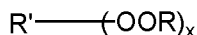


Safety. Inspired.

INTRODUCTION

Dialkyl peroxides (also called di-tertiary alkyl) are organic compounds that have the following general formula:

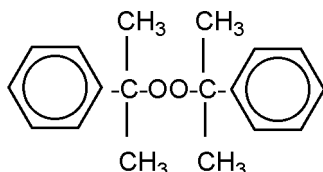
These peroxides have the following general structure:



Where R' and R are alkyl or substituted alkyl groups and x is 1 or 2. They are among the most stable of all the commercially available organic peroxides.

The free radicals generated from dialkyl peroxide decomposition are efficient for **crosslinking** and **modification** of polyolefins (polyethylene, ethylene-vinyl acetate and polypropylene); **vulcanizing agents** for elastomers (ethylene propylene copolymers and terpolymers); **curing agents** for polyester resins; **initiators** in bulk, and suspension vinyl polymerizations and as **synergists** for flame retardant polymers.

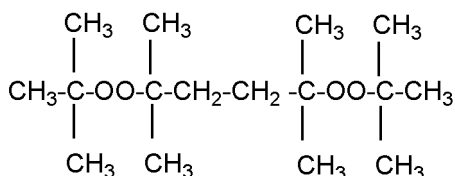
The most common monofunctional di-tertiary alkyl peroxide is dicumyl peroxide, Luperox[®] DCP:



For the most common difunctional di-tertiary alkyl peroxides:

X = 2
R = t-alkyl
R' = t-alkyl diradical

Such as Luperox[®] 101:



X = 2 R = t-butyl R' = di-t-alkyl diradical

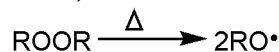
COMMERCIAL PRODUCTS

Specifications and typical physical properties for all commercially available di-tertiary alkyl peroxides are illustrated in **Table 1**. Storage, packaging and shipping information is provided in **Table 3**.

REACTIONS OF DIALKYL PEROXIDES

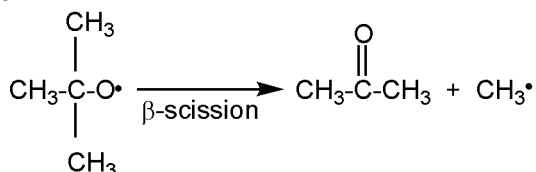
Primary Reaction

When subjected to heat, dialkyl peroxides decompose homolytically (first order) into two free radicals:



Secondary Reaction

Tertiary alkoxy radicals (RO•) can undergo further fragmentation (e.g. β-scission) to form ketones and alkyl radicals:

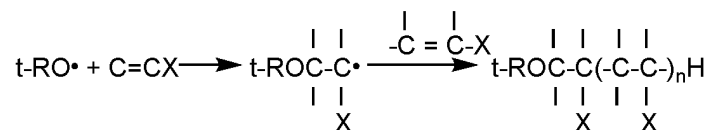
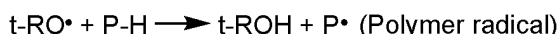


t-butoxy radical acetone + methyl radical

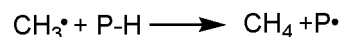
Radicals produced by either primary or secondary reactions initiate the desired free radical reaction.

DECOMPOSITION PRODUCTS

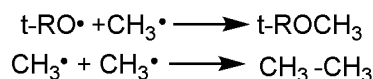
The products obtained from the thermolytic decomposition of dialkyl peroxides depend upon the nature of the peroxide and the decomposition environment. The alkoxy radicals from the primary reaction can abstract hydrogens (from polymer backbones, solvent or monomers) to form t-alkyl or alkyl alcohols or they can add to double bonds (e.g. vinyl monomers) to form t-alkyl ether radicals which react further to form t-alkyl ethers or polymers with t-alkoxy end groups:



Two polymer radicals can couple to form a crosslink bond. The alkyl radicals from the secondary reaction can react in a similar manner to form alkanes by hydrogen abstraction or polymers by addition to vinyl monomers:

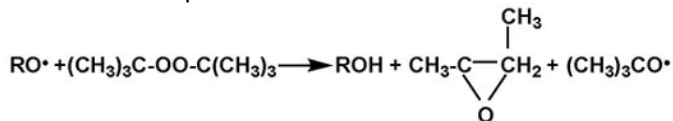


The alkyl radicals can couple with t-alkoxy radicals to form t-alkyl alkyl ethers or with other alkyl radicals to form alkanes:



The secondary reaction (β -Scission) is favored by higher temperatures and environments with poor radical scavenging abilities (e.g. monomer starved).

