

## GPS Safety Summary

Substance Name:

### **Tert-butyl 2-ethylhexaneperoxoate**

#### **1. General Statement**

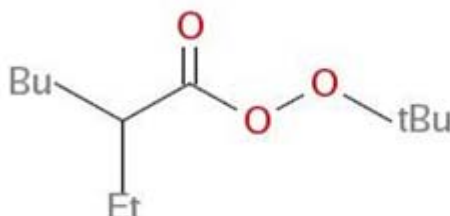
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Tert-Butyl peroxy-2-ethylhexanoate is primarily used in the manufacture of polymers, as a polymerisation initiator. The substance is used at industrial stage and is not sold to consumers.

#### **2. Chemical Identity**

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<b>Name:</b>	tert-butyl peroxy-2-ethylhexanoate, tert-butyl peroxoate, TBPEH
<b>Brand names:</b>	Luperox® 26 grades
<b>Chemical name (IUPAC):</b>	tert-butyl 2-ethylhexaneperoxoate
<b>CAS number:</b>	3006-82-4
<b>EC number:</b>	221-110-7
<b>Molecular formula:</b>	C <sub>12</sub> H <sub>24</sub> O <sub>3</sub>
<b>Structure:</b>	



#### **3. Use and applications**

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Tert-Butyl peroxy-2-ethylhexanoate is primarily used as a radical initiator to induce polymerisation (free radical polymerisation process), for the manufacture of e.g. polyethylene, acrylic polymers, and as a curing agent for the production of unsaturated polyester resins.

#### **4. Physical / Chemical properties**

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Organic peroxides are thermally unstable substances or mixtures, which can undergo exothermic self-accelerating decomposition.

Tert-butyl peroxy-2-ethylhexanoate is classified as Organic Peroxide, Type C, H242 (see section 8 and 9 below).

Property	Value
Physical state	Liquid at 20°C and 1013 hPa
Colour	Colourless
Odour	Slight, ester-like
Molecular weight	216.3 g/mol
Density	0.896 g/cm <sup>3</sup> at 20°C
Vapour pressure	0.02 hPa at 20°C
Melting point	- 67.3°C at 1013 hPa
Self-Accelerating Decomposition Temperature (SADT)	35°C
Explosive properties	Risk of explosion by shock, friction, fire or other sources of ignition.
Water solubility	46.3 mg/L at 20°C
Octanol-water partition coefficient (Log K <sub>ow</sub> )	4.79 at 20°C

## 5. Health Effects

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Slightly harmful by inhalation; low acute toxicity by oral and dermal routes.
Irritation / corrosion Skin / eye/ respiratory tract	Slightly irritating to eyes and skin.
Sensitisation	Product may cause allergic skin reaction.
Toxicity after repeated exposure Oral / inhalation / dermal	Based on the available test data, did not cause significant target organ toxicity after oral repeated exposure.
Genotoxicity / Mutagenicity	Based on the available test data, it is not possible to conclude for gene mutation effects (one <i>in vitro</i> test was positive, 2 tests ( <i>in vitro</i> and <i>in vivo</i> ) were negative).
Carcinogenicity	No data available.
Reproductive / Developmental Toxicology	Based on the available test data, did not cause adverse effects on reproduction after oral exposure at doses that were not toxic to the parents.

## 6. Environmental Effects

Based on available data, tert-butyl 2-ethylhexaneperoxoate is considered to be very toxic towards aquatic organisms and is classified according to EC 1272/2008 regulation.

Several tests have shown that tert-butyl 2-ethylhexaneperoxoate is degradable by hydrolysis and also by biotic degradation in water: this substance is inherently biodegradable. As a consequence, tert-butyl 2-ethylhexaneperoxoate is neither PBT nor vPvB.

Effect Assessment	Result
Aquatic Toxicity	Very toxic to aquatic life, with long lasting effects

Fate and behaviour	Result
Biodegradation	Inherently biodegradable.
Bioaccumulation potential	Bioaccumulative
PBT / vPvB conclusion	Not considered as PBT nor vPvB

## 7. Exposure

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### 7.1 Human health

The manufacture of TBPEH is a closed process that occurs behind anti-deflagration walls, which minimizes worker exposure during the production process.

However, workers can be exposed during loading/unloading operations, mixing, sampling or maintenance operations.

The primary routes of industrial/professional exposure of TBPEH are skin contact and inhalation.

In addition, general population is not expected to be exposed to TBPEH by inhalation, dermal or oral exposure, the product does not remain in the plastic products.

Based on the risk assessment, risk is controlled when activities are carried out under conditions recommended in the extended safety data sheet (chapter 8 and exposure scenarios).

### 7.2 Environment

Releases of TBPEH into the environment are to be expected during production, processing (formulation) and industrial/professional uses mainly via wastewater and lesser amounts via emissions of vapour or powder (due to its physical state and its vapour pressure).

Potential release during production is treated by on-site and off-site risk management measures.

