	Material Safety Data Sheet (MSDS)	Issue date	2011.09.23
		Revision date	2022.04.01
	Hanwha TotalEnergies Petrochemical Terpolymer	Revision No.	REV.6
		Print date	2022.04.01

1. IDENTIFICATION

A. Product name

○ Product name: Hanwha TotalEnergies Petrochemical Terpolymer TF451

B. Recommended Use and Restriction on Use

○ General Use: Plastic articles or goods

○ Restriction in use: Not available

C. Manufacturer/Distributor Information

- Manufacturer Information

Company	Hanwha TotalEnergie Petrochemical Co., Ltd.		
Address	103, Dokgot 2-ro, Daesan-Up, Seosan-Si, Chungnam, Korea 31900		
Phone	82-41-660-6190	FAX	82-41-660-6189

2. HAZARDS IDENTIFICATION

A. GHS Classification

1) Physical Hazards : Not classified

2) Health Hazards : Not classified

3) Environmental Hazards : Not classified

B. GHS label elements

1) Hazard symbols : Not applicable

2) Signal Word : Not applicable

3) Hazard Statements Not applicable

4) Precautionary Statements

■ Prevention : Not applicable

■ Response : Not applicable

■ Storage : Not applicable

■ Disposal : Not applicable

C. Other hazards which do not result in classification

- Not available

3. COMPOSION/INFORMATION ON INGREDIENTS

Chemical name	Trade names and Synonyms	CAS No	Contents (%)
Propylene-1-butene-ethylene copolymer	Propylene-1-butene-ethylene copolymer	25895-47-0	≥99
Additive※	Not applicable	Not applicable	< 1

※ In additive components, there are no 1% or more hazardous substance subject to management, no 0.1% or more carcinogens and germ cell mutagenic substance, no 0.2% or more respiratory sensitizing substance(gas), and no 0.3% or more reproductive toxic substance.

4. FIRST-AID MEASURES

A. Eye Contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.

B. Skin Contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Wash contaminated clothing thoroughly before re-using.

C. Inhalation

- When exposed to large amounts of steam and mist, move to fresh air.
- Take specific treatment if needed.

D. Ingestion

- Please be advised by doctor whether induction of vomit is demanded or not.
- Rinse your mouth with water immediately.

E. Delayed and immediate effects and also chronic effects from short and long term exposure

- Not available

F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.

5. FIRE FIGHTING MEASURE

A. Suitable (Unsuitable) extinguishing media

1) Suitable extinguishing media

-Use mist, fine water spray, chemical desiccant, carbon dioxide, foam.

2) Unsuitable extinguishing media : Do not use water in a jet.

3) Unusual fire(big fire) : Not available

B. Specific hazards arising from the chemical

- Pyrolysis or combustion may produce irritating gases and carbon oxides.

C. Special protective actions for firefighters

- Cool containers with water until well after fire is out.
- Keep unauthorized personnel out.
- Notify your local fire station and inform the location of the fire and characteristics hazard.
- In case of conflagration, use automatic fire sprinkler. Major fire may require withdrawal, allowing the object itself to burn.
- Avoid inhalation of materials or combustion by-products.
- Keep containers cool with water spray.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedures

- Remove all flammable sources
- If it is not dangerous, stop leaking.
- Take caution of substances and conditions that should be avoided.
- Ventilate properly.
- DO NOT touch the effluents or walk around the area.
- Prevent producing dust.

B. Environmental precautions

-Prevent runoff and contact with waterways, drains or sewers.
- If large amounts have been spilled, inform the relevant authorities.

C. Methods and materials for containment and cleaning up

- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notify the central and local government if the emission reach the standard threshold.
- Disposal of waste shall be in compliance with the Wastes Control Act
- Appropriate container for disposal of spilled material collected.
- Small leak: sand or other non-combustible material, please let use absorption.
- Wipe off the solvent.
- Dike for later disposal.
- Prevent the influx to waterways, sewers, basements or confined spaces.
- Spilled material should be treated as a potential risk of waste collected.

