



# LUPEROX® 231

## 1. PRODUCT AND COMPANY IDENTIFICATION

### Company

Arkema Inc.  
2000 Market Street  
Philadelphia, Pennsylvania 19103

### Functional Additives

**Customer Service Telephone Number:** (800) 331-7654  
(Monday through Friday, 8:30 AM to 5:30 PM EST)

### Emergency Information

**Transportation:** CHEMTREC: (800) 424-9300  
(24 hrs., 7 days a week)  
**Medical:** Rocky Mountain Poison Center: (303) 623-5716  
(24 hrs., 7 days a week)

### Product Information

**Product name:** LUPEROX® 231  
**Synonyms:** Peroxyketal  
**Molecular formula:** Complex mixture  
**Chemical family:** Organic peroxide - peroxyketals  
**Product use:** Initiator

## 2. HAZARDS IDENTIFICATION

### Emergency Overview

**Color:** none  
**Physical state:** liquid  
**Odor:** mild

**WARNING!**  
**ORGANIC PEROXIDE.**  
**HAZARDOUS DECOMPOSITION MAY OCCUR.**  
**COMBUSTIBLE LIQUID AND VAPOR.**

### Potential Health Effects

**Primary routes of exposure:**  
Inhalation and skin contact.

**Signs and symptoms of acute exposure:**  
The product, in the form supplied, is not anticipated to produce significant adverse human health effects.

**Skin:**  
No more than slightly toxic. Slightly irritating. (based on components)

**Inhalation:**  
Practically nontoxic. (based on components)

**Eyes:**

Slightly irritating. (based on components)

**Ingestion:**

No more than slightly toxic. (based on components)

**Remarks:**

Handle in accordance with good industrial hygiene and safety practice.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Chemical Name	CAS-No.	Wt/Wt	OSHA Hazardous
Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl)]	6731-36-8	>= 92 %	Y
Cyclohexanone, 3,3,5-trimethyl-	873-94-9	<= 8 %	Y

The substance(s) marked with a "Y" in the Hazard column above, are those identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

This material is classified as hazardous under Federal OSHA regulation.

**4. FIRST AID MEASURES**

**Inhalation:**

If inhaled, remove victim to fresh air.

**Skin:**

In case of contact, immediately flush skin with plenty of water. Remove material from clothing. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eyes:**

Immediately flush eye(s) with plenty of water.

**Ingestion:**

If swallowed, DO NOT induce vomiting. Get medical attention. Never give anything by mouth to an unconscious person.

**5. FIRE-FIGHTING MEASURES**

**Flash point** 180 °F (82 °C) (Method: Seta Flash Method)

**Auto-ignition temperature:** Not determined

**Lower flammable limit (LFL):** Not determined

**Upper flammable limit (UFL):** Not determined

**Extinguishing media (suitable):**

Water spray, Foam, Dry chemical

**Protective equipment:**

Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand / NIOSH approved or equivalent). Fire fighting equipment should be thoroughly decontaminated after use.

**Further firefighting advice:**

Fight fire with large amounts of water from a safe distance.  
Cool closed containers exposed to fire with water spray.  
After a fire, wait until the material has cooled to room temperature before initiating clean-up activities.

**Fire and explosion hazards:**

Contact with materials to avoid or exposure to temperatures exceeding the SADT may result in a self accelerating decomposition reaction with release of flammable vapors which may autoignite.  
When burned, the following hazardous products of combustion can occur:  
Carbon oxides

## 6. ACCIDENTAL RELEASE MEASURES

**In case of spill or leak:**

Prevent further leakage or spillage if safe to do so. Use inert, non-combustible absorbant material such as sodium bicarbonate, sodium carbonate, calcium carbonate, clean sand or non-acidic clay directly on the spilled peroxide, then wet down (dampen) the mixture with water. Sweep or scoop up using non-sparking tools and place into suitable container for disposal. The sweepings should be wetted down further with water. Dispose of promptly. Clean contaminated floors and objects thoroughly with water and detergents, observing environmental regulations. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits.

