Printing date 07/16/2021

Reviewed on 07/16/2021

1 Identification

- · Product name
- $\cdot Trade name: \underbrace{(R)-(+)-2,2'-Bis(diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H_{s-BINAP}}_{BINAP}$
- Item number: 15-2972
- CAS Number: 139139-86-9
- Details of the supplier of the safety data sheet
 Manufacturer/Supplier: Strem Chemicals, Inc.
 7 Mulliken Way
 NEWBURYPORT, MA 01950
 USA
 info@strem.com
- · Information department: Technical Department
- Emergency telephone number: EMERGENCY: CHEMTREC: + 1 (800) 424-9300 During normal opening times: +1 (978) 499-1600

2 Hazard(s) identification

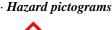
· Classification of the substance or mixture

Skin Irrit. 2 H315 Causes skin irritation.

Eye Irrit. 2A H319 Causes serious eye irritation.

STOT SE 3 H335 May cause respiratory irritation.

- · Label elements
- · GHS label elements
- The substance is classified and labeled according to the Globally Harmonized System (GHS).





· Signal word Warning

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Hazard-determining components of labeling:
(R)-(+)-2,2'-Bis(diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP
Hazard statements
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
Precautionary statements
P262 Do not get in eyes, on skin, or on clothing.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present
and easy to do. Continue rinsing.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
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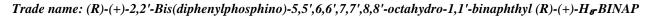
(Contd. on page 2)

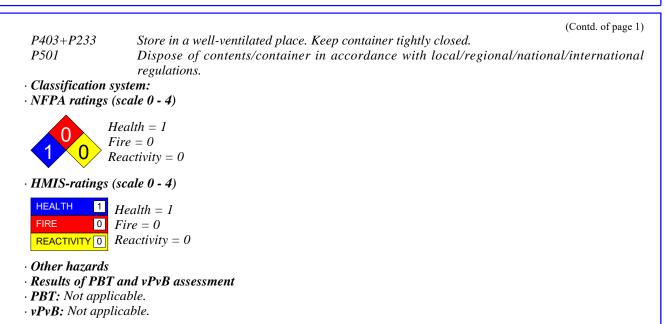
CHEMICALS, INC

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3 Composition/information on ingredients

· Chemical characterization: Substances

· CAS No. Description

139139-86-9 (R)-(+)-2,2'-Bis(diphenylphosphino)-5,5',6,6',7,7',8,8'octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP

4 First-aid measures

· Description of first aid measures

- After inhalation: In case of unconsciousness place patient stably in side position for transportation.
- After skin contact: Immediately wash with water and soap and rinse thoroughly.
- After eye contact: Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- After swallowing: If symptoms persist consult doctor.
- Information for doctor:
- · Most important symptoms and effects, both acute and delayed No further relevant information available.
- Indication of any immediate medical attention and special treatment needed No further relevant information available.

5 Fire-fighting measures

- · Extinguishing media
- Suitable extinguishing agents: Use fire fighting measures that suit the environment.
- · Special hazards arising from the substance or mixture No further relevant information available.
- · Advice for firefighters
- · Protective equipment: No special measures required.

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(Contd. of page 2)

6 Accidental release measures

- · Personal precautions, protective equipment and emergency procedures Not required.
- · Environmental precautions: No special measures required.
- *Methods and material for containment and cleaning up:* Dispose contaminated material as waste according to item 13. Ensure adequate ventilation.
- **Reference to other sections** See Section 7 for information on safe handling. See Section 8 for information on personal protection equipment. See Section 13 for disposal information.
- Protective Action Criteria for Chemicals

· PAC-1:

Substance is not listed.

· PAC-2:

Substance is not listed.

· PAC-3:

Substance is not listed.

7 Handling and storage

- · Handling:
- · Precautions for safe handling No special precautions are necessary if used correctly.
- · Information about protection against explosions and fires: No special measures required.
- · Conditions for safe storage, including any incompatibilities
- · Storage:
- Requirements to be met by storerooms and receptacles: No special requirements.
- · Information about storage in one common storage facility: Not required.
- Further information about storage conditions: Keep receptacle tightly sealed.
- \cdot Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

- · Additional information about design of technical systems: No further data; see item 7.
- · Control parameters
- · Components with limit values that require monitoring at the workplace: Not required.
- Additional information: The lists that were valid during the creation were used as basis.
- · Exposure controls
- · Personal protective equipment:
- General protective and hygienic measures: Keep away from foodstuffs, beverages and feed. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin.
- Breathing equipment: A NIOSH approved respirator in accordance with 29 CFR 1910.134.

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· Protection of hands:



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.

Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation \cdot *Material of gloves*

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

· Penetration time of glove material

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

· Eye protection:



Tightly sealed goggles

Information on basic physical and General Information	chemical properties	
Appearance:		
Form:	Powder	
Color:	Whitish	
Odor:	undistinguishable	
Odor threshold:	Not determined.	
pH-value:	Not applicable.	
Change in condition		
Melting point/Melting range:	Undetermined.	
Boiling point/Boiling range:	Undetermined.	
Flash point:	Not applicable.	
Flammability (solid, gaseous):	Not determined.	
Ignition temperature:		
Decomposition temperature:	Not determined.	
Auto igniting:	Not determined.	
Danger of explosion:	Product does not present an explosion hazard.	
Explosion limits:		
Lower:	Not determined.	
Upper:	Not determined.	
Vapor pressure:	Not applicable.	
Density:	Not determined.	
Relative density	Not determined.	

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		(Contd. of page
· Vapor density	Not applicable.	
· Evaporation rate	Not applicable.	
· Solubility in / Miscibility with		
Water:	Insoluble.	
· Partition coefficient (n-octanol/	water): Not determined.	
· Viscosity:		
Dynamic:	Not applicable.	
Kinematic:	Not applicable.	
· Solvent content:		
Organic solvents:	0.0 %	
VOC content:	0.0 g/l / 0.00 lb/gl	
Solids content:	100.0 %	
• Other information	No further relevant information available.	

10 Stability and reactivity

- *Reactivity* No further relevant information available.
- · Chemical stability
- Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
- · Possibility of hazardous reactions No dangerous reactions known.
- · Conditions to avoid No further relevant information available.
- $\cdot \textit{Incompatible materials: } No further relevant information available.$
- · Hazardous decomposition products: No dangerous decomposition products known.

11 Toxicological information

- · Information on toxicological effects
- Acute toxicity:
- · Primary irritant effect:
- \cdot on the skin: Irritant to skin and mucous membranes.
- on the eye: Irritating effect.
- Sensitization: No sensitizing effects known.
- \cdot Additional toxicological information:

· Carcinogenic categories

· IARC (International Agency for Research on Cancer)

Substance is not listed.

· NTP (National Toxicology Program)

Substance is not listed.

· OSHA-Ca (Occupational Safety & Health Administration)

Substance is not listed.

12 Ecological information

· Toxicity

- Aquatic toxicity: No further relevant information available.
- · Persistence and degradability No further relevant information available.

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Trade name: (R)-(+)-2,2'-Bis(diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H_sBINAP

- · Behavior in environmental systems:
- · Bioaccumulative potential No further relevant information available.
- · Mobility in soil No further relevant information available.
- · Additional ecological information:
- · General notes: Not known to be hazardous to water.
- · Results of PBT and vPvB assessment
- · PBT: Not applicable.
- **vPvB:** Not applicable.
- · Other adverse effects No further relevant information available.

13 Disposal considerations

- · Waste treatment methods
- Recommendation:

Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

- · Uncleaned packagings:
- · Recommendation: Disposal must be made according to official regulations.

Transport information		
· UN-Number · DOT, ADN, IMDG, IATA	not regulated	
UN proper shipping name DOT, ADN, IMDG, IATA	not regulated	
Transport hazard class(es)		
DOT, ADN, IMDG, IATA Class	not regulated	
Packing group DOT, IMDG, IATA	not regulated	
Environmental hazards: Marine pollutant:	No	
Special precautions for user	Not applicable.	
Transport in bulk according to Annex MARPOL73/78 and the IBC Code	II of Not applicable.	
UN "Model Regulation":	not regulated	

15 Regulatory information

- \cdot Safety, health and environmental regulations/legislation specific for the substance or mixture
- · Sara
- Section 355 (extremely hazardous substances):
- Substance is not listed.
- · Section 313 (Specific toxic chemical listings):
- Substance is not listed.

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Trade name: (R)-(+)-2,2'-Bis(diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H_s-BINAP

