

Safety Data Sheet

according to UK REACH Regulation

Essentium TPU 80A - Z

Revision date: 24.11.2021

Product code:

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

1.1. Product identifier

Essentium TPU 80A - Z

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

Use of the substance/mixture

Industrial uses

Uses advised against

Any non-intended use.

1.3. Details of the supplier of the safety data sheet

Company name: Essentium Inc.
Street: 19025 N. Heatherwilde Boulevard, Suite 100
Place: TX 78660 Pflugerville
Telephone: +1 512-643-0548
Responsible Department: Info@Essentium.com

1.4. Emergency telephone number:

+1 512-643-0548 (Mo- Fr, 8:00 - 16:00 CST)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GB CLP Regulation

This mixture is not classified as hazardous in accordance with GB CLP Regulation.

2.2. Label elements

Additional advice on labelling

Labelling according to GHS (UK CLP) regulation.: none

2.3. Other hazards

The substances in the mixture (>0,1%) do not meet the PBT/vPvB criteria according to REACH, annex XIII.

The product contains nano particles. To what extent nano-particles can cause a damage of the human organism, is not yet sufficiently clarified.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Chemical characterization

polymer: Polyurethane and Additive and Stabilisers.

The components listed in Chapter 3 are listed voluntarily for information purposes.

Hazardous components

CAS No	Chemical name			Quantity
	EC No	Index No	REACH No	
	GHS Classification			
	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape			< 4 %
	936-414-1		01-2119879048-26	

Full text of H and EUH statements: see section 16.

Specific Conc. Limits, M-factors and ATE

CAS No	EC No	Chemical name	Quantity
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	Specific Conc. Limits, M-factors and ATE	
936-414-1	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape	< 4 %
	inhalation: LC50 = 241 (6h) mg/l (dusts or mists); dermal: LD50 = >2000 mg/kg; oral: LD50 = >5000 mg/kg	

Further Information

Product does not contain listed SVHC substances > 0,1 % according to Regulation (EC) No. 1907/2006 Article 59 (REACH)

SECTION 4: First aid measures

4.1. Description of first aid measures

General information

In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

After inhalation

In case of accident by inhalation: remove casualty to fresh air and keep at rest. In case of respiratory tract irritation, consult a physician.

After contact with skin

Gently wash with plenty of soap and water. In case of skin irritation, seek medical treatment.

After contact with eyes

Rinse cautiously with water for several minutes. In case of troubles or persistent symptoms, consult an ophthalmologist.

After ingestion

Rinse mouth thoroughly with water. Let water be drunken in little sips (dilution effect). Do NOT induce vomiting. In all cases of doubt, or when symptoms persist, seek medical advice.

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

No information available.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media

Carbon dioxide (CO₂). Dry extinguishing powder. alcohol resistant foam. Atomized water.

Unsuitable extinguishing media

High power water jet.

5.2. Special hazards arising from the substance or mixture

Can be released in case of fire: Carbon monoxide Carbon dioxide (CO₂). Nitrogen oxides (NO_x).

5.3. Advice for firefighters

In case of fire: Wear self-contained breathing apparatus.

Additional information

Collect contaminated fire extinguishing water separately. Do not allow entering drains or surface water. Co-ordinate fire-fighting measures to the fire surroundings.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General advice

Avoid dust formation.

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Do not breathe dust.

For non-emergency personnel

Wear personal protection equipment (refer to section 8).

For emergency responders

No special measures are necessary.

6.2. Environmental precautions

Discharge into the environment must be avoided.

6.3. Methods and material for containment and cleaning up

For containment

Take up mechanically.

Treat the recovered material as prescribed in the section on waste disposal.

For cleaning up

Clean contaminated objects and areas thoroughly observing environmental regulations.

Elimination of dust deposits containing nanoparticles in the wet/wet process and only as a second priority with a suitable vacuum cleaner (never blow off with compressed air).

6.4. Reference to other sections

Safe handling: see section 7

Personal protection equipment: see section 8

Disposal: see section 13

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling

Wear personal protection equipment (refer to section 8).