7. HANDLING AND STORAGE

A. Precautions for safe handling

- Wash thoroughly after use.
- Take caution against high temperature.
- Refer Engineering Maintenance and Personal Protective Gears at work.

B. Conditions for safe storage, including any incompatibilities
- Seal it before storage.
- Store in cool and dry places.
- Take caution of substances and conditions that should be avoided.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

1) ACGIH TLV
- Not available

2) OSHA PEL
- Not available

B. Engineering controls
- Business owner is recommended to maintain below recommended exposure limits for the working place with general exhaust of gas/vapor/mist/fume.

C. Personal protective equipment

1) Respiratory protection
- Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.
- Respiratory protection is ranked in order from minimum to maximum.
- Consider warning properties before use.
- Any chemical cartridge respirator with organic vapor cartridge(s).
- Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).
- Any air-purifying respirator with a full facepiece and an organic vapor canister.
- For Unknown Concentration or Immediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in

combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.

2) Eye protection

- Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.
- Provide an emergency eye wash station and quick drench shower in the immediate work area.

3) Hand protection

- Wear appropriate chemical resistant glove.

4) Skin protection

- Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

5) Others

- Not available

9. Physical and Chemical Properties

A. Appearance(physical state, color etc.) : Pellet
B. Odor : Not available
C. Odor Threshold : Not available
D. pH : Not available
E. Melting point/Freezing point : 120~150℃
F. Initial boiling point and boiling point range: Not available
G. Flash point: Not available
H. Evaporation Rate: Not available
I. Flammability (solid, liquid): Not available
J. Explosion range of prints or high / low: Not available
K. VAPOR PRESSURE: Not available
L. Solubility: Not available
M. Vapor Density: Not available
N. Specific gravity: 0.89~0.92
O. n-octanol / water partition coefficient: Not available
P. Autoignition temperature: 380℃

Q. Decomposition temperature: Not available
R. Viscosity: Not available
S. Molecular Weight: > 1,000

10. STABILITY AND REACTIVITY

A. Chemical Stability
- This product is stable at steady-state when stored and handled under recommended conditions, temperature and pressure.

B. Possibility of hazardous reactions
- No report about harmful polymerized reactions in the room temperature and pressure.

C. Conditions to avoid
- Avoid contact with heat, sparks, flame or other ignition sources.
- Containers may burst or explode when exposed to heat
- Store away from waterways and sewers
- Cylinders exposed to fire may release flammable gases (no code)

D. Incompatible material
- Flammable substance

E. Hazardous decomposition products
- Thermal decomposition product → carbon oxides

11. Toxicological Information

A. Information on the likely routes of exposure
1) Respiratory tracts : Not available
2) Oral : Not available
3) Skin contact : Not available
4) Eye contact : Not available

B. Delayed and immediate effects and also chronic effects from short and long term exposure

1) Acute toxicity
- Oral : Not available
- Dermal : Not available
- Inhalation : Not available

2) Skin corrosion/irritation : Not available

3) Serious eye damage/irritation : Not available

4) Respiratory sensitization : Not available

5) Skin sensitization : Not available

6) Carcinogenicity : Not available
* IARC : Not available
* OSHA : Not available
* ACGIH : Not available
* NTP : Not available
* EU CLP : Not available

7) Germ cell mutagenicity : Not available

8) Reproductive toxicity : Not available

9) STOT-single exposure : Not available

10) STOT-repeated exposure : Not available

11) Aspiration hazard : Not available

12. ECOLOGICAL INFORMATION

A. Ecotoxicity
- Acute aquatic toxicity : Not available
- Chronic aquatic toxicity : Not available

1) Fish : Not available

2) Crustacean : Not available

3) Algae : Not available

B. Persistence and Degradability

1) Persistence : Not available

2) Degradabiltiy : Not available

C. Bioaccumulation potential

1) Bioaccumulation : Not available

2) Biodegration : Not available

D. Mobility in soil : Not available

E. Other adverse effects

- Not available

13. Disposal Considerations

A. Disposal method

- When this waste is solid state and doesn't mixed with other materials, it should be entrusted to the waste recycling processor
- When it is impossible to recycle, it should be entrusted to the waste recycling processor in accordance with the national regulated disposal methods(ex. incineration, landfill, etc)
- When this waste is mixed with designated wastes, it is entrusted to the waste recycling processor in accordance with the national regulated disposal methods for the designated wastes