In highly peroxide concentrated environments, radicals can attack undecomposed peroxide resulting in a radical induced decomposition:



LUPEROX[®] SP and SP2 SCORCH PROTECTION

The susceptibility of organic peroxides to prematurely crosslink (i.e. scorch) during compounding is a major concern to the elastomer/crosslinking industry.

Arkema Inc. has developed new technology which allows increased scorch protection during the compounding process. This technology also allows the utilization of lower temperature peroxides for elastomer and crosslinking applications. Thus cure times can be reduced to increase productivity without sacrificing process ability.

This new scorch resistant technology has been incorporated into our new scorch protected organic peroxides (Luperox[®] SP and SP2 Series).

HALF-LIFE DATA

Half-life can be defined as the time required at a specific temperature, to affect a loss of one-half of the peroxide's active oxygen content. Because the efficiency of a free radical initiator depends heavily upon its rate of decomposition, half-life data can be a useful guide in selecting the optimum initiator for a specific application.

Several factors apply to half-life data obtained in dilute solution: (a) use only applies to thermolytic decomposition and (b) half-life can vary in different solvents due to induced decomposition if no radical scavenger is present. In the presence of monomer, induced decomposition becomes relatively insignificant, and first order kinetics are observed in most cases.

Published half-life data are only approximations of observed polymerization kinetics, and serve as comparisons between initiators in similar systems.

Table 2 lists these products along with values for activation energy and temperatures calculated to produce one and ten hour half-life values in the given solvents. **Table 5** shows an example for the Luperox[®] DCP spread sheet. The decomposition spread sheets, in addition to providing half-life information, enable the user to determine % residual peroxide at various time/temperature intervals.

LUPEROX[®] MASTERBATCHES

A masterbatch is a uniform dispersion of additives and/or peroxides in a polymeric or rubber medium. The active component, e.g. peroxide, in a masterbatch is generally much higher in concentration as compared to the final rubber compound. Our Luperox[®] Masterbatches e.g. Luperox[®] DC40MG and DC40MF; Luperox[®] F40MG and F40MF, offer the rubber and cable industry an easy way to add organic peroxides to a rubber or polymer compound with confidence and accuracy. Luperox[®] Masterbatches allow the manufacturer to prepare ready to crosslink compounds containing precise concentrations of various dialkyl type peroxides. The ability to maintain accurate peroxide concentrations from batch to batch is essential to the total quality of the final crosslinked product and manufacturing operation.

STORAGE

Facilities – Dialkyl peroxides should be stored in a cool (<100°F) place, separated from the manufacturing area, away from other combustible materials, and in accordance with the labeling designed for each specific package. Storage buildings should be well ventilated.

Storage Temperatures – To minimize loss of active oxygen, dialkyl peroxides should be stored below 100°F.

Shelf-Life – Properly stored dialkyl peroxides have a shelf-life of at least one year. All containers of dialkyl peroxides should be dated upon receipt and either used or disposed of within twelve months.

Melt Bin Containers – This 458 gallon container is a stainless steel package designed for repeated use. Specific handling and use information is available upon request. (Melt Bin containers are currently being used for Luperox[®] DCP and Luperox[®] F product packaging.)

HANDLING PRECAUTIONS

Containers (other than Melt Bins) – Dialkyl peroxides should be stored in their original container. Drain containers completely and flush with a suitable solvent, such as odorless mineral spirits, before discarding. Render the containers nonusable. Never allow residual peroxide to remain undiluted in discarded containers.

Materials of Construction – Materials of construction in contact with dialkyl peroxides should generally be limited to inert materials like polyethylene, Teflon[®], nylon and Kel-F[®], reinforced plastics, Type 304 and 316 stainless steel or tantalum.

Flammability – Luperox[®] DI has a low flash point and its vapors are highly flammable, thus it must be handled as a

Flammable Liquid. All other dialkyl peroxides have relatively high flash points, but once ignited, burn

vigorously and are very difficult to extinguish. All dialkyl peroxides should be kept away from sources of heat and ignition such as radiators, steam pipes, direct rays of the sun, sparks and open flames.

Contamination – Care should be taken to avoid all forms of contamination with peroxides. Strong mineral acids, metal salts and oxidizing and reducing agents are substances that especially need to be avoided.

Static Electricity – When handling dialkyl peroxides, generally accepted methods of reducing static electricity, e.g. grounding of equipment, shortening freefall of material, etc. are recommended.