Advice on protection against fire and explosion

Usual measures for fire prevention. Dust clouds may present an explosion hazard.

Advice on general occupational hygiene

Always close containers tightly after the removal of product. Do not eat, drink, smoke or sneeze at the workplace. Wash hands before breaks and after work.

Further information on handling

Avoid generation of dust.

During dusty work with the product, nanomaterials can be released.

General protection and hygiene measures: refer to chapter 8

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Keep container tightly closed in a cool, well-ventilated place.

Suitable material for Container: Polyethylene (HDPE, LDPE).

Hints on joint storage

Do not store together with: Explosives. Oxidizing solids. Oxidizing liquids. Radioactive substances. Infectious substances. Food and animal feedingstuff.

Further information on storage conditions

Keep the packing dry and well sealed to prevent contamination and absorption of humidity.

Recommended storage temperature: 20°C

Protect against: frost. UV-radiation/sunlight. heat. Humidity

7.3. Specific end use(s)

See section 1.

SECTION 8: Exposure controls/personal protection

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8.1. Control parameters

DNEL/DMEL values

CAS No	Substance			
DNEL type		Exposure route	Effect	Value
	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape			
Worker DNEL, long-term		inhalation	local	0,05 mg/m³

PNEC values

CAS No	Substance			
Environmental compartment				Value
	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape			
Freshwater				0,43 mg/l
Marine water				0,043 mg/l
Micro-organisms in sewage treatment plants (STP)				100 mg/l

Additional advice on limit values

To date, no national critical limit values exist.

8.2. Exposure controls

Appropriate engineering controls

Technical measures and the application of suitable work processes have priority over personal protection equipment.

Dust should be exhausted directly at the point of origin.

Individual protection measures, such as personal protective equipment

Eye/face protection

Dust protection goggles.

Hand protection

In case of prolonged or frequently repeated skin contact:

Wear suitable gloves.

Suitable material:

FKM (fluororubber). - Thickness of glove material: 0,4 mm

Breakthrough time \geq 8 h

Butyl rubber. - Thickness of glove material: 0,5 mm

Breakthrough time \geq 8 h

CR (polychloroprenes, Chloroprene rubber). - Thickness of glove material: 0,5 mm

Breakthrough time \geq 8 h

NBR (Nitrile rubber). - Thickness of glove material: 0,35 mm

Breakthrough time \geq 8 h

PVC (Polyvinyl chloride). - Thickness of glove material: 0,5 mm

Breakthrough time \geq 8 h

The selected protective gloves have to satisfy the specifications of EU Directive EC/2016/425 and the standard EN 374 derived from it.

Before using check leak tightness / impermeability. In the case of wanting to use the gloves again, clean them before taking off and air them well.

Skin protection

Suitable protective clothing: Protective clothing.

Minimum standard for preventive measures while handling with working materials are specified in the TRGS 500 (D).

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Respiratory protection

With correct and proper use, and under normal conditions, breathing protection is not required.

Respiratory protection necessary at:

-Exceeding exposure limit values

-Insufficient ventilation and Generation/formation of dust

Suitable respiratory protective equipment: particulates filter device (DIN EN 143). Type: P1-3

The filter class must be suitable for the maximum contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. If the concentration is exceeded, self-contained breathing apparatus must be used.

Thermal hazards

Material handled at elevated temperature may cause thermal burns by contact with molten product.

Environmental exposure controls

No special precautionary measures are necessary.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state:	Granulate, solid
Colour:	black
Odour:	odourless

Changes in the physical state

Melting point/freezing point:	not determined
Boiling point or initial boiling point and boiling range:	not determined
Sublimation point:	not determined
Softening point:	>120 °C
Pour point:	not determined
Flash point:	not determined

Explosive properties

Dust clouds may present an explosion hazard.

