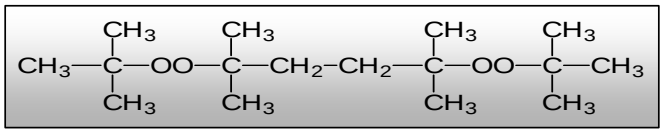
VAROX® DBPH Emulsion

A Peroxide Accelerator for Water-based Polymers



Chemical Name: 2,5-dimethyl-2,5-di(t-butylperoxy)hexane
Peroxide Class: Dialkyl
CAS No: 78-63-7
Molar Mass: 290.5 g/mol
Properties: Liquid, 50% aqueous emulsion

Description

White liquid, consisting of an emulsion of 2,5-dimethyl-2,5-di-(t-butylperoxy) hexane in water. This dialkyl peroxide can be used as an initiator (radical source) in the crosslinking of water-based polymers such as natural rubber latex and Neoprene liquid dispersions.

Product Data

Physical Properties	
Appearance	White to off-white liquid
Assay, %, min.	46.0
pH, neat sample	7.5 – 9.5
Half Life: 10 hrs/1 hr/1 min (0.1 benzene)	120/142/190ºC
Critical Temperature for pure peroxide (SADT)	Approximately 90ºC
Cold Storage Stability	Freezing point below 10ºC
Recommended Storage Temperature	10 to 30ºC
Storage Stability from Date of Delivery	6 months
Major Decomposition Products (hyp)	methane; acetone; tert butyl alcohol; tert amyl alcohol; ethane; 2,5-dihydroxy-2,5-dimethylhexane
Minor Decomposition Products (hyp)	isobutene; isobutene oxide; ethane; 2-methyl-3-butyn-2-ol; 2-butanone; methyl vinyl ketone; 2,5-hexanedione

Table 1: Physical Properties

Recommended Use Level

For most applications, 0.5-2.0 dry phr of **VAROX DBPH Emulsion** should be sufficient.

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The Use of Organic Peroxides in Latex

When polymers are crosslinked by peroxides, carbon to carbon bonds are formed between individual polymer chains. The C-C bond is stronger and more thermally stable than the S-S bond formed by elemental sulfur vulcanization. The use of a sulfur donor system will primarily form C-S type bonds, whose thermal stability falls between those of S-S and C-C bonds. Due to the higher strength of the covalent C-C bond network, peroxide curing is the preferred crosslinking method to obtain optimum thermal stability.

	Elemental Sulfur	Sulfur Donor	Peroxide
Crosslink Bond Energy, kJ	155-270 kJ	285 kJ	350 kJ

Table 2: A Comparison of Three Standard Cure Systems

Decomposition rates of organic peroxides are reported as “half-life time” and “half-life temperature”. The half-life time of a peroxide at any specified temperature is the time in which 50% of the peroxide has decomposed. Correspondingly, the half-life temperature at any specific time is the temperature at which 50% of the peroxide has decomposed. Table 3 shows how the number of half-lives correlates to the percentage of decomposed peroxide.

Number of Half-Lives	Percentage of Decomposed Peroxide
0	0
1	50
2	75
3	87.5
4	93.75
5	96.9
6	98.4
7	99.2
8	99.6
9	99.8
10	99.9

Table 3: Half-Lives vs. Percentage of Decomposed Peroxide

Since crosslinking is directly related to the amount of decomposed peroxide, at least 6 to 10 half-lives of peroxide decomposition are recommended for crosslinking operations.

Until recently only sulfur-based cure systems were widely available to the latex industry. **VAROX DBPH Emulsion** allows for the use of peroxides in the crosslinking of latex. This peroxide can be used in either open air environments (additional additives are required) or in closed systems (RTV patent pending), without exhibiting the surface tackiness that is often associated with the use of peroxides in an open air cure.

FDA Compliance: Peroxides in Indirect Food Additives

VAROX® DBPH is listed in FDA regulations covering polymers, resins, paper products, coatings or adhesives intended for food packaging or food-contact applications.

Commercial Name	21 CFR (FDA)	Limitations[1]
VAROX DBPH	§177.1520(b)	For use as an initiator in the production of propylene homopolymer complying with §177.1520(c), Item 1.1 and olefin copolymers complying with §177.1520(c), Items 3.1 and 3.2 and containing not less than 75 weight percent of polymer units derived from propylene, provided that the maximum concentration of tert-butyl alcohol in the polymer does not exceed 100 parts per million, as determined by an FDA method titled "Determination of tert-Butyl Alcohol in Polypropylene."
	§177.2600I(4)(ii)(b)	For use as a vulcanization accelerator in rubber articles for repeated contact with food; total vulcanization accelerators not to exceed 1.5 percent by weight of rubber product.

[1] The limitations listed in this summary are those applied by the regulation to the specific organic peroxide. Some regulations impose additional limitations on finished products, such as the maximum quantity of material that may be extracted. Please consult the individual regulations for further information.

Additional information is available at www.rtvanderbilt.com. 11/10