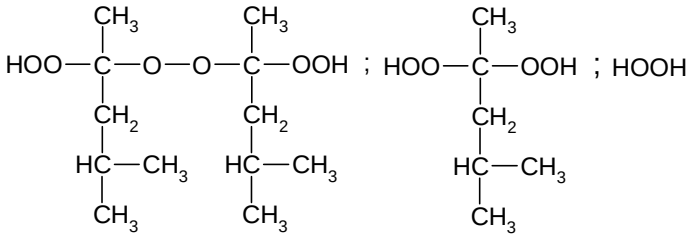
AKZO NOBEL

POLYMER CHEMICALS

Trigonox® HM

Product description

Mixture of methyl isobutyl ketone peroxide and cyclohexanone peroxide in solvents



Peroxide content	:	45%
CAS No.	:	37206-20-5; 108-10-1
Einecs	:	2533964; 2035501
TSCA	:	registered

Specification

Appearance	:	clear liquid
Color	:	50 Pt-Co max.
Total Active Oxygen	:	8.7-8.9%

Physical properties

Density, 20°C	:	910 kg/m^3
Viscosity, 20°C	:	11 mPa.s

Safety characteristics

Flashpoint	:	34°C (SETA)
SADT*	:	50°C
Auto ignition temperature	:	204°C

Solubility

Insoluble in water. Soluble in phthalates.

Hazardous reactions

Oxidizing agent. Decomposes violently under the influence of heat or by contact with reducing agents. Never mix with accelerators.

Major decomposition products

Carbon monoxide, water, mixture of aliphatic acids and ketones.

Toxicological data

LD 50, acute oral (rat)	:	1700 mg/kg
LC 50, acute inhalation (rat)	:	1.5 mg/l (4 hours exposure)
Primary skin irritation	:	Corrosive
Eye irritation	:	Severely irritating
Ames test	:	Not mutagenic

Packaging

Standard packaging size for Trigonox HM is 25 kg net.
Smaller packaging size is available on request.

*SADT = Self Accelerating Decomposition Temperature

Application

Trigonox HM is a methyl isobutyl ketone peroxide (MIBKP) formulation for the curing of unsaturated polyester resins as such or in the presence of a cobalt accelerator in the temperature range of 60-150°C.

Trigonox HM can be used in combination with a cobalt accelerator (e.g. Accelerator NL-49P) for those applications where a long gel time or production time is required at ambient temperature and a fast cure at higher temperatures e.g. 60-100°C. Application area can be: filament winding and production of flat and corrugated sheets.

Trigonox HM shows also without the addition of a cobalt accelerator a high reactivity at elevated temperatures, which is demonstrated by its low activation temperature.

Trigonox HM can therefore successfully be used in the temperature range of approximately 80-150°C:

- for the production of flat and corrugated sheets where a discoloration by the cobalt accelerator is not acceptable
- as kicker for the pultrusion application in combination with a low reactive peroxide like Trigonox 22-B50 or Trigonox C.
  The low reactive peroxide must be included in the formulation in order to achieve a complete cure.

Dosage

Depending on working conditions, the following peroxide and accelerator dosage levels are recommended:

Trigonox HM as such	1 - 3 phr*
Trigonox HM as kicker	0.5 - 1 phr
Accelerator NL-49P	0 - 3 phr

Cure Characteristics

In a high reactive standard orthophthalic UP resin the following application characteristics were determined:

Activation temperature

1 phr Trigonox HM	50°C

Gel times at 20°C

1 phr Trigonox HM + 0.5 phr Accerelator NL-49P	70 min
1 phr Trigonox HM + 1.0 phr Accerelator NL-49P	40 min
2 phr Trigonox HM + 1.0 phr Accelerator NL-49P	32 min

Pot lives at 20°C

1 phr Trigonox HM	17 hours
2 phr Trigonox HM	10 hours

* phr = parts per hundred resin

Cure of 1 mm laminates at elevated temperatures

1 mm laminates have been made with a 450g/m^2 glass chopped strand mat. The glass content in the laminate is 30% (w/w).

The following parameters were determined:
- Time-temperature curve
- Barcol 934-1 hardness and the residual styrene content after a cure time of time to peak plus 10 minutes.

Cure temperature 70°C

	Gel time min.	Time to Peak min.	Peak exotherm °C
1 phr Trigonox HM	2.8	7.5	109
1 phr Trigonox HM + 1 phr Acc. NL-49P	1.5	4.2	120

	Barcol 934-1	Res. styrene %
1 phr Trigonox HM	35	5.8
1 phr Trigonox HM + 1 phr Acc. NL-49P	42	3.4

Cure temperature 100°C

	Gel time min.	Time to Peak min.	Peak exotherm °C
1 phr Trigonox HM	0.7	3.5	162
1 phr Trigonox HM + 1 phr Acc. NL-49P	0.8	4.0	147

	Barcol 934-1	Res. styrene %
1 phr Trigonox HM	46	2.6
1 phr Trigonox HM + 1 phr Acc. NL-49P	45	2.9

Time-temperature curves at elevated temperatures

Time-temperature curves have been determined with 25 grams of UP resin at 100°C and 150°C to demonstrate the use of Trigonox HM as kicker in pultrusion applications.

From the curves the time to peak exotherm was calculated as an indication for the cure speed.

	Time to Peak exotherm at 100°C min.	at 150°C min.
1 phr Trigonox 22-B50	7.7	2.6
1 phr Trigonox 22-B50 + 1 phr Trigonox HM	3.7	1.7
1 phr Trigonox C	13.5	3.0
1 phr Trigonox C + 1 phr Trigonox HM	3.8	1.8

Recommended Handling Procedures and First Aid

Protective equipment and handling instructions

- Use safety goggles or face shield and gloves.
- Extra ventilation recommended.
- Use clean equipment and tools of inert material, such as stainless steel,
  polyethylene, glass.
- All equipment should be earthed.
- Do not pipet by mouth.
- Avoid contact with rust.
- Never bring peroxide into direct contact with accelerators.
- Never weigh out in the storage room

Storage conditions

Keep container tightly closed in a well-ventilated place. Temperature max. +25°C. Keep away from reducing agents e.g. amines, acids, alkalis, heavy metal compounds (e.g. accelerators, driers, metal soaps). Never weigh out in the storage room.

Storage stability

Only when stored under these recommended storage conditions, the product will remain within the Akzo Nobel specifications for a period of at least three months after delivery.

Fire fighting

Extinguish a small fire with powder or carbon dioxide; then apply water to prevent re-ignition. Extinguish a big fire with large amounts of water, applied from a safe distance.

Spillage

Mix with e.g. vermiculite. Sweep up with dustpan and brush of inert material, flush the remainder with water. Remove the waste to a safe place. The waste should NOT be confined.

Disposal

According to local regulations.

Spillage on clothes

Remove contaminated clothes. Examine skin. If skin contact, wash or shower; apply a lanolin-based ointment. Launder clothes normally.

Eye contact

Rinse with plenty of water for at least 15 minutes. Seek medical advice.

Skin contact

Wash with plenty of water (and soap) or shower, afterwards apply a lanolin-based ointment. Seek medical advice.

Ingestion

Rinse mouth. Give water to drink. Seek medical advice. Do NOT induce vomiting.

Inhalation

Move to fresh air, rest, half-upright position. Loosen clothing. Seek medical advice.

For more detailed information reference can be made to the SDS of this product.

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