Lower explosion limits:	not determined
Upper explosion limits:	not determined
Auto-ignition temperature:	>400 °C

Self-ignition temperature

Gas:	not determined
Decomposition temperature:	>230 °C

Oxidizing properties

none

pH-Value:	not determined
Viscosity / dynamic:	not determined
Viscosity / kinematic:	not determined
Flow time:	not applicable
Water solubility:	Immiscible

Solubility in other solvents

not determined

Partition coefficient n-octanol/water:

SECTION 12: Ecological information

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Vapour pressure:	not determined
Density (at 20 °C):	1,1 - 1,2 g/cm ³
Bulk density (at 20 °C):	500 - 700 kg/m ³
Relative vapour density:	not applicable

9.2. Other information

Information with regard to physical hazard classes

Sustaining combustion: Not sustaining combustion

Other safety characteristics

Solvent separation test:	not applicable
Solvent content:	not determined
Solid content:	not determined
Evaporation rate:	not applicable

Further Information

Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape:
particle characteristics:

Electron microscopy images show that Multi-Walled Carbon Nanotubes(MWCNT) consist of tightly bound agglomerates consisting of tangled tubes. In dispersions, the median diameters of these agglomerates are in the range of 533 - 569 µm with a D90 in the range of 679 - 945 µm.

The size of the agglomerates is not significantly reduced when MWCNT is aerosolised in the dry state and analysed with a Malvern particle size analyzer at pressures of 1 and 4 bar. Depending on pressure, the mean particle diameters are in the range of 85 to 427 µm (D90: 228-1172 µm) and the inhalable fraction (under 10 µm) is very small (0 % at 1 bar and 0.19 % at 4 bar)

The tubes within the MWCNT agglomerates can be described as short, thin and tangled. Specifically, they display an outer tube diameter distribution of at least 90 % under 30 nm (D90 ≤ 30 nm). Single results were D90 = 18 nm, 24 nm and 12.7 nm. The mean outer diameter range was 10 nm, 13.4 nm and 9.2 nm

The tube length distribution of MWCNT was measured by Transmission Electron Microscopy after dispersion in aqueous medium after sonication. The mean tube length was 380 - 902 nm (D90 = 980 - 1820 nm). In all cases length D90 was lower than 5 µm

Specific surface area: 253 m²; DIN-/EN-Norms: DIN66131

SECTION 10: Stability and reactivity

10.1. Reactivity

No information available.

10.2. Chemical stability

The product is chemically stable under recommended conditions of storage, use and temperature.

10.3. Possibility of hazardous reactions

No hazardous reaction when handled and stored according to provisions.
Refer to chapter 10.5.

10.4. Conditions to avoid

Protect against: UV-radiation/sunlight. heat. (>230°C)

10.5. Incompatible materials

Materials to avoid: Oxidizing agents, strong. Reducing agents, strong.

10.6. Hazardous decomposition products

Does not decompose when used for intended uses.

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Hazardous decomposition products: Carbon monoxide Carbon dioxide (CO₂). Hydrogen cyanide (hydrocyanic acid). Nitrogen oxides (NO_x). Isocyanates.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in GB CLP Regulation

Toxicokinetics, metabolism and distribution

No data available.

Acute toxicity

Based on available data, the classification criteria are not met.

ATEmix tested

	Dose	Species	Source
LD50, oral	>5000 mg/kg	Rat	By analogy.

CAS No	Chemical name				
	Exposure route	Dose	Species	Source	Method
	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape				
	oral	LD50 >5000 mg/kg	Rat	ECHA Dossier	OECD 423
	dermal	LD50 >2000 mg/kg	Rat	ECHA Dossier	OECD 402
	inhalation aerosol	LC50 241 (6h) mg/l	Rat	ECHA Dossier	OECD 403

Irritation and corrosivity

Based on available data, the classification criteria are not met.

Sensitising effects

Based on available data, the classification criteria are not met.

Carcinogenic/mutagenic/toxic effects for reproduction

Based on available data, the classification criteria are not met.

Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape:

In-vitro mutagenicity:

Method:

-OECD Guideline 471 (Bacterial Reverse Mutation Assay)

-OECD Guideline 473 (In vitro Mammalian Chromosome Aberration Test)

-OECD Guideline 476 (In Vitro Mammalian Cell Gene Mutation Test)

Result: negative.)