Fire – If a small fire occurs, class B type extinguishers (dry chemical foam or carbon dioxide) can be used. In case of a fire involving large quantities of dialkyl peroxides, the area should be evacuated and the fire fought with water spray or foam.

SPILLAGE and DISPOSAL

Small Quantities – If a small quantity of a dialkyl peroxide is spilled, an inert absorbent material should be used to soak up (liquids) or dilute the solid peroxide. The sweepings can then be disposed of by incineration.

Large Quantities – Larger quantities of dialkyl peroxides should be diluted to less than 1% active oxygen or less than 10% assay, whichever is lower with kerosene or Fuel Oil #2 and, subsequently burned in a suitable furnace or incinerator.

Provisions must be made for introducing the dilute peroxide solution into the furnace or incinerator as slowly as practicable. Dialkyl peroxides burned under these conditions will emit less air pollutants into the atmosphere since the peroxide is destroyed completely and effectively.

In any situation where doubts or questions exist, contact with an Arkema representative is recommended.

Note: Many peroxide formulations meet EPA criteria for Reactive Hazardous Wastes (Waste No. D003). Treatment or disposal of such formulations should only be performed by those with proper RCRA permits. See 40CFR Part 261.23.

TOXICITY

All the physiological effects have not been determined for dialkyl peroxides. The Material Safety Data Sheet for each peroxide should be reviewed for specific toxicity and health hazard information.

FIRST AID

Care should be exercised by all personnel handling dialkyl peroxides. Do not allow prolonged contact with skin. Inhalation of vapors or decomposition products emitted during processing should be avoided. In case of skin or eye contact with a dialkyl peroxide or its decomposition products, wash skin with plenty of soap and water, immediately flush eyes with water for at least 15 minutes and get medical attention. If swallowed, do not induce vomiting, call a physician.

SOLUBILITY

Dialkyl peroxides are soluble in most organic solvents and insoluble in water. Luperox[®] DCP and Luperox[®] F may have solubilities of less than 50% by weight in low molecular weight alcohols.

AVAILABILITY

Arkema manufactures dialkyl peroxides at its plants in Spinetta, Italy, Geneseo, New York and Crosby, Texas, servicing the U.S. and Canada and major ports and border crossings for export.

For additional information, pricing and the location of the nearest distributor, contact our Customer Service Department at:

Arkema, Inc.
Functional Additives Business Group
2000 Market Street
Philadelphia, PA 19103
Phone: 1.800.331.7654
Fax: 215.419.5455

FOOD AND DRUG ADMINISTRATION STATUS

The following dialkyl peroxides are listed in the Code of Federal Regulations: Title 21 "Food and Drugs" part 170 under "Food Additives."

| <u>Dialkyl Peroxide</u> | <u>Applicable Paragraphs</u> |
|--------------------------|--|
| Luperox [®] DI | 176.170, 177.2600 |
| Luperox [®] DCP | 175.300, 175.105 177.2600, 177.2420 |
| Luperox 101 | 177.2600, 177.1520 |

For literature, additional technical information or evaluation samples, visit our website at www.luperox.com or call our customer service at 1-800-331-7654.

