



## SAFETY DATA SHEET

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### SECTION 1 - IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

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<b>Product identifier</b>	trans- $\beta$ -Farnesene
<b>Synonyms</b>	1,6,10-Dodecatriene, 7,11-dimethyl-3-methylene, (6 <i>E</i> ); 1,6,10-Dodecatriene, 7,11-dimethyl-3-methylene, ( <i>E</i> ); ( <i>E</i> )-7,11-Dimethyl-3-methylenedodeca-1,6,10-triene; ( <i>E</i> )-7,11-Dimethyl-3-methylene-1,6,10-dodecatriene
<b>Trade names</b>	HP Farnesene
<b>Chemical family</b>	Terpene hydrocarbons
<b>Relevant identified uses of the substance or mixture and uses advised against</b>	For use as an intermediate in the preparation of renewable chemical products for the cosmetics, specialty chemicals and biofuel industries.
<b>Note</b>	The pharmacologic and toxicologic properties of this substance have not been fully characterized; this SDS will be revisited as more data become available.
<b>Issue Date</b>	30 May 2013

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### SECTION 2 - HAZARDS IDENTIFICATION

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<b>US Signal word</b>	Danger
<b>US Hazard overview</b>	Harmful or fatal if swallowed. Can enter lungs and cause damage. May cause mild skin irritation. Substance not yet fully tested.
<b>Classification of the substance or mixture</b>	
<b>Regulation (EC) 1272/2008 [GHS]</b>	Aspiration hazard - Category 1. Chronic aquatic toxicity – Category 4. Substance not yet fully tested. Mild skin irritation- Category 3.

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**SECTION 2 - HAZARDS IDENTIFICATION ...continued**

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**Label elements****CLP/GHS hazard pictogram****CLP/GHS signal word**     Danger**CLP/GHS hazard statements**     H304 - May be fatal if swallowed and enters airways. H316- Causes mild skin irritation. H413 – May cause long lasting harmful effects to aquatic life**CLP/GHS precautionary statements**     P273-Avoid release to the environment. P301+P310 - If swallowed: Immediately contact a poison control center or physician. P331- Do NOT induce vomiting. P332+P313: If skin irritation occurs: get medical advice. P405 - Store locked up. P501 - Dispose of contents/container to location in accordance with local/regional/national/international regulations.**NFPA Classification:**     Health Hazard: 1; Fire Hazard: 1; Reactivity Hazard; 0**Other hazards**     See Section 11.**Note**     This substance should be considered hazardous according to Regulation (EC) No 1272/2008 (EU CLP) and United Nations ST/SG/AC 10/30 rev 3 applicable GHS regulations. The pharmacologic and toxicologic properties of this substance have not been fully characterized. See Section 16 for full text of GHS classifications.

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**SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENTS**

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<u>Ingredient</u>	<u>CAS #</u>	<u>EINECS/ELIN CS#</u>	<u>Amount</u>	<u>GHS Classification</u>
trans- $\beta$ -Farnesene	18794-84-8	242-582-0	~98%	AH1: H304; SI3: H316; CA4: H413

**Note**     The substance listed above should be considered hazardous because the pharmacologic and toxicologic properties have not yet been fully characterized. This product may be stabilized with small quantities of t-butylcatechol (30-130 ppm). See Section 16 for full text of GHS classifications.

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## SECTION 4 - FIRST AID MEASURES

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<b>Description of first aid measures</b>	
<b>Immediate Medical Attention Needed</b>	Yes
<b>Eye Contact</b>	If easy to do, remove contact lenses, if worn. Immediately flush eyes with copious quantities of water for at least 15 minutes. If irritation occurs or persists, notify medical personnel and supervisor.
<b>Skin Contact</b>	Wash exposed area with soap and water and remove contaminated clothing/shoes. If irritation occurs or persists, notify medical personnel and supervisor.
<b>Inhalation</b>	Immediately move exposed subject to fresh air. If not breathing, give artificial respiration. If breathing is labored, administer oxygen. Immediately notify medical personnel and supervisor.
<b>Ingestion</b>	If swallowed, call a physician immediately. Do not induce vomiting unless directed by medical personnel. Do not give anything to drink unless directed by medical personnel. Never give anything by mouth to an unconscious person. Notify medical personnel and supervisor.
<b>Protection of first aid responders</b>	See Section 8 for Exposure Controls/Personal Protection recommendations.
<b>Most important symptoms and effects, both acute and delayed</b>	See Sections 2 and 11
<b>Indication of immediate medical attention and special treatment needed, if necessary</b>	Treat symptomatically and supportively. If accidental exposure occurs to an individual who is also taking one or more concomitant medications, consult the respective package or prescribing information for potential drug interactions.

