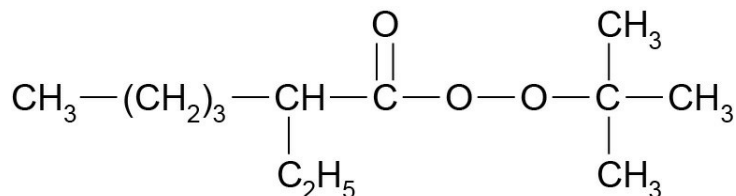


Trigonox 21S

tert-Butyl peroxy-2-ethylhexanoate



Trigonox 21S is a peroxide formulation used for curing unsaturated polyester resin at elevated and high temperatures. Suitable as a kicker in formulations for pultrusion and SMC/BMC.

CAS number
3006-82-4

EINECS/ELINCS No.
221-110-7

TSCA status
listed on inventory

Molecular weight
216.3

Active oxygen content
peroxide
7.40%

Specifications

Acid as 2-ethylhexanoic acid	≤ 0.30 %
Active oxygen	≥ 7.18 %
Assay	≥ 97.0 %
Color	≤ 30 APHA
Inorganic + organic hydrolysable chloride	≤ 100 mg/kg
TBHP	≤ 1000 mg/kg

Characteristics

Appearance	Clear liquid
Density, 20 °C	0.900 g/cm ³
Viscosity, 20 °C	4.3 mPa.s

Applications

For polymer production: Polymerization of ethylene: Trigonox 21S is an efficient initiator for the production of Low Density Polyethylene (LDPE). It is used both for tubular and autoclave processes. In most cases a combination with other peroxides is used to ensure a broad reactivity range. Polymerization of styrene: in suspension polymerization processes, Trigonox 21S can be used for the polymerization of styrene at approximately 90°C. Trigonox 21 has an activity comparable with Dibenzoyl peroxide (Perkadox L-W75). Typically, Trigonox 21S is used in combination with initiators such as tert-Butyl peroxybenzoate (Trigonox C) and tert-Butylperoxy 2 ethylhexyl carbonate (Trigonox 117). For Thermoset: Trigonox 21S, tert-butyl peroxy 2 ethylhexanoate, is a perester which is used for the curing of unsaturated polyester resin at elevated and high temperatures. Trigonox 21S is preferred for the curing of UP resin based Hot Press Moulding formulation (such as SMC and BMC) in the temperature range of 120 - 160°C. As Trigonox 21S is a high reactive peroxide, it is very suitable as a kicker in formulations for pultrusion and SMC/BMC. In combination with a cobalt accelerator, Trigonox 21S is also applicable for the cure of UP resins in the temperature range of 60°C and higher. Application area can be air drying lacquers, diplacquers, wall panels, filament winding, etc.

Half-life data

The reactivity of an organic peroxide is usually given by its half-life ($t_{1/2}$) at various temperatures. For Trigonox 21S in chlorobenzene half-life at other temperatures can be calculated by using the equations and constants mentioned below:

0.1 hr	at 113°C
1 hr	at 91°C
10 hr	at 72°C
Formula 1	$k_d = A \cdot e^{-E_a/RT}$
Formula 2	$t_{1/2} = (\ln 2)/k_d$
E_a	124.90 kJ/mole
A	$1.54E+14 \text{ s}^{-1}$
R	8.3142 J/mole-K
T	(273.15+°C) K

Thermal stability

Organic peroxides are thermally unstable substances, which may undergo self-accelerating decomposition. The lowest temperature at which self-accelerating decomposition of a substance in the original packaging may occur is the Self-Accelerating Decomposition Temperature (SADT). The SADT is determined on the basis of the Heat Accumulation Storage Test.

SADT	35°C
Emergency temperature (T_e)	25°C
Control temperature (T_c)	20°C
Method	The Heat Accumulation Storage Test is a recognized test method for the determination of the SADT of organic peroxides (see Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria - United Nations, New York and Geneva).

Storage

Due to the relatively unstable nature of organic peroxides a loss of quality can be detected over a period of time. To minimize the loss of quality, Nouryon recommends a maximum storage temperature ($T_s \text{ max.}$) for each organic peroxide product.

$T_s \text{ Max.}$	10°C and
$T_s \text{ Min.}$	-30°C to prevent crystallization
Note	When stored according to these recommended storage conditions, Trigonox 21S will remain within the Nouryon specifications for a period of at least 3 months after delivery.

Packaging and transport

In North America Trigonox 21S is packed in non-returnable, vented, five gallon polyethylene containers of 35 lb net weight. In other regions the standard packaging is a 30-liter HDPE can (Nourytainer), vented, for 25 kg peroxide content.

Both packaging and transport meet the international regulations. For the availability of other packed quantities consult your Nouryon representative. Trigonox 21S is classified as Organic peroxide type C; liquid, temperature controlled, Division 5.2; UN 3113; PG II.

Safety and handling

Keep containers tightly closed. Store and handle Trigonox 21S in a dry well-ventilated place away from sources of heat or ignition and direct sunlight. Never weigh out in the storage room. Avoid contact with reducing agents (e. g. amines), acids, alkalis and heavy metal compounds (e. g. accelerators, driers and metal soaps). Please refer to the Safety Data Sheet (SDS) for further information on the safe storage, use and handling of Trigonox 21S. This information should be thoroughly reviewed prior to acceptance of this product. The SDS is available at <https://polymerchemistry.nouryon.com>.

Major decomposition products

Carbon dioxide, tert-Butanol, Heptane, 3-tert-Butoxyheptane

All information concerning this product and/or suggestions for handling and use contained herein are offered in good faith and are believed to be reliable. Nouryon, however, makes no warranty as to accuracy and/or sufficiency of such information and/or suggestions, as to the product's merchantability or fitness for any particular purpose, or that any suggested use will not infringe any patent. Nouryon does not accept any liability whatsoever arising out of the use of or reliance on this information, or out of the use or the performance of the product. Nothing contained herein shall be construed as granting or extending any license under any patent. Customer must determine for himself, by preliminary tests or otherwise, the suitability of this product for his purposes. The information contained herein supersedes all previously issued information on the subject matter covered. The customer may forward, distribute, and/or photocopy this document only if unaltered and complete, including all of its headers and footers, and should refrain from any unauthorized use. Don't copy this document to a website.

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The Nouryon logo consists of a stylized orange 'N' followed by the word 'ouryon' in a lowercase, sans-serif font, all in orange.