TABLE 1 – PHYSICAL PROPERTIES OF DIALKYL PEROXIDES

| Chemical Name | Specifications | | | Physical Properties | | | | | | | | | | |
|---|--------------------|-------------|--------------------|----------------------|--------------------|-----------------------------------|----------------------|---------------------|--------------------------------|--|-------------------------------|------|------|------------------------|
| | Commercial Product | Assay % Wt. | Active Oxygen %Wt. | Form | Filler | Bulk Density Lbs./Ft ³ | Melt/Freeze Point °C | SADT °C (container) | Flash Point °F (°C) (open cup) | Specific Gravity (cm ³ at °C) | Viscosity in Centipoise at °C | | | Refractive Index at °C |
| | | | | | | | | | | | 20 | 30 | 40 | |
| Dicumyl Peroxide | Luperox DCP | ≥99.0 | ≥5.86 | Powder | None | NA | 41-43 | 91 (40# pail) | 171 (133) | 1.040 @ 20 | - | - | - | 1.5280 @ 48 |
| | Luperox DC40 | 38.0-42.0 | 2.25-2.49 | White Granules | CaCO ₃ | 50.6 | NA | (2) | >194 (>90) | 1.62 @ 20 | - | - | - | - |
| | Luperox DC40P | 39.5-41.5 | 2.34-2.46 | White Powder | CaCO ₃ | 49.9 | NA | (2) | >194 (>90) | 1.60 @ 20 | - | - | - | - |
| | Luperox DC40KE | 38.0-42.0 | 2.25-2.49 | White Granules | Clay | 49.3 | NA | (2) | >194 (>90) | 1.59 @ 20 | - | - | - | - |
| | Luperox DC40KEP | 39.5-41.5 | 2.34-2.46 | White Powder | Clay | 51.8 | NA | (2) | >194 (>90) | 1.56 @ 20 | - | - | - | - |
| | Luperox DC40MG | 39.5-41.5 | 2.34-2.46 | Pellets; Masterbatch | EPR ⁽¹⁾ | 36.2 | NA | (2) | >239 (>115) | 0.90 @ 25 | - | - | - | - |
| | Luperox DC40MF | 39.5-41.5 | 2.34-2.46 | Sheets; Masterbatch | EPR ⁽¹⁾ | NA | NA | (2) | >239 (>115) | 0.90 @ 25 | - | - | - | - |
| | Luperox DC40P-SP2 | 38.0-42.0 | 2.25-2.49 | Tan Powder | Clay | 51.8 | NA | (2) | >194 (>90) | 1.56 @ 20 | - | - | - | - |
| Di-t-butyl-peroxide | Luperox DI | 98.5 min | 10.8 min | Liquid | None | NA | <-40 | 80 (30# cube) | <30 (<-1) | 0.7923 @ 25 | .85 | .71 | .63 | 1.3850 – 1.3900 @ 25 |
| Di-t-amyl peroxide | Luperox DTA | 96.0 min | 8.81 min | Liquid | None | NA | <-40 | 75 (30# container) | 77 (25) | 0.818 @ 25 | 1.57 | 1.44 | 1.31 | 1.4059 @ 25 |
| α, α' Di(t-butyl peroxy)diisopropylbenzenes | Luperox F | ≥97.0 | ≥9.17 | Flakes | None | NA | 40-60 | 90 Estd'd | 253 (123) | 0.952 @ 25 | - | - | - | - |
| | Luperox F40 | 38.0-42.0 | 3.60-3.98 | White Granules | CaCO ₃ | 44.3 | NA | (2) | >194 (>90) | 1.63 @ 20 | - | - | - | - |
| | Luperox F40P | 39.5-41.5 | 3.74-3.93 | White Powder | CaCO ₃ | 42.5 | NA | (2) | >194 (>90) | 1.60 @ 20 | - | - | - | - |
| | Luperox F40KE | 38.0-42.0 | 3.74-3.93 | White Granules | Clay | 51.2 | NA | (2) | >194 (>90) | 1.50 @ 20 | - | - | - | - |
| | Luperox F40KEP | 39.5-41.5 | 3.74-3.93 | White Powder | Clay | 49.3 | NA | (2) | >194 (>90) | 1.48 @ 20 | - | - | - | - |
| | Luperox F40MG | 39.5-41.5 | 3.74-3.93 | Pellets; Masterbatch | EPR ⁽¹⁾ | 34.3 | NA | (2) | >212 (>100) | 0.90 @ 20 | - | - | - | - |
| | Luperox F40MF | 39.5-41.5 | 3.74-3.93 | Sheets; Masterbatch | EPR ⁽¹⁾ | NA | NA | (2) | >212 (>100) | 0.90 @ 20 | - | - | - | - |
| | Luperox F40M-SP | 38.0-42.0 | 3.60-3.98 | Off-White Pellets | EPR ⁽¹⁾ | NA | NA | (2) | 253 (>130) | 0.95 @ 25 | - | - | - | - |
| | Luperox F40P-SP2 | 38.0-42.0 | 3.60-3.98 | Off-White Powder | CaCO ₃ | NA | NA | 90 | >194 (>90) | 1.60 @ 20 | - | - | - | - |
| | Luperox MIX | 36.0-38.0 | 3.40-3.59 | Tan Paste | None | NA | 42 | 90 (412# drum) | >212 (>100) | 1.025 @ 45 | - | - | - | - |

