SAFETY DATA SHEET

TBPB

SECTION 1. IDENTIFICATION

Product name : TBPB

Other means of identification : No data available

Manufacturer or supplier’s details

Company name of supplier : United Initiators, Inc.
Address : 555 Garden Street
Elyria OH 44035 USA
Unit 3 – 363 Broadway, Suite 324
Winnipeg, MB R3C 3N9 CANADA

Telephone : +1-440-323-3112
Telefax : +1-440-323-2659

Emergency telephone : CHEMTREC US (24h): +1-800-424-9300
CHEMTREC WORLD (24h): +1-703-527-3887
CANUTEC (24h): 1-613-966-6666

E-mail address of person responsible for the SDS : cs-initiators.nafta@united-in.com

For Transportation Incidents : TERRAPURE EMERGENCY RESPONSE SERVICES (24h): 1-800-567-7455

Recommended use of the chemical and restrictions on use

Recommended use : polymerization initiators

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the Hazardous Products Regulations

Organic peroxides : Type C

Acute toxicity (Inhalation) : Category 4
Skin irritation : Category 2
Skin sensitization : Category 1
Short-term (acute) aquatic hazard : Category 1
Long-term (chronic) aquatic hazard : Category 3

GHS label elements
SAFETY DATA SHEET

TBPB

Hazard pictograms

Signal Word: Danger

Hazard Statements:
- H242 Heating may cause a fire.
- H315 Causes skin irritation.
- H317 May cause an allergic skin reaction.
- H332 Harmful if inhaled.
- H400 Very toxic to aquatic life.
- H412 Harmful to aquatic life with long lasting effects.

Precautionary Statements:

Prevention:
- P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P234 Keep only in original packaging.
- P240 Ground and bond container and receiving equipment.
- P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
- P264 Wash skin thoroughly after handling.
- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
- P302 + P352 IF ON SKIN: Wash with plenty of water.
- P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
- P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
- P362 + P364 Take off contaminated clothing and wash it before reuse.
- P370 + P378 In case of fire: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide to extinguish.
- P391 Collect spillage.

Storage:
- P403 Store in a well-ventilated place.
- P410 Protect from sunlight.
- P411 Store at temperatures not exceeding 30 °C/ 86 °F.
- P420 Store separately.

Disposal:
- P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards
None known.
SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance
Chemical nature : Organic Peroxide liquid
Substance name : tert-Butyl perbenzoate
CAS-No. : 614-45-9
Synonyms : No data available

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl perbenzoate</td>
<td>614-45-9</td>
<td>&lt;= 100</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

General advice : Move out of dangerous area.
Show this material safety data sheet to the doctor in attendance.
Do not leave the victim unattended.
Symptoms of poisoning may appear several hours later.
Call a physician immediately.

If inhaled : Call a physician or poison control center immediately.
If unconscious, place in recovery position and seek medical advice.
Keep respiratory tract clear.
If breathed in, move person into fresh air.

In case of skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Wash contaminated clothing before re-use.
If on skin, rinse well with water.
If on clothes, remove clothes.
If symptoms persist, call a physician.

In case of eye contact : In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear.
Call a physician immediately.
Rinse mouth thoroughly with water.

Most important symptoms : Causes skin irritation.
and effects, both acute and delayed

May cause an allergic skin reaction. Harmful if inhaled.

Protection of first-aiders

First Aid responders should pay attention to self-protection and use the recommended protective clothing

Notes to physician

Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Water spray jet
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media

High volume water jet

Specific hazards during fire fighting

Contact with incompatible materials or exposure to temperatures exceeding SADT may result in a self-accelerating decomposition reaction with release of flammable vapors which may auto-ignite.

The product burns violently. Flash back possible over considerable distance. Vapors may form explosive mixtures with air. The product will float on water and can be reignited on surface water. Cool closed containers exposed to fire with water spray.

