

Safety Data Sheet

according to 29 CFR 1910.1200(g)

Essentium TPU 80A - Z

Revision date: 11/24/2021

Product code:

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1. Identification

Product identifier

Essentium TPU 80A - Z

Recommended use of the chemical and restrictions on use

Use of the substance/mixture

Industrial uses

Uses advised against

Any non-intended use.

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

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

2. Hazard(s) identification

Classification of the chemical

29 CFR Part 1910.1200

This mixture is not classified as hazardous in accordance with Regulation 29 CFR 1910.1200(d).

Label elements

Additional advice on labelling

Label elements GHS: None

Hazards not otherwise classified

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

3. Composition/information on ingredients

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	Components	Quantity
	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape	< 4 %

4. First-aid measures

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

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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 drunk in little sips (dilution effect). Do NOT induce vomiting. In all cases of doubt, or when symptoms persist, seek medical advice.

Most important symptoms and effects, both acute and delayed

No information available.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media

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

Unsuitable extinguishing media

High power water jet.

Specific hazards arising from the chemical

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

Special protective equipment and precautions for fire-fighters

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.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

General advice

Avoid dust formation.
Do not breathe dust.

For non-emergency personnel

Wear personal protection equipment (refer to section 8).

For emergency responders

No special measures are necessary.

Environmental precautions

Discharge into the environment must be avoided.

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).

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Reference to other sections

- Safe handling: see section 7
- Personal protection equipment: see section 8
- Disposal: see section 13

7. Handling and storage

Precautions for safe handling

Advice on safe handling

Wear suitable protective clothing. (See 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

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

8. Exposure controls/personal protection

Control parameters

Exposure limits

CAS No.	Substance	ppm	mg/m ³	f/cc	Category	Origin
-	Particulates not Otherwise regulated (PNOR) Respirable fraction	529.5 mp/m ³	5		TWA (8 h)	PEL
-	Particulates not Otherwise regulated (PNOR) Total dust	1765 mp/m ³	15		TWA (8 h)	PEL

Additional advice on limit values

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

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

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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 the glove material 0,4 mm

Breakthrough time \geq 8 h

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

Breakthrough time \geq 8 h

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

Breakthrough time \geq 8 h

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

Breakthrough time \geq 8 h

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

Breakthrough time \geq 8 h

The selected protective gloves should satisfy the specifications of standards like EN 374.

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: Lab apron.

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: Particulate Respirators, Standard: 42 CFR Part 84 or DIN 143. Type: R/N/P-95/99/100

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.

9. Physical and chemical properties

Information on basic physical and chemical properties

Physical state:	Granulate, solid
Color:	black
Odor:	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

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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 determined
Water solubility:	Immiscible

Solubility in other solvents

not determined

Partition coefficient n-octanol/water:	SECTION 12: Ecological information
Vapor 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 determined

Other information

Information with regard to physical hazard classes

Sustaining combustion:	Not sustaining combustion
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Other safety characteristics

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

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

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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; Norms: DIN66131

10. Stability and reactivity

Reactivity

No information available.

Chemical stability

Stability: Stable

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

Possibility of hazardous reactions

Hazardous reactions: Will not occur

Refer to chapter 10.5.

Conditions to avoid

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

Incompatible materials

Materials to avoid: Oxidising agent, strong. Reducing agents, strong.

Hazardous decomposition products

Does not decompose when used for intended uses.

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

11. Toxicological information

Information on toxicological effects

Route(s) of Entry

Ingestion: May be harmful if swallowed. Inhalation: May be harmful if inhaled. Skin contact: May cause irritation. Eye contact: May cause irritation.

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	Components				
	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.

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Sensitizing 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.

OSHA: 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 OSHA.

NTP: 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 NTP.

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

Specific target organ toxicity (STOT) - single exposure

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

Specific target organ toxicity (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

Carcinogenicity (IARC): Carbon nanotubes, multi-walled, other than MWCNT-7 (CAS 308068-56-6) is listed in group 3.

Aspiration hazard

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

Specific effects in experiment on an animal

No data available.

Information on other hazards

Endocrine disrupting properties

No data available.

12. Ecological information

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Ecotoxicity

The product has not been tested.

CAS No	Components					
	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	

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.

Bioaccumulative potential

No indication of bioaccumulation potential.

Mobility in soil

No data available.

