

Safety Data Sheet acc. to OSHA HCS

Printing date 05/25/2017

Reviewed on 05/25/2017

1 Identification

- **Product identifier**
- **Trade name:** **ALPHA PINENE - QUALITY 1**
- **Product Description** terpene hydrocarbon
- **Application of the substance / the mixture**
Chemical intermediate used in the manufacture of synthetic flavors and fragrances.
Chemical intermediate used in the manufacture of alpha pinene based polymer resins.
- **Details of the supplier of the safety data sheet**
- **Manufacturer/Supplier:**
Manufacturer:
DRT America LLC
400 Governor Treutlen Drive
Rincon, GA 31326
Supplier:
Les Dérivés Résiniques & Terpéniques
30 Rue Gambetta, BP 206
40105 Dax Cedex
France
- **Information department:** Regulatory Affairs
- **Emergency telephone number:**
Within USA and Canada: 1-800-CHEMTREC (424-9300)
Outside the USA and Canada: 1-703-527-3887

2 Hazard(s) identification

- **Classification of the substance or mixture**



GHS02 Flame

Flam. Liq. 3 H226 Flammable liquid and vapor.



GHS08 Health hazard

Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.



GHS09 Environment

Aquatic Acute 1 H400 Very toxic to aquatic life.

Aquatic Chronic 1 H410 Very toxic to aquatic life with long lasting effects.



GHS07

Skin Irrit. 2 H315 Causes skin irritation.

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Skin Sens. 1 H317 May cause an allergic skin reaction.

· **Label elements**

· **GHS label elements**

The substance is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**



GHS02 GHS07 GHS08 GHS09

· **Signal word** Danger

· **Hazard statements**

H226 Flammable liquid and vapor.

H315 Causes skin irritation.

H317 May cause an allergic skin reaction.

H304 May be fatal if swallowed and enters airways.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

· **Precautionary statements**

P202 Do not handle until all safety precautions have been read and understood.

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P233 Keep container tightly closed.

P243 Take precautionary measures against static discharge.

P261 Avoid breathing dust/fume/gas/mist/vapors/spray

P264 Wash thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.

P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P330 Rinse mouth.

P331 Do NOT induce vomiting.

P333+P313 If skin irritation or rash occurs: Get medical advice/attention.

P337+P313 If eye irritation persists: Get medical advice/attention.

P363 Wash contaminated clothing before reuse.

P403+P235 Store in a well-ventilated place. Keep cool.

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Information pertaining to particular dangers for man and environment:**

May cause eye irritation.

May cause skin irritation.

May be absorbed through the skin.

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Inhalation of vapor or mist may cause respiratory tract irritation.
May cause central nervous system depression (dizziness, drowsiness, incoordination).

POTENTIAL HEALTH EFFECTS

Ingestion may cause nausea, vomiting, and gastrointestinal irritation.
Aspiration may cause lung damage.

Refer to Section 5 for Hazardous Combustion Products and Section 10 for Hazardous Decomposition/
Hazardous Polymerization Products.

- **Classification system:**
- **NFPA ratings (scale 0 - 4)**



- **HMIS-ratings (scale 0 - 4)**



- **Other hazards**
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.

3 Composition/information on ingredients

- **Chemical characterization: Substances**
monoconstituent
alpha-pinene (2,6,6-trimethylbicyclo[3.1.1]hept-2-ene) 95-98%
- **CAS No.:** 80-56-8
- **CAS No. Description**
alpha pinene (2,6,6-trimethylbicyclo[3.1.1]hept-2-ene)
- **EC number:** 201-291-9
- **Impurities and stabilising additives:**
Impurities levels:
beta-pinene 0 - 3%
camphene 0 - 3%
alpha-fenchene 0 - 1%
tricyclene 0 - 1%

4 First-aid measures

- **Description of first aid measures**
- **After inhalation:** Remove to fresh air. Get medical attention if nasal, throat or lung irritation develops.

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- **After skin contact:**
Wash thoroughly with soap and water. Remove contaminated clothing. Get immediate medical attention. Thoroughly wash clothing before reuse.
- **After eye contact:**
Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get immediate medical attention.
- **After swallowing:** Do NOT induce vomiting. Get immediate medical attention. See Note to Physician.
- **Information for doctor:**
Aspiration into the lungs will result in chemical pneumonitis and may be fatal. Ingestion may cause damage to the esophageal mucosa which would contraindicate insertion of a nasogastric tube. Measures against circulatory shock and respiratory depression may be necessary.
- **Most important symptoms and effects, both acute and delayed**
Pulmonary effects if swallowed accidentally.
- **Indication of any immediate medical attention and special treatment needed**
Do not induce vomiting. Aspiration may cause lung damage.
If swallowed or in case of vomiting, danger of entering the lungs.
Medical supervision for at least 48 hours.

