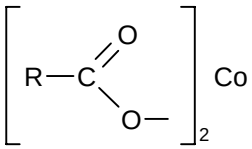
POLYMER CHEMICALS

Accelerator NL-49P

Product description

Cobalt(II) 2-ethylhexanoate, 1% Co, in aliphatic ester



Balance	:	90% TXIB, 4% mainly white spirit
CAS No.	:	136-52-7; 6846-50-0
Einecs	:	2052506; 2299349
TSCA	:	registered

Specification

Appearance	:	clear blue violet liquid
Cobalt content	:	1.00±0.05%

Physical properties

Density, 20°C	:	949 kg/m^3
Viscosity, 20°C	:	7 mPa.s

Safety characteristics

Flashpoint	:	89°C (COC)
Auto ignition temperature	:	not determined

Solubility

Insoluble in water. Soluble in various organic solvents.

Hazardous reactions

Might react violently with organic peroxides. It is therefore not allowed to store or transport the product together with peroxides. NEVER BRING AN ACCELERATOR INTO DIRECT CONTACT WITH PEROXIDES!

Major decomposition products

In a fire, Cobalt oxides and carbonmonoxide may be formed.

Toxicological data

LD 50, acute oral (rat)	:	>2000 mg/kg
Eye irritation	:	Non-irritating
Primary skin irritation	:	Moderately irritating
Ames test	:	Not mutagenic

Packaging

Standard packaging size for Accelerator NL-49P is 25 kg net.
Smaller packaging size available on request.

Application

The curing of unsaturated polyester resins at ambient temperatures can in general not be performed by an organic peroxide alone. The radical formation, which is necessary to start the polymerization reaction, is at ambient temperatures with most generally applied organic peroxides too slow. To speed up the radical formation in a controllable way organic peroxides must therefore be used in combination with a so-called accelerator.

For ketone peroxides like methyl ethyl ketone peroxides, cyclohexanone peroxides and acetylacetone peroxide a cobalt accelerator must be used.

For this purpose the following formulations of cobalt 2-ethylhexanoate also called cobalt octoate are available:

Accelerator NL-49P	1% cobalt in aliphatic ester
Accelerator NL-51P	6% cobalt in aliphatic ester
Accelerator NL-53	10% cobalt in white spirit

The reactivity of the various cobalt accelerators is directly correlated with the cobalt content.
The use of a lower concentrated version increases the dosage accuracy. However, when the dosage level of e.g. Accelerator NL-49P must be higher than approx. 3% to achieve the required cure performance, it is advised to use a higher concentrated cobalt accelerator e.g. 0.5% Accelerator NL-51P.

The cure characteristics of an unsaturated polyester resin/ketone peroxide mixture can, apart from the choice of the ketone peroxide, very effectively be influenced by the dosage level of the cobalt accelerator. The dosage level of the cobalt accelerator expressed as Accelerator NL-53 (10% cobalt) can for this purpose be varied between e.g. 0.025% up to approximately 0.6% calculated on the UP resin.

When the right peroxide has been chosen and still the required gel time and cure characteristics can not be obtained with the cobalt accelerator alone, it is possible to increase the reactivity of the cobalt accelerator by the extra addition of a promoter like Accelerator NL-63-100 (N,N-Dimethylaniline) or Promotor D (N,N-Diethylacetoacetamide).

This adaptation of the accelerator system may be necessary when:
- a very short gel time and/or a very fast cure is required e.g. for resin transfer molding or the production of polymer concrete
- highly inhibited and/or low reactive resins must be cured e.g. bisphenol A/fumarate and vinylester resins.

The cure system ketone peroxide/cobalt accelerator can further be characterized by:
- the relatively low color, related to the cobalt dosage, of the cured molding
- a very good UV light resistance of the molded parts
- the long pot life of the cobalt accelerator in the polyester resin

A possible disadvantage may be that the cure system is more sensitive for moisture, pigments and fillers than the cure system dibenzoyl peroxide/ amine accelerator.

Cobalt accelerators can also be used to increase the reactivity of organic peresters, which are applied for the cure of unsaturated polyester resins at elevated temperatures. Moreover, the use of a cobalt accelerator gives in general a lower residual styrene content in the cured molding. For this application peresters like Trigonox® C, Trigonox 21 and the special mixtures Trigonox 42PR and Trigonox 93 can be used.

