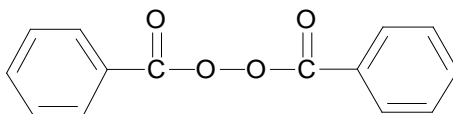


Product Data Sheet

Perkadox[®] GB-50X

Product description Dibenzoyl peroxide, powder, 50% in proprietary (phthalate-free) carrier with free flowing characteristics



CAS No.	: 94-36-0
EINECS/ELINCS No.	: 202-327-6
TSCA status	: not listed on inventory

Specifications	Appearance	: white free flowing powder
	Assay	: 48.0-50.0%

Characteristics	Bulk density	: 0.610 g/cm ³
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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 *Perkadox* GB-50X T_s max. = 25°C

When stored under these recommended storage conditions, *Perkadox* GB-50X will remain within the AkzoNobel specifications for a period of at least one year 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 *Perkadox* GB-50X SADT : 55°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, benzene, benzoic acid, diphenyl, phenylbenzoate

Packaging and transport

The standard packaging is a non-returnable cardboard box for 25 kg net.

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

Perkadox GB-50X is classified as Organic peroxide type D, solid; Division 5.2; UN 3106.

Safety and handling

Keep containers tightly closed. Store and handle *Perkadox* GB-50X 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 *Perkadox* GB-50X. This information should be thoroughly reviewed prior to acceptance of this product.

The SDS is available at polymerchemistry.akzonobel.com.

Applications

Perkadox GB-50X is a non-caking, fine, granular powder with excellent free flowing properties containing 50% dibenzoyl peroxide. *Perkadox* GB-50X is used for the curing of unsaturated polyester resins and (meth)acrylic resins at ambient and elevated temperatures. At temperatures up to 80°C, *Perkadox* GB-50X should be used in combination with an aromatic tertiary amine accelerator. Above 80°C the use of an accelerator is not required.

Perkadox GB-50X is easy to handle, easy to disperse and dissolves very quickly in unsaturated polyester resins and (meth)acrylic resins. *Perkadox* GB-50X does not dissolve clearly in the resin system and is therefore not applicable for the production of cured parts when a high degree of transparency is required. For these applications, *Perkadox* GB-50L is advised.

The curing system *Perkadox* GB-50X/amine accelerator shows a very fast cure that is hardly influenced by humidity and fillers. Even at low temperatures a relatively good cure will be obtained. A disadvantage may be the yellow colour and poor light resistance of the moulded product.

For curing at ambient temperature the following amine accelerators are available to adjust the gel time and speed of cure of the cure system based on *Perkadox* GB-50X:

- Accelerator NL-65-100 (N,N-Dimethyl-p-toluidine) for short gel times
- Accelerator NL-67 (Ethoxylated-p-toluidine) for medium gel times
- Accelerator NL-64-100 (N,N-Diethyl aniline) for long gel times

* phr = parts per hundred resin

Dosing

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

<i>Perkadox</i> GB-50X	2 - 5 phr*
Amine accelerator	0.05 - 0.5 phr

Cure Characteristics

In a **high reactive standard orthophthalic polyester resin** the following application characteristics were determined.

Geltime clear resin at 20°C (Gelnorm)

UP resin	100	100	100	100	100
<i>Perkadox</i> GB-50X	3.0	3.0	3.0	3.0	3.0
Accelerator NL-64-100	0.1	0.5			
Accelerator NL-65-100			0.05	0.1	0.4
Gel time (minutes)	160	20	20	5	1

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
3 phr <i>Perkadox</i> GB-50X + 0.5 phr Acc. NL-64-100			0.5	1 h
3 phr <i>Perkadox</i> GB-50X + 0.05 phr Acc. NL-65-100	1		2.5	14 h
3 phr <i>Perkadox</i> GB-50X + 0.1 phr Acc. NL-65-100				0.5 h

Cure of 4 mm laminates at 20°C

4 mm laminates have been made with 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 (SPI method)
- Speed of cure expressed as the time to achieve Barcol hardness (934-1) of 0-5 and 25.
- Residual styrene content after 24h at 20°C and a subsequent post cure of 8 h at 80°C.

	Gel time (min.)	Time to Peak (min.)	Peak exotherm (°C)	Barcol		Res. styrene	
				0-5	25	24 h 20°C	+8 h 80°C
				h	h	%	%
3 phr <i>Perkadox</i> GB-50X + 0.5 phr Acc. NL-64-100	21	26	140				
3 phr <i>Perkadox</i> GB-50X + 0.05 phr Acc. NL-65-100	28	35	64				
3 phr <i>Perkadox</i> GB-50X + 0.5 phr Acc. NL-64-100		<<1	2.9				
3 phr <i>Perkadox</i> GB-50X + 0.05 phr Acc. NL-65-100	1	8.5	6.6				

In a **medium** reactive **standard orthophthalic polyester resin** the following application characteristics were determined.