5 Fire-fighting measures

- **Extinguishing media**
- **Suitable extinguishing agents:**
Dry chemical, carbon dioxide or foam may be used on fires involving this product.
- **For safety reasons unsuitable extinguishing agents:** If water must be used, use as a spray only.
- **Special hazards arising from the substance or mixture**
During combustion, the following substances may be formed:
Carbon monoxide (CO)
Carbon Dioxide (CO₂)
Irritating gases
Aldehydes
Carboxylic acids
- **Advice for firefighters**
- **Protective equipment:**
Wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH approved (or equivalent) and full protective gear when fighting fires involving this product.
Cool containers with water to prevent rupture.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
Extinguish all sources of ignition. Ventilate area. Wear protective equipment as required (see SDS Section 8). Evacuate area of all personnel.
Wear protective equipment. Keep unprotected persons away.
- **Environmental precautions:**
Do not allow product to reach soil, waterways, drains and sewers.
Inform the relevant authorities if the product has caused environmental pollution (soil, waterways, drains or sewers).

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- **Methods and material for containment and cleaning up:**
For small spills: Add absorbent, sweep up, and dispose properly.
For large spills: Dike to contain and pump into drums for use or disposal.
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
- **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**
Flammable. Bond containers during filling or discharge when performed at temperatures at or above the product flash point.
Keep containers closed when not in use.
- **Information about protection against explosions and fires:**
Keep away from heat, flame, sparks and other ignition sources.
Spontaneous combustion may occur in materials soaked with this product and exposed to air, as well as soaked vessel and piping insulation.
Avoid storing product near incompatible materials. See SDS Section 10.
Keep ignition sources away - Do not smoke.
Use only non-sparking tools.
Protect against electrostatic charges.
- **Conditions for safe storage, including any incompatibilities**
- **Storage:**
- **Requirements to be met by storerooms and receptacles:**
Store in areas designed for flammable liquid storage (see NFPA 30).
Store in a cool, dry, well-ventilated area.
- **Information about storage in one common storage facility:** Not required.
- **Further information about storage conditions:**
Keep receptacle tightly sealed.
Recommended materials for storage: stainless steel or aluminum containers with specific inner coating.
Certain plastics and elastomers may not be compatible with the product. Test or get manufacturer's recommendation prior to use.
- **Specific end use(s)** No further relevant information available.

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8 Exposure controls/personal protection

- **Additional information about design of technical systems:**

- Eliminate ignition sources and prevent build-up of static electrical charges.
- Properly discard any item soaked with material, as spontaneous heating may occur.
- Eyewash fountains and safety showers should be easily accessible.
- Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
- Discharge from the ventilation system should comply with applicable air pollution control regulations.
- Keep area clean. Product will burn.
- For good industrial hygiene practice: Completely isolate and thoroughly clean all equipment, piping, or vessels before beginning maintenance or repairs.

- **Control parameters**

- **Components with limit values that require monitoring at the workplace:**

80-56-8 alpha pinene (95-98%)

TLV	Long-term value: 112 mg/m ³ , 20 ppm (SEN) NIC-DSEN
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- **Additional information:** The lists that were valid during the creation were used as basis.

- **Exposure controls**

- **Personal protective equipment:**

- **General protective and hygienic measures:**

- Avoid contact with eyes, skin, and clothing.
- Avoid breathing vapor, fumes or mist.
- Handle in areas with adequate ventilation.
- Do not swallow.
- Avoid contamination of food, beverages, or smoking materials.
- Wash thoroughly after handling, and before eating, drinking or smoking.
- Remove contaminated clothing and shoes promptly and clean thoroughly before reuse.
- Wash hands before breaks and at the end of work.

- **Breathing equipment:**

Appropriate respiratory protection is required when exposure to airborne contaminants may exceed acceptable limits. Respirators should be selected and used in accordance with OSHA, Subpart I (29 CFR 1910.134) and manufacturers recommendations.

- **Protection of hands:**

Impervious gloves
The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Selection of the glove material should be made based on consideration of the penetration times, rates of diffusion and the degradation

- **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.