## 7. HANDLING AND STORAGE

**Handling**

**General information on handling:**

Contact with materials to avoid or exposure to temperatures exceeding the SADT may result in a self accelerating decomposition reaction with release of flammable vapors which may autoignite.  
Keep away from heat, sparks and flames.  
Prevent product contamination.  
Handle in accordance with good industrial hygiene and safety practices. These practices include avoiding unnecessary exposure and removal of material from eyes, skin, and clothing.  
Keep container tightly closed and away from combustible materials.  
Check that all equipment is properly grounded and installed to satisfy electrical classification requirements.  
Emptied container retains product residue.  
DO NOT CUT, DRILL, GRIND, OR WELD ON OR NEAR THIS CONTAINER.  
Do not reuse container as it may retain hazardous product residue.  
Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

**Storage**

**General information on storage conditions:**

Outside or detached storage is preferred. Store in well ventilated area away from heat and sources of ignition such

## LUPEROX® 231

as flame, sparks and static electricity. Store out of direct sunlight in a cool well-ventilated place. Static electricity may accumulate when transferring material. Ensure that all storage and handling equipment is properly grounded and installed to satisfy electrical classification requirements. All storage containers, including drums, cylinders and IBCs, must be bonded and grounded during filling and emptying operations. Store in original container. Store away from combustibles and materials to avoid. Refer also to National Fire Protection Association (NFPA) Code 432, Code for the Storage of Organic Peroxide Formulations.

### Storage stability – Remarks:

Follow the recommended storage temperatures provided in this Section in order to maintain stability and oxygen content.

### Storage incompatibility – General:

Store separate from:

Strong acids

Alkaline materials

Strong oxidizing agents

### Temperature tolerance – Do not store above:

90 °F (32 °C)

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Airborne Exposure Guidelines:

#### Engineering controls:

Investigate engineering techniques to reduce exposures below airborne exposure limits or to otherwise reduce exposures. Provide ventilation if necessary to minimize exposures or to control exposure levels to below airborne exposure limits (if applicable see above). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment. Consult ACGIH ventilation manual or NFPA Standard 91 for design of exhaust systems.

#### Respiratory protection:

Where airborne exposure is likely or airborne exposure limits are exceeded (if applicable, see above), use NIOSH approved respiratory protection equipment appropriate to the material and/or its components. Consult respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where there may be a potential for significant exposure or where exposure limit may be significantly exceeded, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR § 1910.134.

#### Skin protection:

Minimize skin contamination by following good industrial hygiene practice. Wearing protective gloves is recommended. Wash thoroughly after handling.

#### Eye protection:

Use good industrial practice to avoid eye contact.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Color: none

## LUPEROX® 231

<b>Physical state:</b>	liquid
<b>Odor:</b>	mild
<b>pH:</b>	not determined
<b>Density:</b>	0.91 g/cm <sup>3</sup> (68 °F (20 °C))
<b>Specific Gravity (Relative density):</b>	0.904 (77 °F (25 °C))
<b>Vapor pressure:</b>	approximately 27 mmHg (68 °F (20 °C))
<b>Vapor density:</b>	not determined
<b>Boiling point/boiling range:</b>	Not applicable (decomposes on heating)
<b>Melting point/range:</b>	-40 °F (-40 °C)
<b>Evaporation rate:</b>	not determined
<b>Solubility in water:</b>	insoluble
<b>Viscosity, dynamic:</b>	30 mPa.s 77 °F (25 °C)
<b>Self-Accelerating Decomposition Temperature (SADT):</b>	151 °F (66 °C) 5 pound container

### 10. STABILITY AND REACTIVITY

**Stability:**

This material is chemically unstable and should only be handled under specified conditions.

**Hazardous reactions:**

Hazardous polymerization does not occur.