Specific extinguishing methods

Do not use a solid water stream as it may scatter and spread fire. Remove undamaged containers from fire area if it is safe to do so. Use water spray to cool unopened containers.

Further information

Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Special protective equipment for fire-fighters

Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Follow safe handling advice and personal protective
equipment recommendations. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Never return spills in original containers for re-use. Treat recovered material as described in the section “Disposal considerations”.

Environmental precautions: Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

Methods and materials for containment and cleaning up: Contact with incompatible substances can cause decomposition at or below SADT. Clear spills immediately. Suppress (knock down) gases/vapors/mists with a water spray jet. To clean the floor and all objects contaminated by this material, use plenty of water. Soak up with inert absorbent material. Isolate waste and do not reuse. Non-sparking tools should be used. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.

SECTION 7. HANDLING AND STORAGE

Technical measures: See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.

Advice on protection against fire and explosion: Keep away from heat and sources of ignition. Use only explosion-proof equipment. Keep away from combustible material.

Advice on safe handling: Do not swallow. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. Avoid formation of aerosol. Take precautionary measures against static discharges. Never return any product to the container from which it was originally removed. Provide sufficient air exchange and/or exhaust in work rooms. Avoid confinement. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Smoking, eating and drinking should be prohibited in the application area. Wash thoroughly after handling. For personal protection see section 8. Persons susceptible to skin sensitization problems or asthma,
allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
Protect from contamination.

Conditions for safe storage:
- Avoid impurities (e.g. rust, dust, ash), risk of decomposition.
- Electrical installations / working materials must comply with the technological safety standards.
- Containers which are opened must be carefully resealed and kept upright to prevent leakage.
- Store in original container.
- Keep containers tightly closed in a cool, well-ventilated place.
- Store in accordance with the particular national regulations.

Materials to avoid:
- Keep away from strong acids, bases, heavy metal salts and other reducing substances.

Recommended storage temperature:
- 10 - 30 °C
- 50 - 86 °F

Further information on storage stability:
- No decomposition if stored normally.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

Engineering measures:
- Minimize workplace exposure concentrations.

Personal protective equipment
Filter type:
- ABEK-filter

Respiratory protection:
- In the case of dust or aerosol formation use respirator with an approved filter.

Hand protection
Material:
- butyl-rubber

Break through time:
- >= 480 min

Glove thickness:
- 0.5 mm

Remarks:
- Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work.
- For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove Wash hands before breaks and at the end of workday.
Eye protection : Tightly fitting safety goggles
Please wear suitable protective goggles. Also wear face protection if there is a splash hazard.
Ensure that eyewash stations and safety showers are close to the workstation location.

Skin and body protection : Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential.

Hygiene measures : Keep away from food and drink.
When using do not eat or drink.
When using do not smoke.
Wash hands before breaks and immediately after handling the product.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid
Color : light yellow
Odor : ester-like
Odor Threshold : No data available
pH : No data available
Melting point/freezing point : ca. 10 °C
Initial boiling point and boiling range : Decomposition: Decomposes below the boiling point.
Flash point : 100 °C
   Method: ISO 3679
Evaporation rate : No data available
Flammability (solid, gas) : Not applicable
Upper explosion limit / Upper flammability limit : No data available
Lower explosion limit / Lower flammability limit : No data available
Vapor pressure : 0.003 hPa (20 °C)
Relative vapor density : No data available
Density : 1.04 g/cm3 (20 °C)
Solubility(ies)
Water solubility : 1.18 g/l insoluble
Solubility in other solvents : completely miscible
  Solvent: Alcohol
  completely miscible
  Solvent: Phthalates

Partition coefficient: n-octanol/water : log Pow: 3.0 (25 °C)

Self-Accelerating decomposition temperature (SADT) : 60 °C
  Method: UN-Test H.4
  SADT-Self Accelerating Decomposition Temperature. Lowest temperature at which the tested package size will undergo a self-accelerating decomposition reaction.

