SAFETY DATA SHEET

TBPB

SECTION 1: Identification of the hazardous chemical and of the supplier

Product identifier
Product name : TBPB
Chemical name : tert-Butyl perbenzoate
CAS-No. : 614-45-9

Recommended use of the chemical and restrictions on use
Recommended use : polymerisation initiators

Manufacturer or supplier's details
Company : United Initiators GmbH
Address : Dr.-Gustav-Adolph-Str. 3
          82049 Pullach 09
Telephone : +49 / 89 / 74422 – 0
Emergency telephone number : +49 / 89 / 74422 – 0 (24 h)
E-mail address : contact@united-in.com

SECTION 2: Hazards identification

Classification of the hazardous chemical
Organic peroxides : Type C
Acute toxicity (Inhalation) : Category 4
Skin corrosion/irritation : Category 2
Skin sensitisation : Category 1
Hazardous to the aquatic environment - acute hazard : Category 1
Hazardous to the aquatic environment - chronic hazard : Category 3

Label elements
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/sparks/open flames/hot surfaces.
  - No smoking.
  - P220 Keep/Store away from clothing/ strong acids, bases, heavy metal salts and other reducing substances /combustible materials.
  - P234 Keep only in original container.
  - P273 Avoid release to the environment.
  - P280 Wear protective gloves/ eye protection/ face protection.
- Response:
  - P391 Collect spillage.
- Storage:
  - P411 + P235 Store at temperatures not exceeding 30 °C/ 86 °F. Keep cool.

Other hazards which do not result in classification
None known.

SECTION 3: Composition and information of the ingredients of the hazardous chemical

Substance / Mixture: Substance
Chemical nature: Organic Peroxide liquid

Components

<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 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 centre 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 and effects, both acute and delayed: Causes skin irritation. 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: Firefighting measures

Extinguishing media
Suitable extinguishing media: Water spray jet
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media: High volume water jet

Physicochemical hazards arising from the chemical
Specific hazards during firefighting: 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. Vapours 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.
Special protective equipment and precautions for fire-fighters

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

Specific extinguishing methods: 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.

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.

Hazchem Code: 2WE

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 vapours accumulating to form explosive concentrations. Vapours 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/vapours/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

Handling

Precautions for safe handling

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 vapours/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 sensitisation 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.

Storage

Conditions for safe storage, including any incompatibilities

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

Further information on storage stability: No decomposition if stored normally.
SECTION 8: Exposure controls and personal protection

Control parameters
Contains no substances with occupational exposure limit values.

Appropriate engineering controls
Minimize workplace exposure concentrations.

Individual protection measures, such as personal protective equipment

Eye/face 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 protection
- Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential.

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 manufacturer. Wash hands before breaks and at the end of workday.

Filter type
- ABEK-filter

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

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

Colour
- light yellow

Odour
- ester-like

Odour Threshold
- No data available
SAFETY DATA SHEET

TBPB

Version: 1.1
Revision Date: 28.11.2019
SDS Number: 600000000000
Date of last issue: 09.11.2018
Date of first issue: 09.11.2018

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

Vapour pressure : 0.003 hPa (20 °C)

Relative vapour 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
SECTION 10: Stability and reactivity

Reactivity : Stable under recommended storage conditions.
Chemical stability : Stable under recommended storage conditions.
Possibility of hazardous reactions : Vapours 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

Information on likely routes of exposure : None known.

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 perbenzoate:

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 perbenzoate:**
Species: Rabbit
Method: OECD Test Guideline 404
Result: Skin irritation

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

**Product:**
Remarks: Vapours 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 sensitisation**

**Skin sensitisation**
May cause an allergic skin reaction.

**Respiratory sensitisation**
Not classified based on available information.

**Product:**
Remarks: Causes sensitisation.

**Components:**
**tert-Butyl perbenzoate:**
Species: Mouse
Method: OECD Test Guideline 429
Result: May cause sensitisation 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 foetal 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

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 information

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: 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.: 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.

**Hazchem Code**: 2WE

**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**

**Safety, health, and environmental regulations specific for the hazardous chemical**
- Gefahrgruppe nach § 3 BGV B4: Ib, S+ (German regulatory requirements)
- Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013.
- Produkt unterliegt dem Sprengstoffgesetz (SprengG; Stoffgruppe C). (German regulatory requirements)

**The components of this product are reported in the following inventories:**
- **DSL (CA)**: All components of this product are on the Canadian DSL
- **AICS (AU)**: On the inventory, or in compliance with the inventory
- **NZIoC (NZ)**: On the inventory, or in compliance with the inventory
- **ENCS (JP)**: On the inventory, or in compliance with the inventory
- **ISHL (JP)**: On the inventory, or in compliance with the inventory
- **KECI (KR)**: On the inventory, or in compliance with the inventory
- **PICCS (PH)**: On the inventory, or in compliance with the inventory
IECSC (CN): On the inventory, or in compliance with the inventory
TCSI (TW): On the inventory, or in compliance with the inventory
TSCA (US): On TSCA Inventory

SECTION 16: Other information

Further information

Other information: This 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.

Sources of key data used to compile the Safety Data Sheet:

Date format: dd.mm.yyyy

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 Toxicant; 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 Law (Japan); ISO - International Organisation for Standardization; KECI - 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, Authorisation and restriction of Chemicals; SADT - Self-
The information provided in this 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.