Literature information: ECHA Dossier

In-vivo mutagenicity

Method: OECD Guideline 474 (Mammalian Erythrocyte Micronucleus Test)

Species: Mouse.

Result: negative.

Literature information: ECHA Dossier

Carcinogenicity:

Species: Rat

Result / evaluation: Based on available data, the classification criteria are not met. (CLP)

Literature information: Absence of Carcinogenic Response to Multiwall Carbon Nanotubes in a 2-Year

Bioassay in the Peri-toneal Cavity of the Rat, Muller, J. et al., 2009, Toxicological Sciences 110, 442-448

STOT-single exposure

Based on available data, the classification criteria are not met.

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STOT-repeated exposure

Based on available data, the classification criteria are not met.
Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape:
Subchronic inhalation toxicity:
Method: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day)
Species: Rat.
Exposure duration: 90 d
Result: NOAEC = 0.1- 1,01 mg/m³
Literature information: ECHA Dossier

Aspiration hazard

Based on available data, the classification criteria are not met.

Specific effects in experiment on an animal

No data available.

11.2. Information on other hazards

Endocrine disrupting properties

No data available.

SECTION 12: Ecological information

12.1. Toxicity

The product has not been tested.

CAS No	Chemical name					
	Aquatic toxicity	Dose	[h] [d]	Species	Source	Method
	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape					
	Acute fish toxicity	LC50 > 100 mg/l	96 h	Danio rerio	ECHA Dossier	EU Method C.1
	Acute algae toxicity	ErC50 278 mg/l	72 h	Desmodesmus subspicatus	ECHA Dossier	92/69/EEC, C.3
	Acute crustacea toxicity	EC50 > 100 mg/l	48 h	Daphnia magna	ECHA Dossier	OECD 202
	Fish toxicity	NOEC 100 mg/l	10 d	Danio rerio	ECHA Dossier	OECD 212
	Crustacea toxicity	NOEC >25 mg/l	21 d	Daphnia magna	ECHA Dossier	OECD 211
	Acute bacteria toxicity	(>5000 mg/l)	3 h	activated sludge	ECHA Dossier	

12.2. Persistence and degradability

Product is not easily biodegradable. Due to its low solubility in water the product is almost completely mechanically separated in biological sewage plants.

12.3. Bioaccumulative potential

No indication of bioaccumulation potential.

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

The substances in the mixture (>0,1%) do not meet the PBT/vPvB criteria according to REACH, annex XIII.

12.6. Endocrine disrupting properties

No data available.

12.7. Other adverse effects

The nanomaterials used may accumulate in organisms and/or in the environment.

Further information

Do not allow to enter into surface water or drains.

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SECTION 13: Disposal considerations

13.1. Waste treatment methods

Disposal recommendations

Observe in addition any national regulations! Consult the local waste disposal expert about waste disposal.

Non-contaminated packages may be recycled.

According to (EWC) European Waste Catalogue, allocation of waste identity numbers/waste descriptions must be carried out in a specific way for every industry and process.

Control report for waste code/ waste marking according to (EWC) European Waste Catalogue:

List of Wastes Code - residues/unused products

070213 WASTES FROM ORGANIC CHEMICAL PROCESSES; wastes from the MFSU of plastics, synthetic rubber and man-made fibres; waste plastic

List of Wastes Code - used product

070213 WASTES FROM ORGANIC CHEMICAL PROCESSES; wastes from the MFSU of plastics, synthetic rubber and man-made fibres; waste plastic

List of Wastes Code - contaminated packaging

150106 WASTE PACKAGING; ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED; packaging (including separately collected municipal packaging waste); mixed packaging

Contaminated packaging

Handle contaminated packages in the same way as the substance itself.

SECTION 14: Transport information

Land transport (ADR/RID)

14.1. UN number or ID number:	No dangerous good in sense of this transport regulation.
14.2. UN proper shipping name:	No dangerous good in sense of this transport regulation.
14.3. Transport hazard class(es):	No dangerous good in sense of this transport regulation.
14.4. Packing group:	No dangerous good in sense of this transport regulation.