**Materials to avoid:**

Strong acids  
Alkaline materials  
Oxidizing agents

**Conditions / hazards to avoid:**

See HANDLING AND STORAGE section of this MSDS for specified conditions. SADT - Self Accelerating Decomposition Temperature. Lowest temperature at which the tested package size will undergo a self-accelerating decomposition reaction. This reaction will generate flammable vapors which may autoignite. The length of time to generate a decomposition reaction, after the SADT has been reached or exceeded, is dependent upon how much the SADT has been exceeded and the length of time needed for the reaction exotherm (heat spike from increasing decomposition rate) to initiate a rapid decomposition reaction. Typically, SADT is inversely proportional to package size. Larger packages will have a lower SADT due to smaller ratio to heat transfer area to volume of product.

**Hazardous decomposition products:**

Temperatures at or above the SADT can result in the release of hazardous decomposition products which are flammable and may autoignite.

Thermal decomposition giving flammable and toxic products

Carbon oxides

**11. TOXICOLOGICAL INFORMATION**

Data on this material and/or its components are summarized below.

**Data for Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl) (6731-36-8)**

**Acute toxicity**

**Oral:**

Practically nontoxic. (rat) LD50 > 12,918 mg/kg. (75 %) (in dibutyl phthalate)

**Dermal:**

Practically nontoxic. (rabbit) LD50 > 8,000 mg/kg. (75 %) (in dibutyl phthalate)

**Inhalation:**

Practically nontoxic. (rat) 4 h LC50 > 400 mg/l. (75 %) (in dibutyl phthalate)

**Skin Irritation:**

Slightly irritating. (rabbit) 2.15 / 8.0. (97.4 %) (purity)

**Eye Irritation:**

Practically non-irritating. (rabbit) Irritation Index: 1.3/110. (75% in dibutyl phthalate)

**Skin Sensitization:**

Repeated skin exposure. (guinea pig) No skin allergy was observed. (97.4 %)

**Repeated dose toxicity**

Repeated dietary administration to mouse / affected organ(s): spleen, liver, bone marrow / signs: changes in organ weights / reduced body weight

Repeated dietary administration to mouse / increased mortality

**Carcinogenicity**

Repeated dietary administration to mouse / No increase in tumor incidence was reported.

**Genotoxicity**

**Assessment in Vitro:**

No genetic changes were observed in laboratory tests using: bacteria, human cells

**Data for Cyclohexanone, 3,3,5-trimethyl- (873-94-9)**

**Acute toxicity**

**Oral:**

Slightly toxic. (rat) LD50 = 3,450 mg/kg.

**Dermal:**

No more than slightly toxic. (rabbit) LD0 > 3,160 mg/kg.

**Inhalation:**

Practically nontoxic. (rat) 4 h LC50 = 14.2 mg/l. (vapor)

**Skin Irritation:**

Non-irritating. (rabbit) (4 h)

**Eye Irritation:**

Slightly irritating. (rabbit)

**Skin Sensitization:**

Repeated skin exposure. (guinea pig) No skin allergy was observed.

**Repeated dose toxicity**

Inhalation administration to rat / affected organ(s): liver, lung / signs: changes in organ weights

**Genotoxicity**

**Assessment in Vitro:**

No genetic changes were observed in a laboratory test using: bacteria

Genetic changes were observed in a laboratory test using: human cells

**Human experience**

**General:**

Irritating to eyes, respiratory system and skin.

**Human experience**

**Skin contact:**

Irritation.

## 12. ECOLOGICAL INFORMATION

**Chemical Fate and Pathway**

Data on this material and/or its components are summarized below.

**Data for Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl) (6731-36-8)**

**Biodegradation:**

Not readily biodegradable. (Closed Bottle test, 28 d) biodegradation 2 %

**Bioaccumulation:**

56 d BCF 3,500 - 123,200 (Carp)

**Octanol Water Partition Coefficient:**

log Pow > 5

**Data for Cyclohexanone, 3,3,5-trimethyl- (873-94-9)**

**Biodegradation:**

Readily biodegradable. (28 d) 58 % / OECD Guideline 301 D

### Ecotoxicology

Data on this material and/or its components are summarized below.