(1) Ethylene Propylene Resin

 (2) Assumed to be similar to Luperox[®] DCP

NA – Not Applicable

TABLE 1 – PHYSICAL PROPERTIES OF DIALKYL PEROXIDES – continued

| Chemical Name | Specifications | | | Physical Properties | | | | | | | | | | |
|--|--------------------|-------------|--------------------|---------------------|-------------------|-----------------------------------|----------------------|---------------------|--------------------------------|--|-------------------------------|------|------|------------------------|
| | Commercial Product | Assay % Wt. | Active Oxygen %Wt. | Form | Filler | Bulk Density Lbs./Ft ³ | Melt/Freeze Point °C | SADT °C (container) | Flash Point °F (°C) (open cup) | Specific Gravity (cm ³ at °C) | Viscosity in Centipoise at °C | | | Refractive Index at °C |
| | | | | | | | | | | | 20 | 30 | 40 | |
| 2,5-dimethyl-2,5-Di-(t-butylperoxy) hexane | Luperox 101 | 93.0-95.0 | 10.25-10.47 | Liquid | - | - | 8 | 86 (30# cube) | 120 (49) | 0.8650 @ 25 | 6.52 | - | 3.37 | 1.4160 @ 25 |
| | Luperox 101XL45 | 45.0-48.0 | 4.96-5.29 | White Powder | CaCO ₃ | 38.6 | - | 82 (100# drum) | - | - | - | - | - | - |
| | Luperox 101SIL45 | 45.0-48.0 | 4.96-5.29 | White Powder | Silica | 0.417 | - | 82 (100# drum) | - | - | - | - | - | - |
| | Luperox 101PP20 | 19.0-21.0 | 2.09-2.31 | White Powder | Polypropylene | 32.8 | - | 82 (100# drum) | - | - | - | - | - | - |
| | Luperox HP101XLP | 42.5-45.5 | 4.68-5.01 | Tan Powder | CaCO ₃ | 38.6 | - | 82 (100# drum) | - | - | - | - | - | - |
| 2,5-dimethyl-2,5-Di-(t-butylperoxy) hexyne-3 | Luperox 130XL45 | 45.0-48.0 | 5.03-5.36 | Free Flowing Powder | CaCO ₃ | 44 | - | 88 (100# drum) | - | - | - | - | - | - |
| t-Butyl Cumyl Peroxide | Luperox 801 | ≥95 | ≥7.30 | Liquid | None | NA | 6 | 85 (35# ctn) | 79 (174) | - | 4.66 | 3.57 | 2.70 | - |

(1) Ethylene Propylene Copolymer

 (2) Assumed to be similar to Luperox[®] DCP

NA – Not Applicable

TABLE 2 – ACTIVATION ENERGY AND HALF-LIFE DATA

| Chemical Name | Commercial Product | Concentration | Temp °C | t ½ Hours | K. First Order Rate Constant | ΔE. Activation Energy (kcal/mol) | A(SEC-1) | 1 Hr. Half-Life Temp °C | 10 Hr. Half-Life Temp °C |
|--|--------------------|-----------------|---------|-----------|------------------------------|----------------------------------|---------------|-------------------------|--------------------------|
| Dicumyl Peroxide | Luperox DCP | 0.2M (Decane) | 115 | 13 | 0.054 | 36.757 | 7.474E + 15 | 137 | 117 |
| | | | 130 | 2.2 | 0.318 | | | | |
| | | | 145 | 0.42 | 1.65 | | | | |
| Di-t-Butyl Peroxide | Luperox DI | 0.2M (Decane) | 130 | 9.3 | 0.075 | 39.413 | 4.849E + 16 | 149 | 129 |
| | | | 145 | 1.6 | 0.437 | | | | |
| | | | 160 | 0.3 | 2.26 | | | | |
| Di-t-amyl peroxide | Luperox DTA | 0.2M (Dodecane) | 115 | 28 | 0.0245 | 38.121 | 1.99479E + 16 | 143 | 123 |
| | | | 130 | 4.5 | 0.154 | | | | |
| | | | 145 | 0.81 | 0.8156 | | | | |
| α, α'-Di(t-butyl peroxy)diisopropyl- benzene | Luperox F | 0.2M (Decane) | 115 | 15 | 0.041 | 36.831 | 6.299E + 15 | 139 | 119 |
| | | | 130 | 2.5 | 0.244 | | | | |
| | | | 145 | 0.5 | 1.27 | | | | |
| 1012,5-Dimethyl-2,5-di-(t-butylperoxy) hexane | Luperox | 0.1M (Dodecane) | 115 | 19 | 0.036 | 37.182 | 8.731E + 15 | 140 | 120 |
| | | | 130 | 3.2 | 0.218 | | | | |
| | | | 145 | 0.60 | 1.15 | | | | |
| 130 2,5-Dimethyl-2,5-di-(t-butylperoxy) hexyne-3 | Luperox | 0.1M (Dodecane) | 130 | 11 | 0.061 | 38.127 | 7.878E + 15 | 152 | 131 |
| | | | 145 | 2.1 | 0.334 | | | | |
| | | | 160 | 0.42 | 1.64 | | | | |
| t-Butyl Cumyl Peroxide | Luperox 801 | 0.2M (Dodecane) | 130 | 4.7 | 0.1474 | 37.765 | 1.22026E + 16 | 144 | 124 |
| | | | 145 | 0.87 | 0.7996 | | | | |
| | | | 160 | 0.18 | 3.859 | | | | |

Note: Half-life values in polymers may differ.