	(Contd. of page
	ubstances Control Act):
Substance is not	t listed.
Proposition 65	
Chemicals know	vn to cause cancer:
Substance is not	t listed.
Chemicals know	vn to cause reproductive toxicity for females:
Substance is not	t listed.
Chemicals know	vn to cause reproductive toxicity for males:
Substance is not	t listed.
Chemicals know	vn to cause developmental toxicity:
Substance is not	
Carcinogenic c	ategories
EPA (Environn	nental Protection Agency)
Substance is not	t listed.
TLV (Threshold	l Limit Value established by ACGIH)
Substance is not	t listed.
NIOSH-Ca (Na	tional Institute for Occupational Safety and Health)
Substance is not GHS label elem The substance i. Hazard pictogra	ents s classified and labeled according to the Globally Harmonized System (GHS).
GHS label elem The substance i. Hazard pictogra	ents s classified and labeled according to the Globally Harmonized System (GHS).
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GHS label elem The substance i. Hazard pictogra GHS07 Signal word Wa (R)-(+)-2,2'-Bis Hazard stateme H315 Causes sk H319 Causes se	ents s classified and labeled according to the Globally Harmonized System (GHS). ams ining components of labeling: (diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP nts in irritation. rious eye irritation.
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GHS label elem The substance i. Hazard pictogra GHS07 Signal word Wa Hazard-determa (R)-(+)-2,2'-Bis Hazard stateme H315 Causes sk H319 Causes se H335 May caus Precautionary s P262	ents s classified and labeled according to the Globally Harmonized System (GHS). urning ining components of labeling: (diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP nts in irritation. rious eye irritation. rious eye irritation. e respiratory irritation. tatements Do not get in eyes, on skin, or on clothing.
GHS label elem The substance i. Hazard pictogra GHS07 Signal word Wa Hazard-determa (R)-(+)-2,2'-Bis Hazard stateme H315 Causes sk H319 Causes se H335 May caus Precautionary s P262 P280	ents s classified and labeled according to the Globally Harmonized System (GHS). ums uning ining components of labeling: (diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP nts in irritation. rious eye irritation. rious eye irritation. e respiratory irritation. tatements Do not get in eyes, on skin, or on clothing. Wear protective gloves/protective clothing/eye protection/face protection.
GHS label elem The substance i. Hazard pictogra GHS07 Signal word Wa Hazard-determa (R)-(+)-2,2'-Bis Hazard stateme H315 Causes sk H319 Causes se H335 May caus Precautionary s P262 P280	ents s classified and labeled according to the Globally Harmonized System (GHS). tms urning ining components of labeling: (diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP nts in irritation. rious eye irritation. e respiratory irritation. e respiratory irritation. statements Do not get in eyes, on skin, or on clothing. Wear protective gloves/protective clothing/eye protection/face protection. 338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if prese
GHS label elem The substance i. Hazard pictogra GHS07 Signal word Wa Hazard-determa (R)-(+)-2,2'-Bis Hazard stateme H315 Causes sk H319 Causes se H335 May caus Precautionary s P262 P280 P305+P351+P.	ents s classified and labeled according to the Globally Harmonized System (GHS). tms urning ining components of labeling: (diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP nts in irritation. rious eye irritation. e respiratory irritation. e respiratory irritation. tatements Do not get in eyes, on skin, or on clothing. Wear protective gloves/protective clothing/eye protection/face protection. 338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if prese and easy to do. Continue rinsing.
GHS label elem The substance i. Hazard pictogra GHS07 Signal word Wa Hazard-determa (R)-(+)-2,2'-Bis Hazard stateme H315 Causes sk H319 Causes se H335 May caus Precautionary s P262 P280 P305+P351+P. P304+P340	ents s classified and labeled according to the Globally Harmonized System (GHS). tms urning ining components of labeling: (diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP nts in irritation. rious eye irritation. e respiratory irritation. e respiratory irritation. tatements Do not get in eyes, on skin, or on clothing. Wear protective gloves/protective clothing/eye protection/face protection. 338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if prese and easy to do. Continue rinsing. IF INHALED: Remove person to fresh air and keep comfortable for breathing.
GHS label elem The substance i. Hazard pictogra GHS07 Signal word Wa Hazard-determa (R)-(+)-2,2'-Bis Hazard stateme H315 Causes sk H319 Causes se H335 May caus Precautionary s P262 P280 P305+P351+P.	 vents s classified and labeled according to the Globally Harmonized System (GHS). vms vming vming components of labeling: (diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP nts vin irritation. vini irritation. e respiratory irritation. varents Do not get in eyes, on skin, or on clothing. Wear protective gloves/protective clothing/eye protection/face protection. 338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if prese and easy to do. Continue rinsing.
GHS label elem The substance i. Hazard pictogra GHS07 Signal word Wa Hazard-determa (R)-(+)-2,2'-Bis Hazard stateme H315 Causes sk H319 Causes se H335 May caus Precautionary s P262 P280 P305+P351+P. P304+P340 P403+P233 P501	ents s classified and labeled according to the Globally Harmonized System (GHS). uns uns uning cining components of labeling: (diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl (R)-(+)-H8-BINAP nts in irritation. rious eye irritation. e respiratory irritation. e respiratory irritation. etatements Do not get in eyes, on skin, or on clothing. Wear protective gloves/protective clothing/eye protection/face protection. 338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if prese and easy to do. Continue rinsing. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Store in a well-ventilated place. Keep container tightly closed.



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16 Other information This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship. · Department issuing SDS: Technical Department. · Contact: Technical Director · Date of preparation / last revision 07/16/2021 / -· Abbreviations and acronyms: ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road) IMDG: International Maritime Code for Dangerous Goods DOT: US Department of Transportation IATA: International Air Transport Association ACGIH: American Conference of Governmental Industrial Hygienists CAS: Chemical Abstracts Service (division of the American Chemical Society) NFPA: National Fire Protection Association (USA) HMIS: Hazardous Materials Identification System (USA) VOC: Volatile Organic Compounds (USA, EU) PBT: Persistent, Bioaccumulative and Toxic vPvB: very Persistent and very Bioaccumulative NIOSH: National Institute for Occupational Safety OSHA: Occupational Safety & Health TLV: Threshold Limit Value PEL: Permissible Exposure Limit REL: Recommended Exposure Limit Skin Irrit. 2: Skin corrosion/irritation - Category 2 Eye Irrit. 2A: Serious eye damage/eye irritation - Category 2A STOT SE 3: Specific target organ toxicity (single exposure) – Category 3