Material Safety Data Sheet For Dry Hydrogen Peroxide (DHP)

Section 1 — Product and Company Identification

Product Name	Synexis Dry Hydrogen Peroxide (DHP) Generator
Common Names/Synonyms for Dry Hydrogen Peroxide	Hydrogen Peroxide, Dihydrogen Dioxide, H_2O_2
Dry Hydrogen Peroxide Generator Supplier	Synexis LLC 8905 Lenexa Drive Overland Park, KS 66214 844-307-0339 www.Synexis.com
Manufactured for Synexis By	Mack Molding 79 E Arlington Road Arlington, Vermont 05250 802-375-0500 www.Mack.com

Product Use

Synexis Dry Hydrogen Peroxide (DHP) Generators produce air containing dilute, dry, non-aqueous hydrogen peroxide from ambient air at concentrations thousands of times less than are naturally found in the human lung, and millions of times less than are produced by vaporized hydrogen peroxide systems. The generator operates continuously, replacing DHP as it is consumed by the environment. DHP, which is a true gas like oxygen or nitrogen, is dilute, and behaves like a near ideal gas, becomes part of the air and reduces microbial threats both in the air, and on surfaces in contact with the air.

Human and animal lungs contain enzymes which both produce and consume hydrogen peroxide as part of our respiratory defense system. DHP is thousands of times less concentrated than the hydrogen peroxide in human lungs.

Natural Equilibrium Concentration of Hydrogen Peroxide Maintained by Enzymes in the Human Lung:

UP TO 60,000 MOLECULES PER CUBIC MICRON

Dry Hydrogen Peroxide (DHP) Equilibrium Concentration in the Air:

LESS THAN 25 MOLECULES PER CUBIC MICRON, AND LESS THAN ONE PART PER MILLION

Synexis Dry Hydrogen Peroxide (DHP) Generators contain one or more fluorescent bulbs which produce UV-A light (eye safe black light). Please refer to the separately provided MSDS for the fluorescent bulbs for information on this component.

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Section 2 Hazards Identification

Potential Acute Health Effects of Dry Hydrogen Peroxide

None Identified

Dry Hydrogen Peroxide operates at less than 25 molecules per cubic micron and less than 1 mg/cubic meter in the air; thousands of times less than the concentration normally present in healthy adult human lungs (up to 60,000 molecules per cubic micron), and thousands of times less than the aqueous concentrations which produce acute effects in mice, rats, and pigs.

Potential Chronic Health Effects

CARCINOGENIC EFFECTS: Not available

MUTAGENIC EFFECTS: Not available

TERATOGENIC EFFECTS: Not available

DEVELOPMENTAL TOXICITY: Not available

In concentrations millions of times greater than the amount introduced by this technology, the substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 3 Composition and Information on Ingredients

Composition of Air Containing Dry Hydrogen Peroxide

Name	CAS Number	% by Weight
Ambient Air	None	99.99988%
Dry Hydrogen Peroxide	7722-84-1	<0.00012 <1 mg/cubic meter of air

Toxicological Data on Ingredients

Hydrogen Peroxide:
ORAL (LD50): Acute: 2000 mg/kg [Mouse].
DERMAL (LD50): Acute: 4060 mg/kg [Rat]. 2000 mg/kg [Pig]
VAPOR (LC50): Acute: 2000 mg/m 4 hours [Rat]

Section 4 First Aid Measures

Dry Hydrogen Peroxide is non-aqueous and so dilute that it does not pose exposure hazards.

In the unlikely event that irritation to the eyes, skin, lungs, or nasal passages does occur, however, simply turn off the Synexis Dry Hydrogen Peroxide Generator and leave the area. The Dry Hydrogen Peroxide will decompose within minutes to an hour into oxygen and humidity. There is no ingestion hazard.

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Section 5 — Fire and Explosion Data

Flammability of the Product	Non-flammable
Auto-Ignition Temperature	Not applicable
Flash Points	Not applicable
Flammable Limits	Not applicable
Products of Combustion	Not available
Fire Hazards in Presence of Various Substances	None due to the highly dilute nature of Dry Hydrogen Peroxide
Explosion Hazards in Presence of Various Substances	None due to the highly dilute nature of Dry Hydrogen Peroxide
Fire Fighting Media and Instructions	None due to the highly dilute nature of Dry Hydrogen Peroxide

Section 6 — Accidental Release Measures

Dry Hydrogen Peroxide is a dilute gas and is not subject to spills.

