1. PRODUCT AND COMPANY IDENTIFICATION

Product Name  Twaron para-Aramid Yarn

Chemical Name  Poly-paraphenylene terephthalamide
Synonyms  Twaron para-Aramid Yarn, including articles derived thereof

Recommended Use  Strength member in optical fiber cables, Ballistic protective materials, Stab protective materials, Gland packings, Friction material, Technical papers, Elastomer reinforcement, Ripcord, Composites, Spun yarns, Personal protective equipment, Industrial and non-industrial heat resistant and flame retardant products, Anti-vandalism products, Nonwovens, Clutch facings, Ropes, pipes, umbilical and other cables.

Uses advised against  In the event that the product is to be used in special areas of application, e.g. food industry or the medical/surgical sector, please consult us beforehand.

Supplier  TEIJIN ARAMID BV
Velpervweg 76
P.O. Box 5153
6802 ED Arnhem
The Netherlands
Telephone: +31 88 268 88 88
Fax: +31 88 268 9181
Email: SDSinfo@teijinaramid.com

Emergency telephone  TEIJIN ARAMID BV, Emmen NL: +31 591 69 20 00

2. HAZARDS IDENTIFICATION

CAUTION!

Emergency Overview  This product is not hazardous in supplied solid form, however when cut and processed the generated fiber dust may be hazardous (if respirable) as described in this document.

Physical state @20°C

<table>
<thead>
<tr>
<th></th>
<th>Appearance</th>
<th>Colour</th>
<th>Odour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid</td>
<td>(Texturised) filament yarn,</td>
<td>Yellow</td>
<td>Odourless</td>
</tr>
<tr>
<td></td>
<td>Staple fiber, Short-cut fiber,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chopped fiber, Tow, Tire cord,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ripcords</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Potential health effects

Principle Routes of Exposure  Eye contact, Skin contact, Inhalation.

Acute toxicity

- Eyes  Dust contact with the eyes can lead to mechanical irritation
- Skin  Slight skin irritation has been observed in isolated cases.
- Inhalation  Inhalation of dust in high concentration may cause irritation of respiratory system.
- Ingestion  Not an expected route of exposure. May cause additional affects as listed under "Inhalation".
Chronic effects
Respirable p-aramid fiber has been classified by the International Agency for Research on Cancer (IARC) as not classifiable as to carcinogenicity to humans (Group 3). Based on animal studies, long-term exposures to high doses of respirable fibers could lead to pulmonary inflammation and chronic lung disease.

Aggravated Medical Conditions
Respiratory disorders, Skin disorders.

Environmental hazard
See Section 12 for additional information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature
Polymer, fibres.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poly-(para-phenylene-terephthalamide)</td>
<td>26125-61-1</td>
<td>&gt; 88</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>&lt;8</td>
</tr>
</tbody>
</table>

Additional information
Sodium sulphate <3%, Fiber finish <1.2%.

Fiber finish:
The fiber product itself is non-toxic. It may, however, contain up to 1.2% of a fiber finish. If the product is intended for special applications, e.g. in the food industry, please consult the manufacturer prior to application. So far no impairment of health has become known in cases where the product has been used for its intended application. In cases where the product is heat-treated at temperatures of between 130 and 190 ºC, the applied fiber finish may evaporate or decompose. If water is used for further treatment, the waste water generated by the process must be treated in a water purification plant in compliance with local regulations.
Residual solvents: none.

4. FIRST AID MEASURES

General advice
When symptoms persist or in all cases of doubt seek medical advice.

Eye contact
Rinse thoroughly with plenty of water, also under the eyelids. If eye irritation persists, consult a specialist.

Skin contact
If skin irritation occurs, wash thoroughly with soap and water. Get medical attention immediately if symptoms occur.

Ingestion
Clean mouth with water and afterwards drink plenty of water. Get medical attention immediately if symptoms occur.

Inhalation
Move to fresh air. Get medical attention immediately if symptoms occur.

Notes to physician
Treat symptomatically.

Protection of first-aiders
Use personal protective equipment.
5. FIRE FIGHTING MEASURES

Flammable properties
Not flammable.

Flash point
Not applicable

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Extinguishing media which must not be used for safety reasons
None known.

Hazardous combustion products
Carbon oxides, Nitrogen oxides (NOx), Volatile organic compounds, Hydrogen cyanide.

Explosion Data

Sensitivity to Mechanical Impact
None.

Sensitivity to Static Discharge
None.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Do not breathe dust.

Environmental precautions
Should not be released into the environment.

Methods for containment
Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Avoid dust formation. Sweep up and shovel into suitable containers for disposal.

7. HANDLING AND STORAGE

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Wear personal protective equipment. Avoid dust formation.

Storage
Incompatible with strong acids and bases. Keep away from direct sunlight. All bobbins, storage cartons and bales must be stored in compliance with the relevant regulations and in accordance with good handling and storage practice.

8. EXPOSURE CONTROLS/PERSOANL PROTECTION

Exposure Guidelines
This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Other Exposure Guidelines
Exposure Limits: p-Aramid fibers as such are not subject to any exposure regulation. p-Aramid respirable fiber-shaped particulates (RFP) may be released from pulp, cut-fiber and staple fiber or may be formed during abrasive processing of Twaron and it is recommended to keep these levels below 1 RFP (Respirable Fiber Particulates) per cm3 of air.
### Appropriate engineering controls

- Showers
- Eyewash stations
- Ventilation systems

### Personal protective equipment

#### Eye protection
Generally not required when manually handling yarn. Wear safety glasses with side shields in the vicinity of rapidly rotating yarn processing equipment.