#### Data for Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl) (6731-36-8)

##### **Aquatic invertebrates:**

Highly toxic. Daphnia magna (Water flea) 48 h EC50 = 0.133 mg/l

#### Data for Cyclohexanone, 3,3,5-trimethyl- (873-94-9)

##### **Aquatic invertebrates:**

Practically nontoxic. Daphnia magna (Water flea) 48 h EC50 = 180 mg/l

## 13. DISPOSAL CONSIDERATIONS

### **Waste disposal:**

Dilution followed by incineration is the preferred method. Dilution ratio of 10:1 in a clean, compatible, combustible solvent (i.e., Fuel Oil #2, mineral oil) will reduce reactivity hazard during incineration and transportation. Dispose of in accordance with federal, state and local regulations. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits. Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

## 14. TRANSPORT INFORMATION

### **US Department of Transportation (DOT)**

UN Number : 3101  
Proper shipping name : Organic peroxide type B, liquid  
Technical name : (1,1-Di(tert-butylperoxy)-3,3,5-trimethylcyclohexane, 90-100%)  
Class : 5.2  
Subsidiary hazard class : (1)  
Packaging group : II  
Marine pollutant : yes

### **International Maritime Dangerous Goods Code (IMDG)**

UN Number : 3101  
Proper shipping name : ORGANIC PEROXIDE TYPE B, LIQUID  
Technical name : (1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE, 90-100%)  
Class : 5.2  
Subsidiary hazard class : (1)  
Marine pollutant : yes  
Flash point : 180 °F (82 °C)

**15. REGULATORY INFORMATION**

**Chemical Inventory Status**

EU. EINECS	EINECS	Conforms to
US. Toxic Substances Control Act	TSCA	The components of this product are all on the TSCA Inventory.
Australia. Industrial Chemical (Notification and Assessment) Act	AICS	Conforms to
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	DSL	All components of this product are on the Canadian DSL list.
Japan. Kashin-Hou Law List	ENCS (JP)	Conforms to
Korea. Toxic Chemical Control Law (TCCL) List	KECI (KR)	Conforms to
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	PICCS (PH)	Conforms to
China. Inventory of Existing Chemical Substances	IECSC (CN)	Conforms to
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	NZIOC	Conforms to

**United States – Federal Regulations**

**SARA Title III – Section 302 Extremely Hazardous Chemicals:**

The components in this product are either not SARA Section 302 regulated or regulated but present in negligible concentrations.

**SARA Title III - Section 311/312 Hazard Categories:**

Acute Health Hazard, Fire Hazard, Reactivity Hazard

**SARA Title III – Section 313 Toxic Chemicals:**

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - Reportable Quantity (RQ):**

The components in this product are either not CERCLA regulated, regulated but present in negligible concentrations, or regulated with no assigned reportable quantity.

**OSHA Regulated Carcinogens (NTP, IARC, OSHA Listed):**

**NTP:**

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

**IARC:**

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**OSHA:**

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**United States – State Regulations**

**Massachusetts Right to Know**

No components are subject to the Massachusetts Right to Know Act.

**New Jersey Right to Know**

<u>Chemical Name</u>	<u>CAS-No.</u>
Hydroperoxide, 1,1-dimethylethyl	75-91-2
Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl)	6731-36-8

**New Jersey Right to Know – Special Health Hazard Substance(s)**

<u>Chemical Name</u>	<u>CAS-No.</u>
Hydroperoxide, 1,1-dimethylethyl	75-91-2

**Pennsylvania Right to Know**

<u>Chemical Name</u>	<u>CAS-No.</u>
Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl)	6731-36-8

Cyclohexanone, 3,3,5-trimethyl-	873-94-9
---------------------------------	----------

**California Prop. 65**

This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive defects.

**16. OTHER INFORMATION**

**Latest Revision(s):**

Revised Section(s):	Updated after compositional review
Reference number:	00000052202
Date of Revision:	08/21/2009
Date Printed:	08/21/2009

LUPEROX® is a registered trademark of Arkema Inc.

Arkema Inc. believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other materials or in any process. Further, since the conditions and methods of use are beyond the control of Arkema Inc., Arkema Inc. expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.