Viscosity
Viscosity, dynamic : 8 mPa.s (20 °C)

Explosive properties : Not explosive

Oxidizing properties : The substance or mixture is not classified as oxidizing. Organic peroxide

Refractive index : 1.499 (20 °C)

SECTION 10. STABILITY AND REACTIVITY

Reactivity : Stable under recommended storage conditions.

Chemical stability : Stable under recommended storage conditions.

Possibility of hazardous reactions : Vapors may form explosive mixture with air.

Conditions to avoid : Protect from contamination. Contact with incompatible substances can cause decomposition at or below SADT. Heat, flames and sparks. Avoid confinement.

Incompatible materials : Accelerators, strong acids and bases, heavy metals and heavy metal salts, reducing agents

Hazardous decomposition products : Irritant, caustic, flammable, noxious/toxic gases and vapours can develop in the case of fire and decomposition
SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity
Harmful if inhaled.

Product:
Acute inhalation toxicity
LC50 (Rat): > 1.01 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 436

Components:
tert-Butyl phenyl carbonate:
Acute oral toxicity
LD0 (Rat): > 2,000 mg/kg
Method: OECD Test Guideline 423
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity
LC50 (Rat): 1.01 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 436

Acute dermal toxicity
LD0 (Rat): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

Skin corrosion/irritation
Causes skin irritation.

Product:
Remarks
May cause skin irritation in susceptible persons.

Components:
tert-Butyl phenyl carbonate:
Species
Rabbit
Method
OECD Test Guideline 404
Result
Skin irritation

Serious eye damage/eye irritation
Not classified based on available information.

Product:
Remarks
Vapors may cause irritation to the eyes, respiratory system and the skin.
Components:

tert-Butyl perbenzoate:
Species: Rabbit
Result: No eye irritation
Method: OECD Test Guideline 405

Respiratory or skin sensitization

Skin sensitization
May cause an allergic skin reaction.

Respiratory sensitization
Not classified based on available information.

Product:
Remarks: Causes sensitization.

Components:

tert-Butyl perbenzoate:
Species: Mouse
Method: OECD Test Guideline 429
Result: May cause sensitization by skin contact.

Germ cell mutagenicity
Not classified based on available information.

Components:

tert-Butyl perbenzoate:
Genotoxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: positive

Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: positive

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: positive

Test Type: Mouse Lymphoma
Result: positive

Genotoxicity in vivo: Test Type: Micronucleus test
Species: Mouse (male and female)
Application Route: Oral
Result: negative

Carcinogenicity
Not classified based on available information.
Components:

tert-Butyl perbenzoate:
Remarks : This information is not available.

Reproductive toxicity
Not classified based on available information.

Components:

tert-Butyl perbenzoate:
Effects on fertility : Species: Rat
                      Application Route: Oral
                      General Toxicity Parent: NOAEL: 300 mg/kg body weight
                      Method: OECD Test Guideline 421

Effects on fetal development : Species: Rat
                               Application Route: Oral
                               General Toxicity Maternal: NOAEL: 300 mg/kg body weight
                               Method: OECD Test Guideline 414

STOT-single exposure
Not classified based on available information.

STOT-repeated exposure
Not classified based on available information.

Aspiration toxicity
Not classified based on available information.

Further information

Product:
Remarks : No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

tert-Butyl perbenzoate:
Toxicity to fish : LC50 (Danio rerio (zebra fish)): 1.6 mg/l
                  Exposure time: 96 h
                  Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 11 mg/l
                                                   Exposure time: 48 h
                                                   Method: OECD Test Guideline 202

Toxicity to algae : EC50 (Pseudokirchneriella subcapitata (green algae)): 0.8 mg/l
                   Exposure time: 72 h
                   Method: OECD Test Guideline 201
NOEC (Pseudokirchneriella subcapitata (green algae)): 0.72 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

