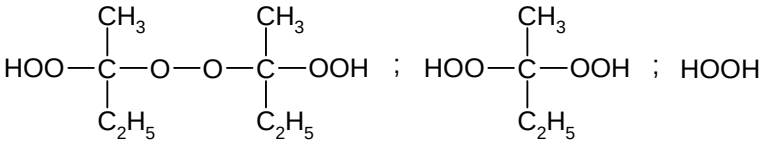
AkzoNobel
Tomorrow's Answers Today

Butanox® M-60

Product description

Methyl ethyl ketone peroxide, solution in dimethyl phthalate



CAS No.	: 1338-23-4
EINECS/ELINCS No.	: 215-661-2
TSCA status	: listed on inventory

Specifications

Appearance	: Clear red liquid
Total active oxygen	: 9.8-10.0%

Characteristics

Density, 20°C	: 1.170 g/cm^3
Viscosity, 20°C	: 25 mPa.s

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, AkzoNobel recommends a maximum storage temperature (T_s max.) for each organic peroxide product.

For *Butanox* M-60 T_s max. = 25°C

When stored under the recommended storage conditions, *Butanox* M-60 will remain within the AkzoNobel specifications for a period of at least 3 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 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.

For *Butanox* M-60 SADT : 60°C

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

Carbon dioxide, water, acetic acid, formic acid, propionic acid, methyl ethyl ketone.

Packaging and transport

The standard packaging is a 30 l HDPE can (Nourytainer®) for 30 kg peroxide solution.

In Asia Pacific the standard packaging is a 30 l HDPE can for 20 kg peroxide solution.

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

Butanox M-60 is classified as Organic peroxide type D; liquid; Division 5.2; UN 3105; PG II.

Applications

Butanox M-60 is a general purpose methyl ethyl ketone peroxide (MEKP) for the curing of unsaturated polyester resins in the presence of a cobalt accelerator at room and elevated temperatures. *Butanox* M-60 is a 10% higher concentrated version of *Butanox* M-50.

The curing system *Butanox* M-60/cobalt accelerator is particularly suitable for the curing of gelcoat resins, laminating resins, lacquers and castings; moreover the manufacture of light resistant parts may be possible contrary to the curing system benzoyl peroxide/amine accelerator.

Practical experience throughout many years has proven that by the guaranteed low water content and the absence of polar compounds in *Butanox* M-60, this peroxide is very suitable in GRP products for e.g. marine applications.

For room temperature application it is necessary to use *Butanox* M-60 together with a cobalt accelerator (e.g. Accelerator NL-49P).

Dosage

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

Butanox M-60	1 - 4 phr*
Accelerator NL-49P	0.5 - 3 phr

* phr = parts per hundred resin

Cure Characteristics

In a high reactive standard orthophthalic resin in combination with Accelerator NL-49P (= 1% cobalt) the following application characteristics were determined:

Gel times at 20°C

2 phr *Butanox* M-60 + 0.5 phr Acc. NL-49P	10 minutes
2 phr *Butanox* M-50 + 0.5 phr Acc. NL-49P	12 minutes
2 phr *Butanox* M-60 + 1.0 phr Acc. NL-49P	6 minutes
2 phr *Butanox* M-50 + 1.0 phr Acc. NL-49P	7 minutes

Cure of 1 mm pure resin layer at 20°C

The speed of cure is expressed as the time to reach a Persoz hardness of respectively 30, 60 and 120 s.

Persoz:	30	60	120	s
2 phr *Butanox* M-60 + 0.5 phr Acc. NL-49P	2.2	3.8	12	h
2 phr *Butanox* M-50 + 0.5 phr Acc. NL-49P	2.4	4.1	13	h
2 phr *Butanox* M-60 + 1.0 phr Acc. NL-49P	1.3	2.5	9	h
2 phr *Butanox* M-50 + 1.0 phr Acc. NL-49P	1.7	3.0	9.5	h

Cure of 4 mm laminates at 20°C

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

The following parameters were determined:
- Time-temperature curve.
- Speed of cure expressed as the time to achieve a Barcol hardness (934-1) of 0-5 and 25-30 respectively.
- Residual styrene content after 24 h at 20°C and a subsequent postcure of 8 h at 80°C.

	Gel time min.	Time to Peak min.	Peak exotherm °C
2 phr *Butanox* M-60 + 0.5 phr Acc. NL-49P	13	33	50
2 phr *Butanox* M-50 + 0.5 phr Acc. NL-49P	13	36	44
2 phr *Butanox* M-60 + 1.0 phr Acc. NL-49P	7	23	71
2 phr *Butanox* M-50 + 1.0 phr Acc. NL-49P	8	26	64

	Barcol		Res. styrene	
	0-5	25-30	24 h 20°C	+ 8 h 80°C
	h	h	%	%
2 phr *Butanox* M-60 + 0.5 phr Acc. NL-49P	2	13	5.7	0.3
2 phr *Butanox* M-50 + 0.5 phr Acc. NL-49P	3	15	6	0.3
2 phr *Butanox* M-60 + 1.0 phr Acc. NL-49P		<1	4.7	0.1
2 phr *Butanox* M-50 + 1.0 phr Acc. NL-49P		1	5	0.1

Pot life at 20°C

Pot lives were determined of a mixture of *Butanox* M-60 and a non-preaccelerated UP resin at 20°C.

2 phr *Butanox* M-60	10 h
4 phr *Butanox* M-60	6 h

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