In the unlikely event that a concentration exceeding one part per million is detected, turn off the Synexis Dry Hydrogen Peroxide Generator. The Dry Hydrogen Peroxide will decompose naturally into humidity and oxygen within minutes to an hour.

Section 7 — Handling and Storage

The Synexis Dry Hydrogen Peroxide Generator produces Dry Hydrogen Peroxide from the air when it is turned on. When it is off, it produces no Dry Hydrogen Peroxide.

Dry Hydrogen Peroxide cannot be stored.

Section 8 — Exposure Controls/Personal Protection

Engineering Controls

If a concentration of Dry Hydrogen Peroxide greater than one part per million is detected, turn off the Synexis Dry Hydrogen Peroxide Generator. The Dry Hydrogen Peroxide will decompose into oxygen and humidity within minutes to an hour.

Personal Protection

No personal protective equipment is required when working in spaces containing Dry Hydrogen Peroxide. If a concentration of Dry Hydrogen Peroxide greater than one part per million is detected, turn off the Synexis Dry Hydrogen Peroxide Generator and leave the space.

Exposure Limits

Hydrogen Peroxide TWA	Authority
1 ppm	ACGIH (TLV) [United States]
1 ppm	OSHA (PEL) [United States]
1 ppm STEL: 2 ppm	[Canada]
1.4 mg/m3	NIOSH
1.4 mg/m3	OSHA (PEL) [United States]
1 ppm	[United Kingdom (UK)]
1.4 mg/m3	[United Kingdom (UK)]

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Section 9 — Physical and Chemical Properties of Dry Hydrogen Peroxide

Physical State And Appearance	Gas
Odor	Odorless
Taste	Tasteless
Molecular Weight	34 grams per mole
Color	Clear colorless
pH	Not available, non-aqueous
Boiling Point	Not applicable, Dry Hydrogen Peroxide is non-aqueous and does not condense
Melting Point	Not applicable
Critical Temperature	Not available
Specific Gravity	1.1 (water = 1)
Vapor Pressure	Not applicable, Dry Hydrogen Peroxide is a gas, not a vapor
Vapor Density	Not applicable, Dry Hydrogen Peroxide is a gas, not a vapor
Volatility	Not available
Odor Threshold	Not available
Water/Oil Dist. Coeff	Not available
Ionicity (in Water)	Not available
Dispersion Properties	See solubility in water, diethyl ether
Solubility	Easily soluble in cold water. Soluble in diethyl ether

Section 10 — Stability and Reactivity Data

Stability	Dry Hydrogen Peroxide decomposes into (returns to) humidity and oxygen, the materials from which it is made, in the environment
Instability Temperature	Not applicable
Conditions of Instability	Dry Hydrogen Peroxide naturally decomposes into (returns to) humidity and oxygen as it reduces microbial contamination
Incompatibility with various substances	Dry Hydrogen Peroxide oxidizes VOCs into carbon dioxide and humidity, removing odors from the air. Dry hydrogen Peroxide does not damage materials
Corrosivity	Dry Hydrogen Peroxide is non-aqueous, and therefore not corrosive
Polymerization	Will not occur

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Section 11 Toxicological Information

Routes of Entry

Inhalation. Eye contact.

Toxicity to Animals

Dry Hydrogen Peroxide is non-aqueous and is thousands of times more dilute than the amount of hydrogen peroxide naturally produced in the human lung, and is easily managed by regulatory enzymes in the lungs. Hydrogen Peroxide, when mixed with water and in concentrations many times greater than that natural for the human lung, however, can be toxic. Acute oral toxicity (LD50): 6667 mg/kg (Mouse) (Calculated value for the mixture). Acute dermal toxicity (LD50): 6667 mg/kg (pig) (Calculated value for the mixture).