Inland waterways transport (ADN)

14.1. UN number or ID number:	No dangerous good in sense of this transport regulation.
14.2. UN proper shipping name:	No dangerous good in sense of this transport regulation.
14.3. Transport hazard class(es):	No dangerous good in sense of this transport regulation.
14.4. Packing group:	No dangerous good in sense of this transport regulation.

Marine transport (IMDG)

14.1. UN number or ID number:	No dangerous good in sense of this transport regulation.
14.2. UN proper shipping name:	No dangerous good in sense of this transport regulation.
14.3. Transport hazard class(es):	No dangerous good in sense of this transport regulation.
14.4. Packing group:	No dangerous good in sense of this transport regulation.

Air transport (ICAO-TI/IATA-DGR)

14.1. UN number or ID number:	No dangerous good in sense of this transport regulation.
14.2. UN proper shipping name:	No dangerous good in sense of this transport regulation.
14.3. Transport hazard class(es):	No dangerous good in sense of this transport regulation.
14.4. Packing group:	No dangerous good in sense of this transport regulation.

14.5. Environmental hazards

ENVIRONMENTALLY HAZARDOUS: No

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14.6. Special precautions for user

Refer to section 6-8

14.7. Maritime transport in bulk according to IMO instruments

not relevant

SECTION 15: Regulatory information

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

EU regulatory information

2010/75/EU (VOC):	No information available.
2004/42/EC (VOC):	No information available.
Information according to 2012/18/EU (SEVESO III):	Not subject to 2012/18/EU (SEVESO III)

Additional information

Safety Data Sheet according to UK-REACH Regulation

The mixture is classified as not hazardous according to regulation (EC) No 1272/2008 [CLP].

UK REACH Appendix XVII, No (mixture): not relevant

National regulatory information

Water hazard class (D): 3 - highly hazardous to water

15.2. Chemical safety assessment

For the following substances of this mixture a chemical safety assessment has been carried out:
Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape

SECTION 16: Other information

Changes

Rev. 1.0; Initial release, 24.11.2021

Abbreviations and acronyms

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

CAS: Chemical Abstracts Service

CLP: Classification, Labelling and Packaging of substances and mixtures

DNEL: Derived No Effect Level

d: day(s)

EINECS: European INventory of Existing Commercial chemical Substances

ELINCS: European List of Notified Chemical Substances

ECHA: European Chemicals Agency

EWC: European Waste Catalogue

IARC: INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

IMDG: International Maritime Code for Dangerous Goods

IATA: International Air Transport Association

IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)

ICAO: International Civil Aviation Organization

ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO)

GHS: Globally Harmonized System of Classification and Labelling of Chemicals

GefStoffV: Gefahrstoffverordnung (Ordinance on Hazardous Substances, Germany)

h: hour

LOAEL: Lowest observed adverse effect level

LOAEC: Lowest observed adverse effect concentration

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

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NOAEL: No observed adverse effect level
NOAEC: No observed adverse effect concentration
NLP: No-Longer Polymers
N/A: not applicable
OECD: Organisation for Economic Co-operation and Development
PNEC: predicted no effect concentration
PBT: Persistent bioaccumulative toxic
RID: Reglement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
REACH: Registration, Evaluation, Authorisation of Chemicals
SVHC: substance of very high concern
TRGS: Technische Regeln für Gefahrstoffe
UN: United Nations
VOC: Volatile Organic Compounds

Further Information

Classification according to Regulation (EC) No 1272/2008 [CLP] - Classification procedure:
Health hazards: Calculation method.
Environmental hazards: Calculation method.
Physical hazards: On basis of test data and / or calculated and / or estimated.

The above information describes exclusively the safety requirements of the product and is based on our present-day knowledge. The information is intended to give you advice about the safe handling of the product named in this safety data sheet, for storage, processing, transport and disposal. The information cannot be transferred to other products. In the case of mixing the product with other products or in the case of processing, the information on this safety data sheet is not necessarily valid for the new made-up material.

(The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.)