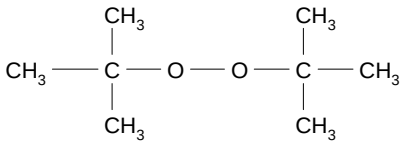
AkzoNobel
Tomorrow's Answers Today

Trigonox® B

Product description

Di-tert-butyl peroxide



Molecular weight	: 146.2
Active oxygen content peroxide	: 10.94%
CAS No.	: 110-05-4
EINECS/ELINCS No.	: 203-733-6
TSCA status	: listed on inventory

Initiator for the (co)polymerization of ethylene, styrene, acrylates and methacrylates.

Specifications

Appearance	: Clear liquid
Assay	: 99.0% min.
Active Oxygen	: 10.83% min.
tert-Butyl hydroperoxide	: 0.10% max.

Characteristics

Density, 20°C	: 0.800 g/cm^3
Viscosity, 20°C	: 0.9 mPa.s

Half-life data

The reactivity of an organic peroxide is usually given by its half-life ($t_{1/2}$) at various temperatures. For *Trigonox* B in chlorobenzene:

0.1 hr	at 164°C (327°F)
1 hr	at 141°C (286°F)
10 hr	at 121°C (250°F)

The half-life at other temperatures can be calculated by using the following equations and constants:

$k_d = A \cdot e^{-Ea/RT}$

$t_{½} = (\ln 2)/k_d$

E_a = 153.46 kJ/mole
A = 4.20E+15 s^{-1}
R = 8.3142 J/mole·K
T = (273.15+°C) K

Storage

Due to the relatively unstable nature of organic peroxides, a loss of quality will occur over a period of time. To minimize the loss of quality, AkzoNobel recommends a maximum storage temperature (T_s max.) for each organic peroxide product.

For *Trigonox* B

T_s max. = 40°C (104°F) and
T_s min. = -30°C (-22°F) to prevent crystallization

When stored according to these recommended storage conditions, *Trigonox* B will remain within the AkzoNobel specifications for a period of at least three months after delivery.

Thermal stability

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

For *Trigonox* B SADT : 80°C (176°F)

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).

Major decomposition products

Acetone, Methane, tert-Butanol

Packaging and transport

In North America *Trigonox* B is packed in non-returnable, five gallon polyethylene containers of 30 lb net weight and steel drums of 100 or 340 lb net weight.

In other regions the standard packaging is a 30-liter HDPE can (Nourytainer®) for 20 kg peroxide. Delivery in a 200 l steel drum for 150 kg peroxide is also possible in a number of countries.

Both packaging and transport meet the international regulations. For the availability of other packed quantities consult your AkzoNobel representative.

Trigonox B is classified as Organic peroxide type E; liquid, Division 5.2; UN 3107.

Safety and handling

Keep containers tightly closed. Store and handle *Trigonox* B 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 Material Safety Data Sheet (MSDS) for further information on the safe storage, use and handling of *Trigonox* B. This information should be thoroughly reviewed prior to acceptance of this product.
The MSDS is available at www.akzonobel.com/polymer.

Applications

Polymerization of ethylene

Trigonox B 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.

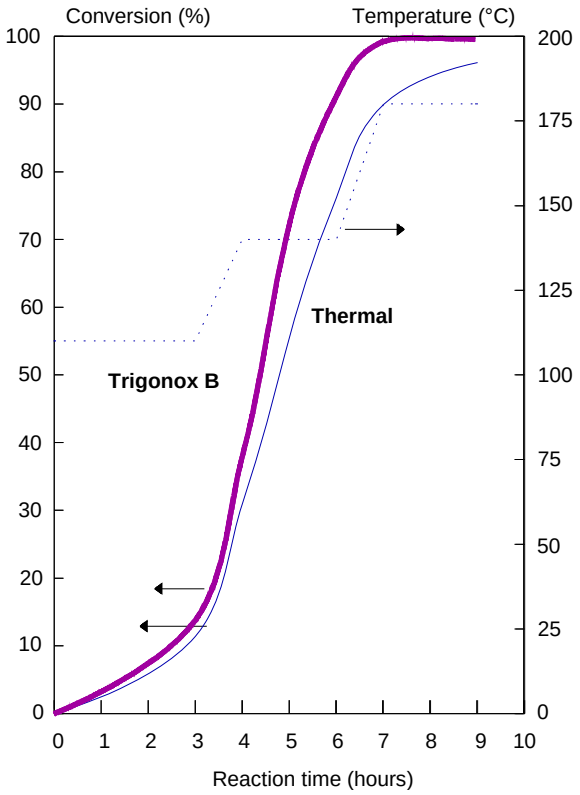
Polymerization of styrene

Trigonox B may be used for the polymerization and copolymerization of styrene in the temperature range of 95-185°C. In practice, combinations of two or more peroxides with diverging activities are used to reduce the residual monomer content in the final polymer and to increase reactor efficiency.

In a mass process *Trigonox* B can be advantageously used to increase polymerization rates.

During polymerization the temperature is increased in steps.
A comparison is made between thermally and *Trigonox* B initiated (0.16 mmole/100 g styrene) polymerization of styrene, applying a typical temperature scheme. Figure 1 shows the conversion/time curves.

Figure 1. Mass polymerization of styrene



Molecular weight (distribution) of final polymer

Initiator	Mw	Mn	D
Thermal	340,000	85,000	4.0
Trigonox B	340,000	105,000	3.2

Polymerization of acrylates and methacrylates

Trigonox B can be used as initiator for the solution (co)polymerization of acrylates and methacrylates in the temperature range of 130-175°C, amongst others for the manufacture of coatings.

Trigonox B can also be applied as an initiator for the bulk and suspension (co)polymerization of acrylates and methacrylates.

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