TABLE 2 – STORAGE, PACKAGING and SHIPPING INFORMATION

| Commercial Product | Maximum Storage Temp °F (°C) | C.A.S. Registry Number ⁽¹⁾ Peroxide/Filler | Shipping Container | Net Weight | Hazard Classification |
|--------------------|------------------------------|--|--|---|--|
| Luperox DCP | 100 (38) | 80-43-3 | 458 gal. Melt Bin Carton | 3500 lbs. 44 lbs. | Organic Peroxide Type F Solid; Hazard Code 5.2; UN 3110; PG II. |
| Luperox DC40 | 100 (38) | 80-43-3/471-34-1 | Carton | 44 lbs. | Nonregulated |
| Luperox DC40P | 100 (38) | 80-43-3/471-34-1 | Carton | 44 lbs. | Nonregulated |
| Luperox DC40KE | 100 (38) | 80-43-3/66402-68-4 | Carton | 44 lbs. | Nonregulated |
| Luperox DC40KEP | 100 (38) | 80-43-3/66402-68-4 | Carton | 44 lbs. | Nonregulated |
| Luperox DC40MG | 100 (38) | 80-43-3/9010-79-1 | Carton | 55 lbs. | Nonregulated |
| Luperox DC40MF | 100 (38) | 80-43-3/9010-79-1 | Carton | 55 lbs. | Nonregulated |
| Luperox DC40P-SP2 | 100 (38) | 80-43-3/66402-68-4 | Carton | 44 lbs. | Nonregulated |
| Luperox DTA | 100 (38) | 10508-09-5 | 5 gal. PE Bottle | 35 lbs. | Organic Peroxide Type E Liquid |
| Luperox DI | 100 (38) | 110-05-4 | 55 gal. Steel Drum 15 gal. Steel Drum 5 gal P.E Bottle 4 x 1 gal. PE Bottle | 340 lbs. 100 lbs. 30 lbs. 4x6 lbs. | Organic Peroxide Type C Liquid; Hazard Code 5.2; UN 3103; PG II. |
| Luperox F | 100 (38) | 25155-25-3 | 458 gal. Melt Bin Carton | 3250 lbs. 44 lbs. | 1,3- and 1,4-di(1-tert-butyl peroxyisopropyl) benzene mixture Organic Peroxide; Type D Solid, Hazard Code 5.2; UN 3106; PG II. |
| Luperox F40 | 100 (38) | 25155-25-3/471-34-1 | Carton | 44 lbs. | Nonregulated |
| Luperox F40P | 100 (38) | 25155-25-3/471-34-1 | Carton | 44 lbs. | Nonregulated |
| Luperox F40KE | 100 (38) | 25155-25-3/66402-68-4 | Carton | 44 lbs. | Nonregulated |
| Luperox F40KEP | 100 (38) | 25155-25-3 | Carton | 44 lbs. | Nonregulated |
| Luperox F40MG | 100 (38) | 25155-25-3/9010-79-1 | Carton | 55 lbs. | Nonregulated |
| Luperox F40MF | 100 (38) | 25155-25-3/9010-79-1 | Carton | 55 lbs. | Nonregulated |
| Luperox F40M-SP | 100 (38) | 25155-25-3/9010-79-1 | Carton | 55 lbs. | Nonregulated |
| Luperox F40P-SP2 | 100 (38) | 25155-25-3/123-31-9 | Carton | 44 lbs. | Nonregulated |
| Luperox HP101XLP | 100 (38) | 78-63-7/471-34-1 | Carton | 50 lbs. | Organic Peroxide Type D Solid; Hazard Code 5.2; UN 3106; PG II. |
| Luperox MIX | 100 (38) | Proprietary Mixture | 5 gal. Pail | 35 lbs. | Nonregulated |
| Luperox 101 | 100 (38) | 78-63-7 | 30 gal P.E. Lined Steel Drum 5 gal. P.E. Bottle | 100 lbs. 35 lbs. | Organic Peroxide Type D Liquid; Hazard Code 5.2; UN 3105; PG II. |
| Luperox 101XL45 | 100 (38) | 78-63-7/471-34-1 | Carton | 50 lbs. | Organic Peroxide Type D Solid; Hazard Code 5.2; UN 3106; PG II. |
| Luperox 101SIL45 | 100 (38) | 78-63-7/112926-00-8 | Carton | 50 lbs. | Organic Peroxide Type D Solid; Hazard Code 5.2; UN 3106; PG II. |
| Luperox 101PP20 | 100 (38) | 78-63-7/9003-07-0 | Carton | 50 lbs. | Organic Peroxide Type D Solid; Hazard Code 5.2; UN 3106; PG II. |
| Luperox 130XL45 | 100 (38) | 1068-27-5/471-34-1 | Carton | 50 lbs. | Organic Peroxide Type D Solid; Hazard Code 5.2; UN 3106; PG II. |
| Luperox 801 | 100 (38) | 3457-61-2 | 5 gal. PE Bottle | 35 lbs. | Organic Peroxide Type E Liquid |

