<td>May be harmful if inhaled.</td>
</tr>
</tbody>
</table>

STOT-repeated exposure:

<table>
<thead>
<tr>
<th>Test material</th>
<th>Exposure</th>
<th>Species, Target organ</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWCNT</td>
<td>28 days, oral</td>
<td>rat, lung (pulmonary inflammation)</td>
<td>NOAEL: 0.5 mg/kg</td>
</tr>
<tr>
<td>MWCNT</td>
<td>5 days, inhalation</td>
<td>rat, lung (multifocal granulomatous inflammation)</td>
<td>LOAEC: 2 mg/m³</td>
</tr>
<tr>
<td>MWCNT</td>
<td>90 days, inhalation</td>
<td>rat, lung (multifocal granulomatous inflammation)</td>
<td>LOAEC: 0.1 mg/m³</td>
</tr>
</tbody>
</table>

Aspiration hazard: No data available

When used and handled according to specifications, the product does not have harmful effects according to our experience and the information provides to us. From a toxicological point of view, the material behaves as the base polymer if there is no dust formation and the operators follow the manipulation instructions of Section 7 and 8.
SECTION 12. Ecological information

12.1 Toxicity

No data available on the product itself.

Acute toxicity

<table>
<thead>
<tr>
<th>Test material</th>
<th>Study type</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWCNT</td>
<td>Fish, 14 days</td>
<td>LC50: &gt; 100 mg/l</td>
</tr>
<tr>
<td>MWCNT</td>
<td>Daphnia, 48 hours</td>
<td>EC50: &gt; 100 mg/l</td>
</tr>
<tr>
<td>MWCNT</td>
<td>Algae, 72 hours</td>
<td>EC50: 134 mg/l</td>
</tr>
</tbody>
</table>

Chronic toxicity

<table>
<thead>
<tr>
<th>Test material</th>
<th>Study type</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWCNT</td>
<td>Fish, semi static</td>
<td>EC10: 100 mg/l</td>
</tr>
<tr>
<td>MWCNT</td>
<td>Daphnia, semi static</td>
<td>NOEC: &gt; 25 mg/l</td>
</tr>
</tbody>
</table>

12.2 Persistence and degradability: Not readily biodegradable (according to OECD criteria).

12.3 Bioaccumulative potential

Partition coefficient n-octanol /water (log Kow): Not applicable.

Bioconcentration factor (BCF): No data available.

12.4 Mobility in soil: No data available.

12.5 Results of PBT and vPvB assessment:

This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

12.6 Other adverse effects: The substance has no ozone depleting potential.

SECTION 13. Disposal considerations

13.1 Waste treatment methods

13.1.1 Product / Packaging disposal:

Product: If the material becomes a waste, consider it as special waste. It can be destroyed by incineration in accordance with local, state and federal regulations. For all countries, the disposal methods must be in compliance with national and provincial laws and any municipal or local by-laws.
Safety Data Sheet: PLASTICYL™ TPU1001 | 25 July 2019 | V05

European Waste Catalogue (EWC) code: 07 02 13 « waste plastic »

13.1.2 Waste treatment-relevant information: Avoid losses to the environment

13.1.3 Sewage disposal-relevant information: Do not allow to enter ground soil, sewage, drains.

13.1.4 Other disposal recommendations: No data available

SECTION 14. Transport information

No dangerous good in sense of these transport regulations:
Land transport (ADR/RID); Inland waterway transport (ADN); Sea transport (IMDG); Air transport (ICAO-TI / IATA-DGR); USA Department of Transport (DOT); Canada Transportation of Dangerous Goods (TDG).

14.1. UN number: None.

14.2. UN proper shipping name: Not applicable.

14.3. Transport hazard class(es): Not applicable.

14.4. Packing group: Not applicable.

14.5. Environmental hazards: No.

14.6. Special precautions for user: Not applicable.

14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code*: Not applicable.

SECTION 15. Regulation information

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

European Union

REACH

The substance “short tangled multi-walled carbon nanotubes obtained by catalytic chemical vapour deposition” (MWCNT) has been registered under REACH (RRN: 01-2119879048-26-0001). The substance as registered had no corresponding CAS number. The European Agency ECHA has however assigned the
provisional EC List Number 936-414-1.

The substance(s) in this product has (have) been Registered or are exempted from registration according to Regulation (EC) REACH 1907/2006.

Other regulations (EU)


REACH Annex XIV (Authorisation): No substance listed, on the SDS publication date.
REACH Annex XVII (Restrictions on use): No substance listed, on the SDS publication date.

**United States of America**

**Toxic Substance Control Act**

All substances in this product are listed/exempted in the TSCA inventory.

This product contains one or more substance(s) which is/are subject to a TSCA Section 5(e) consent order that imposes certain restrictions on handling, storage, distribution, use and disposal. Contact Nanocyl S.A. for details.

**SARA 313 EPCRA Toxic Chemical Release Inventory (TRI):** None applicable.

**SARA Section 311/312 Hazard Categories:** None applicable.

**Clean Water Act (40CFR122.26):**

Plastic pellets are defined by the US EPA under the Clean Water Act (40CFR122.26) as a "significant material" which requires any industrial plant that may expose pellets to storm water to secure a storm water permit. Violations of the rule carry the same penalties as other Clean Water Act violations. Pellets found in storm water runoff are subject to EPA regulations with the potential for substantial fines and penalties.

**Canada**
In Canada, since a component of this product is not listed on the Canadian Domestic Substance List (DSL) or non-Domestic Substances List (NDSL), schedule 5 of the New Substances Notification Regulations (Chemicals and Polymers) of the Canadian Environmental Protection Act, 1999, have been granted.

**Inventories**

All components of this product are compliant with the following chemical inventories:

- European Inventory of Existing Commercial Chemical Substances (EINECS), Canadian Domestic Substance List (DSL) or non-Domestic Substances List (NDSL), Japanese Existing and New Chemical Substance (ENCS), Korean Existing Chemical Substance (ECL), Philippines Inventory of Chemicals and Chemical Substances (PICCS), Chinese Chemical Inventory of Existing Chemical Substance (IECS) and Taiwan Existing Chemical Substance Nomination (ECN).

**15.2 Chemical Safety Assessment:**

No Chemical Safety Assessment has been carried out for this mixture by the supplier.

A Chemical Safety Assessment is not required as product is not classified as hazardous.

**SECTION 16. Other information**

Voluntary safety information following the Safety Data Sheet format according to Regulation (EC) No. 1907/2006 (REACH).

The contents and format of this SDS are in accordance with OSHA GHS Regulation 29 CFR 1910.1200 and its amendments.

**Abbreviations and acronyms:**

- EC European Commission
- EPCRA Emergency Planning and Community Right-to-Know Act
- CLP Classification Labelling and Packaging
- CFR Code of Federal Regulations
- GHS Globally Harmonized System
- HCS Hazard Communication Standard
- NIOSH National Institute for Occupational Safety and Health
- OSHA Occupational Safety and Health Administration
- SARA Superfund Amendments and Reauthorization Act
- SDS Safety Data Sheet
Safety Data Sheet revision history:
Previous version: 3 November 2016 (V04)
Current version: 25 July 2019 (V05)

Disclaimer:
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