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## SECTION 5 - FIREFIGHTING MEASURES

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<b>Extinguishing media</b>	Use water spray (fog), foam, dry powder, or carbon dioxide, as appropriate for surrounding fire and materials.
<b>Specific hazards arising from the substance or mixture</b>	No information identified. May emit toxic fumes of carbon monoxide and carbon dioxide.
<b>Flammability/Explosivity</b>	No explosivity or flammability data identified. High airborne concentrations of finely divided organic particles can potentially explode if ignited.
<b>Advice for firefighters</b>	Wear full protective clothing and a self-contained breathing apparatus with a full facepiece operated in the pressure demand or other positive pressure mode. Decontaminate all equipment after use.

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## SECTION 6 - ACCIDENTAL RELEASE MEASURES

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<b>Personal precautions, protective equipment and emergency procedures</b>	If product is released or spilled, take proper precautions to minimize exposure by using appropriate personal protective equipment (see Section 8). Area should be adequately ventilated.
<b>Environmental precautions</b>	Do not empty into drains. Avoid release to the environment.
<b>Methods and material for containment and cleaning up</b>	For small spills (such as in a laboratory), soak up material with absorbent, e.g., damp paper towel, and wash spill area thoroughly with soap and water. For large spills in manufacturing, use an industrial vacuum cleaner equipped with a high efficiency particulate (HEPA) filter if available. Alternatively if in solid or dried form, do not raise dust. Surround spill or powder with absorbents and place a damp cloth or towel over the area to minimize powder from entering the air. Use care in the choice of absorbents as some may react and generate excess heat and create a risk of fire. Review safety data sheets of absorbents prior to use. Add excess liquid to allow for the material to enter solution. Capture remaining liquid onto spill absorbents. Place spill materials into a leak-proof container suitable for disposal. Decontaminate area a second time. Dispose of material in a manner that is compliant with federal, state and local laws.
<b>Reference to other sections</b>	See Sections 8 and 13 for more information.

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## SECTION 7 - HANDLING AND STORAGE

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<b>Precautions for safe handling</b>	Avoid contact with eyes, skin and other mucous membranes. Wash thoroughly after handling. Use personal protective equipment. Avoid breathing vapor. Do not eat, drink or smoke while handling this product. Avoid prolonged or repeated exposure. Provide sufficient air exchange and/or exhaust in workrooms. Take precautionary measures against static discharges. Use normal preventative fire protection measures.
<b>Conditions for safe storage including any incompatibilities</b>	Keep container tightly closed. Keep in a cool and well ventilated area. To maintain product quality, do not store in heat or direct sunlight. Store at temperatures <40°C.
<b>Specific end use(s)</b>	No information identified.

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## SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

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### Control Parameters/Occupational Exposure Limit Values

<u>Compound</u>	<u>Issuer</u>	<u>Type</u>	<u>OEL</u>
trans- $\beta$ -Farnesene	--	--	--

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**SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION ...continued**

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<b>Exposure/Engineering controls</b>	Control exposures to below the OEL (if available). Selection and use of containment devices and personal protective equipment should be based on a risk assessment of exposure potential. Use local exhaust and/or enclosure at mist/aerosol/spray-generating points. High-energy operations such as spraying should be done within an approved emission control or containment system.
<b>Respiratory protection</b>	Choice of respiratory protection should be appropriate to the task and the level of existing engineering controls. An approved and properly fitted air-purifying respirator with HEPA filters should provide ancillary protection based on the known or foreseeable limitations of existing engineering controls.
<b>Hand protection</b>	Wear nitrile or other impervious gloves if skin contact is possible. When the material is dissolved or suspended in an organic solvent, wear gloves that provide protection against the solvent.
<b>Skin protection</b>	Wear appropriate gloves, lab coat, or other protective overgarment if skin contact is likely. Base the choice of skin protection on the job activity, potential for skin contact and solvents and reagents in use.
<b>Eye/face protection</b>	Wear safety glasses with side shields, chemical splash goggles, or full face shield, if necessary. Base the choice of protection on the job activity and potential for contact with eyes or face. An emergency eye wash station should be available.
<b>Environmental Exposure Controls</b>	Avoid release to the environment and operate within closed systems wherever practicable. Air and liquid emissions should be directed to appropriate pollution control devices. In case of spill, do not release to drains. Implement appropriate and effective emergency response procedures to prevent release or spread of contamination and to prevent inadvertent contact by personnel.
<b>Other protective measures</b>	Wash hands in the event of contact with this substance, especially before eating, drinking or smoking. Protective equipment is not to be worn outside the work area (e.g., in common areas or out-of-doors). Decontaminate all protective equipment following use.

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**SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

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**Information on basic physical and chemical properties**

<b>Appearance</b>	Liquid
<b>Color</b>	Colorless to pale-yellow
<b>Odor</b>	Woody
<b>Odor threshold</b>	No information identified.