Endocrine disrupting properties

No data available.

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.

13. Disposal considerations

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.

Contaminated packaging

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

14. Transport information

US DOT 49 CFR 172.101

Proper shipping name:

Not a hazardous material with respect to these transport regulations. &&
Not controlled under DOT

Marine transport (IMDG)

UN number or ID number:

No dangerous good in sense of this transport regulation.

UN proper shipping name:

No dangerous good in sense of this transport regulation.

Transport hazard class(es):

No dangerous good in sense of this transport regulation.

Packing group:

No dangerous good in sense of this transport regulation.

Air transport (ICAO-TI/IATA-DGR)

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

Environmental hazards

ENVIRONMENTALLY HAZARDOUS: No

Special precautions for user

refer to chapter 6-8

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

not relevant

15. Regulatory information

U.S. Regulations

National Inventory TSCA

All components are listed in the TSCA 8 (b) inventory as "active" or exempted.

No components are listed under TSCA 12(b)

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 your supplier for details.

National regulatory information

SARA Section 304 CERCLA:

Methylenebis(phenylisocyanate)(MDI) (101-68-8): Reportable quantity = 5,000 (2270) lbs. (kg)

SARA Section 313 Toxic release inventory:

Methylenebis(phenylisocyanate)(MDI) (101-68-8): De minimis limit = 1.0 %, Reportable threshold = Standard

Clean Air Act Section 112(b):

Methylenebis(phenylisocyanate)(MDI) (101-68-8)

State Regulations

Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65, State of California)

This product can not expose you to chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Additional information

This mixture is classified as not hazardous according to Regulation 29 CFR Part 1910.1200.

16. Other information

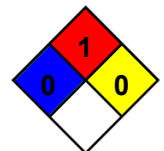
Hazardous Materials Information Label (HMIS)

Health:	0
Flammability:	1
Physical Hazard:	0
Personal Protection:	-

NFPA Hazard Ratings

Health:	0
Flammability:	1
Reactivity:	0
Unique Hazard:	

Changes



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Revision No: 1,0
Rev. 1.0; Initial release, 24.11.2021

Abbreviations and acronyms

ACGIH: American Conference of Governmental Industrial Hygienists
ASTM: American Society for Testing and Materials.
ATE: acute toxicity estimate
BCF: Bio concentration factor
ECHA: European Chemicals Agency
CAS: Chemical Abstracts Service
CFR: Code of Federal Regulations
DOT: Department of Transportation
d: days
DSL: Domestic Substance List
EC50: Half maximal effective concentration
EN: European Norm
EPA: Environmental Protection Agency
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
h: hours
HMIS: Hazardous Materials Identification System
IARC: INTERNATIONAL AGENCY FOR RESEARCH ON CANCER
IBC: Intermediate Bulk Container
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
LOAEL: Lowest observed adverse effect level
LOAEC: Lowest observed adverse effect concentration
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
MARPOL: marine pollution
NDSL: Non-Domestic Substance List
NOAEL: No observed adverse effect level
NOAEC: No observed adverse effect concentration
NTP: National Toxicology Program
N/A: not applicable
NFPA: National Fire Protection Association
UN: United Nations
OECD: Organisation for Economic Co-operation and Development
OSHA: Occupational Safety and Health Administration
PBT: Persistent bioaccumulative toxic
RTECS: Registry of Toxic Effects of Chemical Substances
REACH: Registration, Evaluation, Authorisation and Restriction of Chemicals
SIMDUT: Système d'information sur les matières dangereuses utilisées au travail
SARA: Superfund Amendments and Reauthorization Act
STEL: short-term exposure limits
TDG: Transportation of Dangerous Goods
TSCA: Toxic Substances Control Act
TWA: time weighted average
TWAEV: TIME-WEIGHTED AVERAGE EXPOSURE VALUE
VOC: Volatile Organic Compounds

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WHMIS: Workplace Hazardous Materials Information System

Key literature references and sources for data

<https://echa.europa.eu/>
<https://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index.jsp>
<https://cfpub.epa.gov/ecotox/search.cfm>
<http://www.inchem.org/#/search>
<https://www.nlm.nih.gov/toxnet/index.html>
<http://ccinfoweb.ccohs.ca/rtecs/search.html>

Other data

Classification according 29 CFR Part 1910.1200: - 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.)