(1) First number refers to peroxide followed by filler

TABLE 4 - MOLECULAR WEIGHT AND TYPICAL DECOMP PRODUCTS IN INERT MEDIA

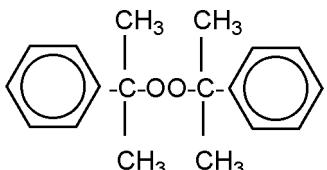
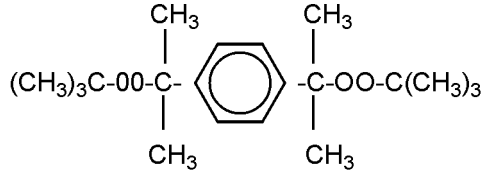
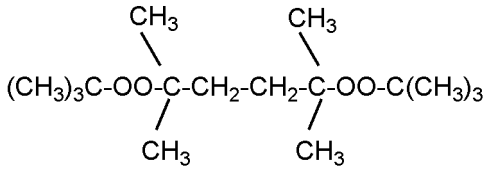
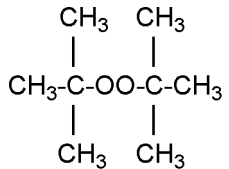
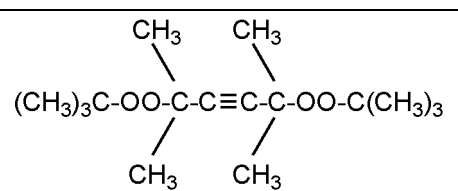
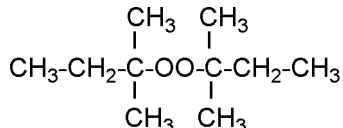
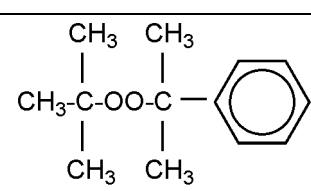
| Commercial Product | Formula | Typical Decomposition Products in Inert Material |
|--|--|--|
| Dicumyl Peroxide Molecular Weight: 270.37 |  | Methane, Acetophenone, Cumyl Alcohol |
| α, α' Di(t-butylperoxy)diisopropylbenzenes Molecular Weight: 338.48 |  | Methane, Acetone, t-Butyl Alcohol, Ethane Mixture of Aromatic Alcohols and Ketones |
| 2,5-dimethyl-2,5-Di-(t-butylperoxy)hexane Molecular Weight: 290.44 |  | Methane, Ethane, Ethylene, Acetone, t-Butyl Alcohol |
| Di-t-butylperoxide Molecular Weight: 146.23 |  | Methane, Acetone, t-Butyl Alcohol |
| 2,5-dimethyl-2,5-Di-(t-butylperoxy)hexyne-3 Molecular Weight: 286.41 |  | Methane, Ethane, Carbon Monoxide, Carbon Dioxide, Acetone, t-Butyl Alcohol |
| Di-t-amyl Peroxide Molecular Weight: 174.3 |  | Acetone, Ethane (trace t-Amyl Alcohol) |
| t-Butyl Cumyl Peroxide Molecular Weight: 208.3 |  | Acetophenone, t-Butyl Alcohol, Methane, Acetone, Cumyl Alcohol |

TABLE 5 – LUPEROX® DCP

| | | |
|------------------|-----------------------|-----------------------------|
| Solvent — | Decane | FW = 270.4 |
| A Value,/SEC | 7.47*10 ¹⁵ | Theoretical Act (0)% = 5.92 |
| Act E, Kcal/Mole | 36.757 | |