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**SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ...continued**

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<b>pH</b>	No information identified.
<b>Melting point/freezing point</b>	< -70°C (pour point)
<b>Initial boiling point and boiling range</b>	250-260 °C (760 mm Hg);
<b>Flash point</b>	116.0 °C (240.8 °F)
<b>Evaporation rate</b>	No information identified.
<b>Flammability (solid, gas)</b>	No information identified.
<b>Upper/lower flammability or explosive limits</b>	LFL 0.5% (25 °C@758 mmHg) UFL 6.5% (25 °C@758 mmHg)
<b>Vapor pressure</b>	117 Pa @ 20 °C
<b>Vapor density</b>	>1 (Air = 1)
<b>Relative density</b>	0.83 g/mL (15°C)
<b>Water solubility</b>	Estimated < 0.0001 g/L @ 20 °C (OECD 105)
<b>Solvent solubility</b>	Soluble in alcohols.
<b>Partition coefficient (n-octanol/water)</b>	Log Kow>6.5 (OECD 117).
<b>Auto-ignition temperature</b>	237 °C.
<b>Decomposition temperature</b>	No information identified.
<b>Viscosity</b>	2.52 cSt @ 20 °C
<b>Explosive properties</b>	No information identified.
<b>Oxidizing properties</b>	No information identified.
<b>Other information</b>	
<b>Molecular weight</b>	204.36
<b>Molecular formula</b>	C <sub>15</sub> H <sub>24</sub>

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**SECTION 10 - STABILITY AND REACTIVITY**

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<b>Reactivity</b>	No information identified.
<b>Chemical stability</b>	May form dimeric or polymeric by-products on standing.

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**SECTION 10 - STABILITY AND REACTIVITY ...continued**

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<b>Possibility of hazardous reactions</b>	Not expected to occur under normal storage conditions.
<b>Conditions to avoid</b>	Keep away from heat and open flames.
<b>Incompatible materials</b>	Avoid strong oxidizers, acids and bases.
<b>Hazardous decomposition products</b>	No information identified.

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**SECTION 11 - TOXICOLOGICAL INFORMATION**

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**Information on toxicological effects**

**Route of entry** May be absorbed by inhalation, skin contact and ingestion.

**Acute toxicity**

<u>Compound</u>	<u>Type</u>	<u>Route</u>	<u>Species</u>	<u>Dose</u>
trans- $\beta$ -Farnesene	LD <sub>50</sub>	Oral	Rat	>5000 mg/kg
	LD <sub>50</sub>	Dermal	Rabbit	>5000 mg/kg
	LC <sub>50</sub> (4 hour)	Inhalation	Rat	>2 mg/L

**Irritation/Corrosion** Farnesene may cause mild skin irritation. Farnesene is not classified as an eye irritant.

**Sensitization** No skin sensitization was observed in a local lymph node assay (LLNA) in mice.

**STOT-single exposure** No studies identified.

**STOT-repeated exposure/dose toxicity** No studies identified.

**Reproductive toxicity** No studies identified.

**Developmental toxicity** No studies identified.

**Genotoxicity** Negative in an Ames bacterial cell mutagenicity assay.

**Carcinogenicity** No studies identified. This substance is not listed by NTP, IARC, ACGIH or OSHA as a carcinogen.

**Aspiration hazard** Based on viscosity and information from similar substances this substance is considered an aspiration hazard.

**Human health data** See "Section 2 - Other Hazards"

**Additional information** Substance not yet fully tested.

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## SECTION 12 - ECOLOGICAL INFORMATION

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### Toxicity

<u>Compound</u>	<u>Type</u>	<u>Species</u>	<u>Concentration</u>
trans- $\beta$ -Farnesene	72 hr EC <sub>50</sub>	<i>Pseudokirchneriella subcapitata</i>	>100% v/v saturated solution
	48 hr EC <sub>50</sub>	<i>Daphnia magna</i>	>100% v/v saturated solution

**Additional toxicity information** No observable effects were noted on activated sludge microorganisms at the top concentration of 1000 mg/L tested (OECD 209).

**Persistence and Degradability** Not readily biodegradable in a CO<sub>2</sub>-evolution ready biodegradability test (OECD301B).