M-Factor (Acute aquatic toxicity): 1

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)
EC10 (Daphnia magna (Water flea)): 0.49 mg/l
Exposure time: 21 d
Method: OECD Test Guideline 211

Toxicity to microorganisms
EC50: 43 mg/l
Exposure time: 0.5 h
Method: OECD Test Guideline 209

Persistence and degradability

Components:
tert-Butyl perbenzoate
Biodegradability: Result: Readily biodegradable.
Method: OECD Test Guideline 301D

Bioaccumulative potential

Components:
tert-Butyl perbenzoate
Partition coefficient: n-octanol/water: log Pow: 2.89 (25 °C)

Mobility in soil
No data available

Other adverse effects

Product:
Additional ecological information:
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.
Harmful to aquatic life with long lasting effects.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods
Waste from residues:
The product should not be allowed to enter drains, water courses or the soil.
Do not contaminate ponds, waterways or ditches with chemical or used container.
Dispose of wastes in an approved waste disposal facility.
### Contaminated packaging
- Empty remaining contents.
- Dispose of as unused product.
- Do not re-use empty containers.
- Do not burn, or use a cutting torch on, the empty drum.
- Dispose of in accordance with local regulations.

### SECTION 14. TRANSPORT INFORMATION

**International Regulations**

#### UNRTDG
- **UN number**: UN 3103
- **Proper shipping name**: ORGANIC PEROXIDE TYPE C, LIQUID (tert-BUTYL PEROXYBENZOATE)
- **Class**: 5.2
- **Packing group**: Not assigned by regulation
- **Labels**: 5.2

#### IATA-DGR
- **UN/ID No.**: UN 3103
- **Proper shipping name**: Organic peroxide type C, liquid (tert-Butyl peroxybenzoate)
- **Class**: 5.2
- **Packing group**: Not assigned by regulation
- **Labels**: Organic Peroxides, Keep Away From Heat
- **Packing instruction (cargo aircraft)**: 570
- **Packing instruction (passenger aircraft)**: 570

#### IMDG-Code
- **UN number**: UN 3103
- **Proper shipping name**: ORGANIC PEROXIDE TYPE C, LIQUID (tert-BUTYL PEROXYBENZOATE)
- **Class**: 5.2
- **Packing group**: Not assigned by regulation
- **Labels**: 5.2
- **EmS Code**: F-J, S-R
- **Marine pollutant**: yes

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**
- Not applicable for product as supplied.

### Domestic regulation

#### TDG
- **UN number**: UN 3103
- **Proper shipping name**: ORGANIC PEROXIDE TYPE C, LIQUID (tert-BUTYL PEROXYBENZOATE)
- **Class**: 5.2
- **Packing group**: II
- **Labels**: 5.2
- **ERG Code**: 146
- **Marine pollutant**: yes
Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

The ingredients of this product are reported in the following inventories:

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSL (CA)</td>
<td>All components of this product are on the Canadian DSL</td>
</tr>
<tr>
<td>AICS (AU)</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>NZIoC (NZ)</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>ENCS (JP)</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>ISHL (JP)</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>KECl (KR)</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>PICCS (PH)</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>IECSC (CN)</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>TCSI (TW)</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>TSCA (US)</td>
<td>On TSCA Inventory</td>
</tr>
</tbody>
</table>

Canadian lists
No substances are subject to a Significant New Activity Notification.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxin; CPR - Controlled Products Regulations; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health
SAFETY DATA SHEET

TBPB

Version 2.1  
Revision Date: 11/28/2019  
SDS Number: 600000000000  
Date of last issue: 04/06/2017  
Date of first issue: 10/24/2016

Law (Japan); ISO - International Organisation for Standardization; KECE - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50% of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

This material safety datasheet only contains information relating to safety and does not replace any product information or product specification. These safety instructions also apply to empty packaging which may still contain product residues.


Revision Date : 11/28/2019

The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

CA / Z8