Dosage

Depending on working conditions the following accelerator dosage level is recommended:

Accelerator NL-49P 0.25 - 3.0 phr*

Cure characteristics

In the following cure experiments the performance of cobalt 2-ethylhexanoate as accelerator will be demonstrated.

Gel times at 20°C

- in a standard orthophthalic resin with various ketone peroxides

	Accelerator NL-49P (phr)		
	0.25	0.5	1
2 phr Butanox® M-60	22	12	7
2 phr Butanox LPT	65	31	20
2 phr Cyclonox® LE-50	20	11	6
2 phr Trigonox 44B	24	14	8

- in various resins with Accelerator NL-63-100 as promoter

standard orthophthalic resin

2 phr Butanox M-60 + 1 phr Acc. NL-49P	7 min.
2 phr Butanox M-60 + 1 phr Acc. NL-49P + 0.05 phr Acc. NL-63-100	4 min.
2 phr Butanox M-60 + 1 phr Acc. NL-49P + 0.10 phr Acc. NL-63-100	2 min.
2 phr Trigonox 44B + 1 phr Acc. NL-49P	8 min.
2 phr Trigonox 44B + 1 phr Acc. NL-49P + 0.05 phr Acc. NL-63-100	5 min.
2 phr Trigonox 44B + 1 phr Acc. NL-49P + 0.10 phr Acc. NL-63-100	3 min.

bisphenol A/fumarate resin

2 phr Butanox LPT + 3 phr Acc. NL-49P	145 min.
2 phr Butanox LPT + 3 phr Acc. NL-49P + 0.05 phr Acc. NL-63-100	65 min.
2 phr Butanox LPT + 3 phr Acc. NL-49P + 0.10 phr Acc. NL-63-100	34 min.

bisphenol A/vinylester resin

2 phr Butanox LPT + 3 phr Acc. NL-49P	32 min.
2 phr Butanox LPT + 3 phr Acc. NL-49P + 0.05 phr Acc. NL-63-100	22 min.
2 phr Butanox LPT + 3 phr Acc. NL-49P + 0.10 phr Acc. NL-63-100	16 min.

* phr = parts per hundred resin

Time-temperature curves at elevated temperatures (70°C and 90°C)

	Cure temp. °C	Gel time min.	Time to Peak min.	Peak exotherm °C
1 phr Trigonox 21	70	9	16	233
1 phr Trigonox 21 + 1 phr Acc. NL-49P	70	3	5	214
1 phr Trigonox 21	90	1	6	258
1 phr Trigonox 21 + 1 phr Acc. NL-49P	90	0.3	1.5	240
1 phr Trigonox C	90	9	25	236
1 phr Trigonox C + 1 phr Acc. NL-49P	90	2	6	258

Pot life at 20°C

The pot life has been determined of Accelerator NL-49P in a standard orthophthalic polyester resin at 20°C.

1 phr Accelerator NL-49P >6 months

Recommended Handling Procedures and First Aid

Protective equipment and handling instructions	- Use safety goggles or face shield and gloves. - No sparks, no open flames, equipment should be earthed. - Protective clothing is advised. - Never bring peroxide into direct contact with accelerators.
Storage conditions	Closed original containers. Ambient temperatures. Well ventilated room. Keep away from organic peroxides.
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 six months after delivery.
Fire fighting	Extinguish with powder, foam, BCF extinguishing media, water mist or carbon dioxide. Keep undamaged containers cool with water.
Spillage	Collect as much as possible in a clean container for (preferably) reuse or disposal. Mix the remainder with an absorbent (e.g. vermiculite). Flush the rest with water. Avoid contact. Avoid ignition.
Disposal	According to local regulations.
Spillage on clothes	Remove contaminated clothing immediately. In case of skin contact wash or shower with water and soap. Launder clothes normally.
Eye contact	Rinse with plenty of water.
Skin contact	Wash immediately with plenty of (soap and) water or shower.
Ingestion	Rinse mouth, give plenty of water to drink. Do NOT induce vomiting. In serious cases seek medical advice.
Inhalation	Move to fresh air. In serious cases: rest, half upright position, loosen clothing, seek medical advice.

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

AKZO NOBEL

Akzo Nobel Polymer Chemicals bv
P.O. Box 247
3800 AE Amersfoort
The Netherlands

Telephone +31 33 467 67 67
Telefax +31 33 467 61 26

www.polymerchemicals.com