**Bioaccumulative potential** No data available.

**Mobility in soil** Farnesene has a log K<sub>oc</sub> = 4.69 and is expected to have low mobility in soil.

**Results of PBT and vPvB assessment** No data available.

**Other adverse effects** No data available.

**Note** The environmental characteristics of this substance have not been fully investigated. Releases to the environment should be avoided. As the log K<sub>OW</sub> is >4 and the compound is not readily biodegradable, this compound has been classified for chronic aquatic toxicity – see section 2 for specific information

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## SECTION 13 - DISPOSAL CONSIDERATIONS

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**Waste treatment methods** Used product should be disposed of according to local, state, and federal regulations. Do not send down the drain or flush down the toilet. All wastes containing the material should be properly labeled. Dispose of wastes in accordance to prescribed federal, state, and local guidelines, e.g., appropriately permitted chemical waste incinerator. Rinse waters resulting from spill cleanups should be discharged in an environmentally safe manner, e.g., appropriately permitted municipal or on-site wastewater treatment facility.

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## SECTION 14 - TRANSPORT INFORMATION

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**Transport** Based on the available data, this substance is not regulated as a hazardous material/dangerous good under EU ADR/RID, US DOT, Canada TDG, IATA, or IMDG.

**UN number** None assigned.

**UN proper shipping name** None assigned.

**Transport hazard classes and packing group** None assigned.

**Environmental hazards** Based on the available data, this substance is not regulated as an environmental hazard or a marine pollutant.



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**SECTION 14 - TRANSPORT INFORMATION ...continued**

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**Special precautions for users** Substance not fully tested - avoid exposure.

**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.

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**SECTION 15 - REGULATORY INFORMATION**

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**Safety, health and environmental regulations/legislation specific for the substance or mixture** This SDS complies with the requirements under US, EU and GHS (EU CLP - Regulation EC No 1272/2008 and GHS UN ST/SG/AC 10/30 rev 3 2009) guidelines.

**Chemical safety assessment** Not conducted.

**OSHA Hazardous** Yes. Harmful or fatal if swallowed. Can enter lungs and cause damage. May cause mild skin irritation. Substance not fully tested.

**WHMIS classification** This substance does not meet any of the hazard criteria of the Controlled Products Regulations and the SDS contains all of the information required by those regulations.

**TSCA status** Listed on July 2008 Inventory.

**SARA section 313** Not listed.

**California proposition 65** Not listed.

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**SECTION 16 - OTHER INFORMATION**

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**Full text of H phrases, P phrases and GHS classification** AH1- Aspiration Hazard - Category 1 H304 - May be fatal if swallowed and enters airways. CA4 - Chronic aquatic toxicity - Category 4. H413- May cause long lasting harmful effects in the environment. SI3-Causes mild irritation- Category 3.

**Sources of data** Information from published literature and internal company data.

**Abbreviations** ACGIH - American Conference of Governmental Industrial Hygienists ADR/RID - European Agreement Concerning the International Carriage of Dangerous Goods by Road/Rail AIHA - American Industrial Hygiene Association; CAS# - Chemical Abstract Services Number; DNEL - Derived No Effect Level DOT - Department of Transportation

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**SECTION 16 - OTHER INFORMATION ...continued**

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**Abbreviations ...continued** EINECS - European Inventory of New and Existing Chemical Substances  
ELINCS - European List of Notified Chemical Substances EU - European Union  
GHS - Globally Harmonized System of Classification and Labelling of Chemicals  
IARC - International Agency for Research on Cancer IDLH - Immediately Dangerous to Life or Health IATA - International Air Transport Association  
IMDG - International Maritime Dangerous Goods LOEL - Lowest Observed Effect Level LOAEL - Lowest Observed Adverse Effect Level NIOSH - The National Institute for Occupational Safety and Health NOEL - No Observed Effect Level NOAEL - No Observed Adverse Effect Level NTP - National Toxicology Program OEL - Occupational Exposure Limit OSHA - Occupational Safety and Health Administration PBT - Persistent, Bioaccumulative and Toxic PNEC - Predicted No Effect Concentration SARA - Superfund Amendments and Reauthorization Act STEL - Short Term Exposure Limit TDG - Transport Dangerous Goods TSCA - Toxic Substances Control Act TWA - Time Weighted Average WHMIS - Workplace Hazardous Materials Information System

**Revisions** This is the ninth version of this SDS.

**Disclaimer** The above information is based on data available to us and is believed to be correct. Since the information may be applied under conditions beyond our control and with which we may be unfamiliar, we do not assume any responsibility for the results of its use and all persons receiving it must make their own determination of the effects, properties and protections which pertain to their particular conditions. No representation, warranty, or guarantee, express or implied (including a warranty of fitness or merchantability for a particular purpose), is made with respect to the materials, the accuracy of this information, the results to be obtained from the use thereof, or the hazards connected with the use of the material. Caution should be used in the handling and use of the material because it is a chemical substance. The above information is offered in good faith and with the belief that it is accurate. As of the date of issuance, we are providing all information relevant to the foreseeable handling of the material. However, in the event of an adverse incident associated with this product, this Safety Data Sheet is not, and is not intended to be, a substitute for consultation with appropriately trained personnel.