#### Hand protection
None. Slight skin irritation has been observed in isolated cases: Protective gloves.

#### Skin and body protection
Long sleeved clothing. Yarn which is processed at high speeds can cause abrasions and cuts. It is therefore advisable to avoid skin contact with these potential sources of injury.

#### Respiratory protection
In case of insufficient ventilation wear suitable respiratory equipment. This is required in cases where a maximum concentration of 1 RFP/ml of air is exceeded.

#### Recommended filter type
P2

#### Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. During the processing and application of the fibers, small amounts of dust (including dust particles of respirable size) may be given off. A health risk caused by the inhalation of Twaron dust particles does not exist if our safety instructions are observed. Fiber fly, dust and decomposition products of the fiber finishes must be avoided by ensuring adequate extraction and ventilation. Factory safety regulations must be strictly observed.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical state @20°C</strong></td>
<td>Solid</td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td>(Texturised) filament yarn, Staple fiber, Short-cut fiber, Chopped fiber, Tow, Tire cord, Ripcords</td>
</tr>
<tr>
<td><strong>Colour</strong></td>
<td>Yellow</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>Odourless</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Melting/freezing point</strong></td>
<td>Decomposes</td>
</tr>
<tr>
<td><strong>Boiling point/boiling range</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Flammability Limits in Air</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Vapour pressure</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Vapour density</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Vapour density</strong></td>
<td>Not relevant</td>
</tr>
<tr>
<td><strong>Relative density</strong></td>
<td>1.44</td>
</tr>
<tr>
<td><strong>Solubility</strong></td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Water solubility</strong></td>
<td>Strong Sulphuric acid</td>
</tr>
<tr>
<td><strong>Solubility in other solvents</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Partition coefficient (n-octanol/water)</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Autoignition Temperature</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Decomposition temperature</strong></td>
<td>&gt;500 °C</td>
</tr>
<tr>
<td><strong>Viscosity, dynamic</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Explosive properties</strong></td>
<td>Not explosive</td>
</tr>
<tr>
<td><strong>Oxidising Properties</strong></td>
<td>Not relevant</td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td>1440 kg/m³</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

Stability
Stable under normal conditions.

Materials to Avoid
Strong acids, Strong bases.

Conditions to Avoid
Exposure to UV-rays. Temperatures above 500 °C. To avoid thermal decomposition, do not overheat.

Hazardous Decomposition Products
Carbon monoxide (CO), Carbon dioxide (CO₂), Organic materials, Hydrogen cyanide.

Hazardous Polymerisation
Hazardous polymerisation does not occur.

11. TOXICOLOGICAL INFORMATION

Acute toxicity
Product does not present an acute toxicity hazard based on known or supplied information.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poly-(para-phenylene-terephthalamide)</td>
<td>&gt; 7500 mg/kg ( Rat )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chronic Toxicity

Chronic Toxicity
Respirable p-aramid fiber has been classified by the International Agency for Research on Cancer (IARC) as not classifiable as to carcinogenicity to humans (Group 3). Based on animal studies, long-term exposures to high doses of respirable fibers could lead to pulmonary inflammation and chronic lung disease.

Carcinogenicity
The table below indicates whether each agency has listed any ingredient as a carcinogen.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poly-(para-phenylene-terephthalamide)</td>
<td></td>
<td>Group 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend
IARC: (International Agency for Research on Cancer)
Group 3 - Not Classifiable as to Carcinogenicity in Humans

Mutagenic Effects
Negative in the chromosomal aberration assay.

Target Organ Effects
Skin, Respiratory system.

12. ECOLOGICAL INFORMATION

Ecotoxicity Effects
Contains no substances known to be hazardous for the environment.

Persistence and Degradability
Not readily biodegradable.

Bioaccumulative potential
Not applicable.
13. DISPOSAL CONSIDERATIONS

Waste disposal methods
This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered. Consult 40 CFR 261 to determine whether the altered material is a hazardous waste. Consult the appropriate state, regional, or local regulations for additional requirements.

Contaminated packaging
Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT</td>
<td>Not regulated</td>
</tr>
<tr>
<td>TDG</td>
<td>Not regulated</td>
</tr>
<tr>
<td>MEX</td>
<td>Not regulated</td>
</tr>
</tbody>
</table>
15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSCA</td>
<td>Complies</td>
</tr>
<tr>
<td>DSL</td>
<td>Complies</td>
</tr>
</tbody>
</table>

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

Federal Regulations

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazardous Categorization

- Acute Health Hazard: No
- Chronic Health Hazard: No
- Fire Hazard: No
- Sudden Release of Pressure Hazard: No
- Reactive Hazard: No

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

This product does not contain any substances regulated by state right-to-know regulations

International Regulations

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
D2B  Toxic materials
16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>06/10/2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision Note</td>
<td>No information available.</td>
</tr>
</tbody>
</table>

**Disclaimer**

The information given in this Safety Datasheet for Man-made Fibers refers exclusively to the fiber product described herein. It covers neither its use in combination with any other material/preparation/product nor its use in any process. The purpose of this Safety Datasheet for Man-made Fibers is to make adequate and correct information available to commercial users of man-made fibers for the protection of human beings and the environment.

The information given in this Safety Datasheet for Man-made Fibers reflects the standard of knowledge of the party completing the sheet at the time of printing. It is not a contractual guarantee of product properties. This information only concerns the above mentioned product and does not need to be valid if used with other product(s) or in any process. The information is to our best present knowledge correct and complete and is given in good faith but without warranty. It remains the user's own responsibility to make sure that the information is appropriate and complete for his special use of this product.

End of Safety Data Sheet