TBPEH is used for production of polymers and resins, which can either be dry or wet processes. In case of wet processes, releases to water have to be directed to a wastewater treatment plant.

The substance is used in low quantity in polymer/resin production, and is almost totally consumed during the process. Therefore the release to environment is very low and, in spite of the environmental hazard profile of the substance, the use is considered as safe for the environment (which has been confirmed by a quantitative risk assessment performed in the framework of REACH regulation).

## 8. Risk Management recommendations

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Human health measures	
Eye/Face protection	Safety glasses/goggles Half-mask during the discharge
Skin protection	Protective suit
Hand protection	Gloves: nitrile rubber, neoprene (suitable gloves tested to EN374) and for activities >1h

Respiratory protection	Suitable respiratory equipment in case of insufficient ventilation
Organizational measures	Ensure workers are duly trained to minimize exposure
Engineering control	Provide sufficient air exchange and/or exhaust ventilation in work rooms

### Environmental measures

Can be discharged in waste water, when in compliance with local regulations. Do not spread sludge on natural soils.  
Eliminate the product by incineration after dilution in a suitable flammable solvent (in accordance with local and national regulations) – amount of active oxygen must be below 1%.

### Storage and handling

Strictly limit the quantities of product in the work area to those which are absolutely necessary for the work in hand. Great cleanliness in work areas is a necessary and important factor for safety. Never weigh out in the storage room. Handle and open container with care (risk of over pressurization in containers). Eliminate all sources of ignition, and do not generate flames or sparks. Take precautionary measures against static discharges. Apply earthing when transferring from one container to another. Confinement must be avoided. Use explosion protected equipment.

Use non-sparking tools in areas where explosive vapor/air mixtures may occur. Keep product and emptied container away from heat and sources of ignition. Do not cut or weld on or near this container even when empty. Keep away from incompatible materials such as: strong oxidizing agents, powerful reducers, acids, bases, amines, transition metal salts, sulphur compounds, rust, ash, dusts (risk of self-accelerating exothermic decomposition).

Never return any product to the container from which it was originally removed (risk of decomposition).

Avoid temperatures above 20 °C (prevention of fire/explosion). Storage buildings must be built and equipped so as not to exceed the maximum proscribed temperature limit.

## 9. Regulatory Information / Classification and Labelling

### 9.1 Regulatory Information

A dossier was generated by the Organic Peroxide Producers Association during the High Production Volume Program.

On top of that, the substance has been registered under EU Regulation EC 1907/2006 (REACH).




As organic peroxides are sensitive substances (as they are liable to exothermic decomposition), the carriage of TBPEH is strongly regulated, under the rules and conditions of class 5.2 of UN Recommendations on the Transport of Dangerous Goods regulation.

%	Form	UN Number	Classification	OP Category
>52%-100%	liquid	UN 3133	OP Type C, Liquid, temperature controlled	Type C: the mixture possesses explosive properties but cannot detonate or deflagrate rapidly or undergo a thermal explosion when packaged

>32-52%	liquid	UN 3117	OP Type E, Liquid, temperature controlled	Type E: the mixture, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement.
≤32%	liquid	UN 3119	OP Type F, Liquid, temperature controlled	Type F: neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power.

## 9.2 Classification and labelling

Under GHS substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the eSDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. Substances registered for REACH are classified according CLP (EC) 1272/2008, implementation of the GHS in the European Union.

Classification	
According to REGULATION (EC) no 1272/2008:	
<ul style="list-style-type: none"> <li>– Organic peroxide; type C; Heating may cause a fire.</li> <li>– Skin sensitization; Category 1B; May cause an allergic skin reaction.</li> <li>– Acute aquatic toxicity; Category 1; Very toxic to aquatic life.</li> <li>– Chronic aquatic toxicity; Category 1; Very toxic to aquatic life with long lasting effects.</li> </ul>	
Pictogram	
– GHS02: Flame	
– GHS07: Exclamation mark	
– GHS09: Environment	
Hazard statement	
<ul style="list-style-type: none"> <li>– H242: Heating may cause a fire.</li> <li>– H317: May cause an allergic skin reaction.</li> <li>– H400: Very toxic to aquatic life.</li> <li>– H410: Very toxic to aquatic life with long lasting effects.</li> </ul>	
Alternative classification according to Globally Harmonized System (GHS)	
– Acute toxicity by inhalation; Category 5; May be harmful if inhaled	

## 10. Contact Information within Company

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For further information on this substance or product safety summary in general, please contact:

- [arkema.peroxides-reach-uses@arkema.com](mailto:arkema.peroxides-reach-uses@arkema.com)
- **ICCA portal where the GPS Safety Summary is posted:**  
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

## 11. Date of Issues / Revision

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- Date of issue: 30/11/2013
- Date of revision:

## 12. Disclaimer

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The information contained in this paper is intended as advice only and whilst the information is provided in utmost good faith and has been based on the best information currently available, is to be relied upon at the user's own risk.

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