Chronic Effects on Humans

Dry Hydrogen Peroxide is thousands of times less concentrated than the amount naturally present in human lungs and presents no chronic risks. Chronic effects do occur, however with aqueous and vapor forms of hydrogen peroxide at concentrations greater than those maintained by the human lung. For aqueous and vapor hydrogen peroxide, these effects are as follows: CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH [Hydrogen Peroxide]. Classified 3 (Not classifiable for human.) by IARC [Hydrogen Peroxide]. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. [Hydrogen Peroxide]. Mutagenic for bacteria and/or yeast. [Hydrogen Peroxide]. Contains material which may cause damage to the following organs: blood, upper respiratory tract, skin, eyes, central nervous system (CNS).

Other Toxic Effects on Humans	None for Dry Hydrogen Peroxide
Special Remarks on Toxicity to Animals	Not available
Special Remarks on Chronic Effects on Humans	None for Dry Hydrogen Peroxide
Special Remarks on other Toxic Effects on Humans	None for Dry Hydrogen Peroxide

Section 12 Ecological Information

Ecotoxicity	None, Dry Hydrogen Peroxide is produced from humidity and oxygen in ambient air and decomposes back into humidity and oxygen
BOD5 and COD	Not available
Products of Biodegradation	Dry Hydrogen Peroxide kills microbes and oxidizes COCs into carbon dioxide and humidity
Toxicity of the Products of Biodegradation	The products of degradation are less toxic than the product itself
Special Remarks on the Products of Biodegradation	Not available

Section 13 Disposal Considerations

Waste Disposal

Dry Hydrogen Peroxide creates no disposable wastes. Should a Synexis Dry Hydrogen Peroxide generator require disposal, it must be disposed of in accordance with federal, state and local environmental control regulations

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Section 14 Transport Information

DOT Classification	Dry Hydrogen Peroxide is produced on-site by a Synexis Dry Hydrogen Peroxide Generator and cannot be transported
Identification	Dry Hydrogen Peroxide, non-aqueous gas
Special Provisions for Transport	Not available

Section 15 Other Regulatory Information

EPA

Synexis Dry Hydrogen Peroxide Generators are regulated by the EPA as pesticidal devices under the Federal Insecticide, Fungicide, and Rodenticide Act, FIFRA and are not required to have a pesticide approval for Dry Hydrogen Peroxide.

Other regulations exist for aqueous liquid and vapor forms of hydrogen peroxide that are millions of times more concentrated than the hydrogen peroxide levels naturally found in the human lung. See below.

Federal and State Regulations for Aqueous Hydrogen Peroxide

New York acutely hazardous substances: Hydrogen Peroxide Rhode Island RTK hazardous substances: Hydrogen Peroxide Pennsylvania RTK: Hydrogen Peroxide Florida: Hydrogen Peroxide Minnesota: Hydrogen Peroxide Massachusetts RTK: Hydrogen Peroxide New Jersey: Hydrogen Peroxide TSCA 8(b) inventory: Hydrogen Peroxide SARA 302/304/311/312 extremely hazardous substances: Hydrogen Peroxide CERCLA: Hazardous substances.: Hydrogen Peroxide: 1 lbs. (0.4536 kg);

Other Regulations: OSHA

Aqueous Hydrogen Peroxide is hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications

WHMIS (Canada)	Concentrated Aqueous Hydrogen Peroxide is CLASS C: Oxidizing material. CLASS E: Corrosive liquid. CLASS F: Dangerously reactive material
DSCL (EEC)	
HMIS (U.S.A.)	
Health Hazard	3 for concentrated aqueous hydrogen peroxide
Fire Hazard	0 for concentrated aqueous hydrogen peroxide
Reactivity	1 for concentrated aqueous hydrogen peroxide
Personal Protection	
National Fire Protection Association (U.S.A.)	
Health	2 for concentrated aqueous hydrogen peroxide
Flammability	0 for concentrated aqueous hydrogen peroxide
Reactivity	1 for concentrated aqueous hydrogen peroxide
Specific Hazard	
Protective Equipment for Concentrated Aqueous Hydrogen Peroxide	Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

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Section 16 Other Information

References	Not available
Other Special Considerations	Not available
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