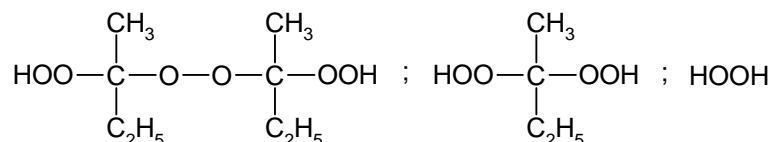




Butanox[®] M-60

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/cm³
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:

| | |
|---------------------|------------------------|
| <i>Butanox M-60</i> | 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 <i>Butanox</i> M-60 + 0.5 phr Acc. NL-49P | 10 minutes |
| 2 phr <i>Butanox</i> M-50 + 0.5 phr Acc. NL-49P | 12 minutes |
| 2 phr <i>Butanox</i> M-60 + 1.0 phr Acc. NL-49P | 6 minutes |
| 2 phr <i>Butanox</i> 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 <i>Butanox</i> M-60 + 0.5 phr Acc. NL-49P 2.2 | 3.8 | 12 | | h |
| 2 phr <i>Butanox</i> M-50 + 0.5 phr Acc. NL-49P 2.4 | 4.1 | 13 | | h |
| 2 phr <i>Butanox</i> M-60 + 1.0 phr Acc. NL-49P 1.3 | 2.5 | 9 | | h |
| 2 phr <i>Butanox</i> 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/m² 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 <i>Butanox</i> M-60 + 0.5 phr Acc. NL-49P | 13 | 33 | 50 |
| 2 phr <i>Butanox</i> M-50 + 0.5 phr Acc. NL-49P | 13 | 36 | 44 |
| 2 phr <i>Butanox</i> M-60 + 1.0 phr Acc. NL-49P | 7 | 23 | 71 |
| 2 phr <i>Butanox</i> M-50 + 1.0 phr Acc. NL-49P | 8 | 26 | 64 |

| | Barcol 0-5 | Barcol 25-30 | Res. styrene 24 h 20°C | Res. styrene + 8 h 80°C |
|---|------------|--------------|------------------------|-------------------------|
| | h | h | % | % |
| 2 phr <i>Butanox</i> M-60 + 0.5 phr Acc. NL-49P | 2 | 13 | 5.7 | 0.3 |
| 2 phr <i>Butanox</i> M-50 + 0.5 phr Acc. NL-49P | 3 | 15 | 6 | 0.3 |
| 2 phr <i>Butanox</i> M-60 + 1.0 phr Acc. NL-49P | <1 | | 4.7 | 0.1 |
| 2 phr <i>Butanox</i> 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 <i>Butanox</i> M-60 | 10 h |
| 4 phr <i>Butanox</i> M-60 | 6 h |

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