Half-Life Temperatures

| Period | Degree C | Degree F |
|-----------|----------|----------|
| 100 Hours | 99.0 | 210.2 |
| 10 Hours | 117.1 | 242.7 |
| 1 Hour | 137.0 | 278.5 |
| 6 Minutes | 159.0 | 318.3 |
| 1 Minute | 177.9 | 352.2 |
| 1 Second | 227.9 | 442.3 |

Temperature Increment, °C 5.0

| Temp °C | 110.0 | 115.0 | 120.0 | 125.0 | 130.0 | 135.0 | 140.0 | 145.0 |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Temp °F | 230 | 239 | 248 | 257 | 266 | 275 | 284 | 293 |
| Rate Const./,HR | 0.029 | 0.054 | 0.099 | 0.179 | 0.318 | 0.557 | 0.965 | 1.648 |
| Half-life, Hrs | 23.93 | 12.85 | 7.01 | 3.88 | 2.18 | 1.24 | 0.72 | 0.42 |

| Temp °C | 110.0 | 115.0 | 120.0 | 125.0 | 130.0 | 135.0 | 140.0 | 145.0 |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|
|---------|-------|-------|-------|-------|-------|-------|-------|-------|

Time, Hours **Percent Peroxide Remaining at Above Temperatures**

| | | | | | | | | |
|------|----|----|----|----|----|----|----|----|
| 0.2 | 99 | 99 | 98 | 96 | 94 | 89 | 82 | 72 |
| 0.5 | 99 | 97 | 95 | 91 | 85 | 76 | 62 | 44 |
| 1.0 | 97 | 95 | 91 | 84 | 73 | 57 | 38 | 19 |
| 1.5 | 96 | 92 | 86 | 77 | 62 | 43 | 24 | 8 |
| 2.0 | 94 | 90 | 82 | 70 | 53 | 33 | 15 | 4 |
| 2.5 | 93 | 87 | 78 | 64 | 45 | 25 | 9 | 2 |
| 3.0 | 92 | 85 | 74 | 59 | 39 | 19 | 6 | 1 |
| 3.5 | 90 | 83 | 71 | 54 | 33 | 14 | 3 | 0 |
| 4.0 | 89 | 81 | 67 | 49 | 28 | 11 | 2 | 0 |
| 4.5 | 88 | 78 | 64 | 45 | 24 | 8 | 1 | 0 |
| 5.0 | 87 | 76 | 61 | 41 | 20 | 6 | 1 | 0 |
| 5.5 | 85 | 74 | 58 | 37 | 17 | 5 | 0 | 0 |
| 6.0 | 84 | 72 | 55 | 34 | 15 | 4 | 0 | 0 |
| 6.5 | 83 | 70 | 53 | 31 | 13 | 3 | 0 | 0 |
| 7.0 | 82 | 69 | 50 | 29 | 11 | 2 | 0 | 0 |
| 7.5 | 80 | 67 | 48 | 26 | 9 | 2 | 0 | 0 |
| 8.0 | 79 | 65 | 45 | 24 | 8 | 1 | 0 | 0 |
| 9.0 | 77 | 62 | 41 | 20 | 6 | 1 | 0 | 0 |
| 10.0 | 75 | 58 | 37 | 17 | 4 | 0 | 0 | 0 |
| 12.0 | 71 | 52 | 31 | 12 | 2 | 0 | 0 | 0 |
| 15.0 | 65 | 45 | 23 | 7 | 1 | 0 | 0 | 0 |
| 20.0 | 56 | 34 | 14 | 3 | 0 | 0 | 0 | 0 |

REMEMBER THE RULES FOR SAFETY

Safe use of organic peroxide initiators:

- Leave room for cool air circulation in storage
- Rotate inventory: "First in, First out"
- Know your plant's emergency procedures
- Take only what you will be using
- Clean up spills, dispose of properly
- Control the temperature of all equipment
- Protect eyes and skin – wear the correct PPE
- Read the label and material safety data sheet (MSDS) for every peroxide you use
- Keep peroxide away from flames and sparks
- Avoid contamination

Emergency Response Number

Chemtrec – 800.424.9300

Customer Service

1.800.331.7654

Website

www.Luperox.com

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Before handling this material, read and understand the MSDS (Material Safety Data Sheet) for additional information on personal protective equipment and for safety, health and environmental information.

For environmental, safety and toxicological information, contact our Customer Service Department at 1.800.331.7654 to request a Material Safety Data Sheet or visit our website at www.luperox.com.
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