B. Disposal instruction

- Take care not to burst the package bag and/or the package container
- Take care not to spill out of the package bag and/or the package container
- Don't dispose of the waste which mixed with the reactive material
- When disposing of the waste mixed with other materials, after stabilzing in order not to react each other, it should be safely disposed in accordance with the national regulation
- Dispose of the waste in accordance with all national laws and regulations

14. TRANSPORT INFORMATION

A. UN No. (IMDG CODE/IATA DGR) : Not applicable

B. Proper shipping name : Not applicable

C. Hazard Class : Not applicable

D. IMDG CODE/IATA DGR Packing group : Not applicable

E. Marine pollutant : Not applicable

F. Special precautions for user related to transport or transportation measures

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- Air transport(IATA): Not subject to IATA regulations.

15. REGULATORY INFORMATION

A. National and/or international regulatory information

1) POPs Management Law : Not regulated

2) Information of EU Classification

- Classification : Not applicable

3) U.S. Federal regulations

- OSHA PROCESS SAFETY (29CFR1910.119) : Not regulated
- CERCLA Section 103 (40CFR302.4) : Not regulated
- EPCRA Section 302 (40CFR355.30) : Not regulated
- EPCRA Section 304 (40CFR355.40) : Not regulated
- EPCRA Section 313 (40CFR372.65) Not regulated

4) Rotterdam Convention listed ingredients : Not regulated

5) Stockholm Convention listed ingredients : Not regulated

6) Montreal Protocol listed ingredients : Not regulated

16. OTHER INFORMATION

A. Reference

○ TSCA ; http://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/searchbylist/search.do

○ EU Regulation 1272/2008

○ TOMES; LOLI ; http://csi.micromedex.com/fraMain.asp?Mnu=0

○ UN Recommendations on the transport of dangerous goods 17th

○ IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; http://monographs.iarc.fr

○ ECHA CHEM; http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances

○ OECD SIDS; http://webnet.oecd.org/Hpv/UI/Search.aspx

○ HSDB; http://toxnet.nlm.nih.gov/cgi-bin/sis/search2

○ EPA; http://www.epa.gov/iris

○ InCHEM; http://www.inchem.org/

○ EPISUITE Program ver.4.1

B. Key acronyms

○ ACGIH(American Conference of Governmental Industrial Hygienists)

○ ECHA(European Chemicals Agency)

○ OECD(Organization for Economic Co-operation and Development)

○ CERCLA(Comprehensive Environmental Response, Compensation, and Liability Act)

○ IARC(International Agency for Research on Cancer)

○ NIOSH(National Institute for Occupational Safety and Health)

○ OSHA(Occupational Safety and Health Administration)

○ NTP(National Toxicology Program)

○ TSCA(Toxic Substances Control Act)

○ NFPA(National Fire Protection Association)

○ LC50(Lethal Concentration 50% kill)

○ LD50(Lethal Dose 50% kill)
○ EC50(50% Effect Concentration)
○ STEL(Short Term Exposure Limit)
○ TWA(Time weight Average)
○ TLV(Threshold Limit Value)

C. Issued date : 2011.09.23

D. Revision number and date : 6th, 2022.04.01

E. Other material safety data sheet information:

- This SDS is prepared according to the Globally Harmonized System (GHS).
- This safety data sheet is based on current knowledge and information that we know.
- Please note that this information is not a guarantee of the product itself.
- This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability on completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information nor do we offer warranty against patent infringement.