Geltime clear resin at 20°C (Gelnorm)

3 phr Perkadox GB-50X + 0.15 phr Accelerator NL-67 15 minutes

Cure of 4 mm laminates at 20°C

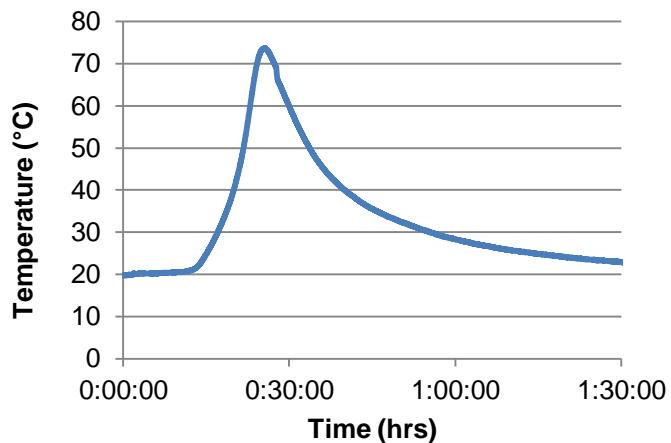
4 mm laminates have been made with 450 g/m² glass chopped strand mat. The glass content in the laminates is 30% (w/w).

The following parameters were determined:

- Time-temperature curve (SPI method)
- Speed of cure expressed as the time to achieve Barcol hardness (934-1) of 25.
- Residual styrene content after 24h at 20°C

	Gel time (min.)	Time to Peak (min.)	Peak exotherm (°C)
3 phr <i>Perkadox</i> GB-50X + 0.15 phr Acc. NL-67	16	26	74
	Barcol 25 h	Res. styrene 24 h, 20°C %	
3 phr <i>Perkadox</i> GB-50X + 0.15 phr Acc.NL-67	1	3.3	

Graph 1. Time-temperature curve



In a **high reactive Bisphenol-A epoxy vinyl ester resin** the following application characteristics were determined.

Geltime clear resin at 20°C (Gelnorm)

3 phr *Perkadox* GB-50X + 0.15 phr Accelerator NL-67 11 minutes

Clear SPI reactivity data with different types of accelerators

	Gel time (min.)	Time to Peak (min.)	Peak exotherm (°C)
3 phr <i>Perkadox</i> GB-50X + 0.2 phr Acc. NL-64	29	39	150
3 phr <i>Perkadox</i> GB-50X + 0.2 phr Acc. NL-65	4	9	150
3 phr <i>Perkadox</i> GB-50X + 0.2 phr Acc. NL-67	8	15	164

Cure of 4 mm laminates at 20°C

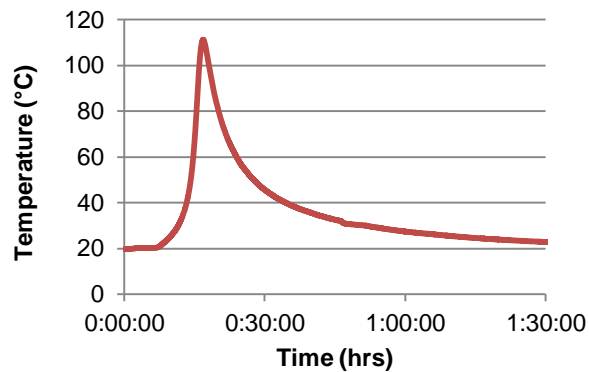
4 mm laminates have been made with 450 g/m² glass chopped strand mat. The glass content in the laminates is 30% (w/w).

The following parameters were determined:

- Time-temperature curve (SPI method)
- Speed of cure expressed as the time to achieve Barcol hardness (934-1) of 25.
- Residual styrene content after 24h at 20°C

	Gel time (min.)	Time to Peak (min.)	Peak exotherm (°C)
3 phr <i>Perkadox</i> GB-50X + 0.15 phr Acc. NL-67	10	17	111
	Barcol 25 h	Res. styrene 24 h, 20°C %	
3 phr <i>Perkadox</i> GB-50X + 0.15 phr Acc. NL-67	1	1.7	

Graph 1. Time-temperature curve



In a **standard methacrylate syrup** the following application characteristics were determined.

Cure time clear resin at 20°C (Gelnorm)

3 phr Perkadox GB-50X + 0.15 phr Accelerator NL-67 29 minutes

Time-temperature curve of a thin layer at 20°C (SPI-method)

	Cure time (min.)	Peak exotherm (°C)
3 phr <i>Perkadox</i> GB-50X + 0.15 phr Acc. NL-67	30	59

Pot life at 20°C

The pot life is determined of a mixture of *Perkadox* GB-50X and a non-pre-accelerated UP resin at 20°C.

3 phr <i>Perkadox</i> GB-50X	21 days
6 phr <i>Perkadox</i> GB-50X	11 days

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