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· **Eye protection:**



Tightly sealed goggles

· **Body protection:** Appropriate protective clothing

9 Physical and chemical properties

· **Information on basic physical and chemical properties**

· **General Information**

· **Appearance:**

· Form:	Liquid
· Color:	Colorless
· Odor:	Pine
· Odor threshold:	Not determined.
· Freezing Point	< -40°F

· **pH-value:** Not determined.

· **Change in condition**

· Melting point/Melting range:	-64/-55 °C (-83/-67 °F)
· Boiling point/Boiling range:	155 °C (311 °F)

· **Flash point:** 31 °C (88 °F) (closed cup)

· **Flammability (solid, gaseous):** Flammable.

· **Ignition temperature:**

· **Decomposition temperature:** Not determined.

· **Auto ignition temperature:** 255°C

· **Danger of explosion:** Product is not explosive. However, formation of explosive air/vapor mixtures are possible.

· **Explosion limits:**

· Lower:	Not determined.
· Upper:	Not determined.

· **Vapor pressure at 25 °C (77 °F):** 4.75 mmHg

· **Density at 15 °C (59 °F):** 0.8625 g/cm³ (7.198 lbs/gal)

· **Bulk density:** Not determined

· **Relative density:** Not determined.

· **Vapor density:** 4.7 (AIR = 1)

· **Evaporation rate:** slower than butyl acetate

· **Solubility in / Miscibility with**

· **Water:** Negligible at 68°F

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· **Partition coefficient (n-octanol/water):** 4.83

· **Viscosity:**

Dynamic:

Not determined.

Kinematic:

Not determined.

· **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**

Explodes on contact with nitrosyl perchlorate.

HAZARDOUS POLYMERIZATION - Not anticipated under normal or recommended handling and storage conditions.

· **Conditions to avoid**

Prolonged or excessive heat and/or exposure to air may cause non-hazardous decomposition and/or oxidation of the substance. Keep away from heat and sources of ignition.

· **Incompatible materials:** Incompatible with: oxidizing agents, acids and acid catalysts

· **Hazardous decomposition products:** No dangerous decomposition products known.

· **Additional information:** Stable under recommended handling and storage conditions.

11 Toxicological information

· **Information on toxicological effects**

· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

Oral	LD50	3700 mg/kg (rat)
Dermal	LD50	>5000 mg/kg (rabbit)

· **Primary irritant effect:**

· **on the skin:**

An *in vitro* irritation study on reconstructed human epidermis was conducted with alpha-pinene. Classification criteria were met.

· **on the eye:**

Only reversible effects were observed with two structurally related substances in eye irritation studies in rabbit (OECD 405).

· **Sensitization:**

Skin sensitization effects were observed with structurally related substances in the murine Local Lymph Node Assay (LLNA - OECD 429) and in Guinea Pig Maximisation Test (GPMT - OECD 406).

· **Other information (about experimental toxicology):**

PRODUCT/SIMILAR PRODUCT -

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Ingestion causes gastric irritation, pain, nausea, vomiting.

Inhalation may cause chest pain, bronchitis, dizziness, delirium, ataxia or coma. Aspiration into the lungs will cause chemical pneumonia. Inhalation may cause pulmonary edema or pneumonia. May be absorbed through the skin, lungs, and intestinal tract, resulting in kidney damage, painful urination, respiratory or central nervous system effects. Chronic contact may cause benign skin tumors.

• **Additional toxicological information:**

Mutagenicity/genotoxicity:

No mutagenicity was observed (OECD 471, Ames tests) with alpha-pinene.

Alpha-pinene was not genotoxic in vivo in mouse (Mammalian Erythrocyte Micronucleus Test)

No genotoxic effects were observed when a complex substance containing alpha-pinene was tested on mammalian cells (in vitro Mammalian Chromosome Aberration Test - OECD 473 and in vitro Mammalian Cell Gene Mutation Test - OECD 476).

Carcinogenicity: Based on a 90-day toxicity study in rat, alpha-pinene is not expected to be carcinogenic for humans.

Reproductive toxicity:

No effects were observed with alpha-pinene on reproductive organs in a 90-day repeated toxicity study in rat. A structurally related substance was tested in a prenatal development toxicity study in rat (OECD 414) and did not induce any effect. No effects were found in a teratogenicity/postnatal development study conducted in rat with a complex substance containing alpha-pinene.

• **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:**

Tests carried out on a structurally related substance:

LC₅₀ (96 h), fish (Danio rerio): 0.303 mg/L (measured concentration - OECD 203)

EC₅₀ (48 h), daphnids (Daphnia magna): 0.475 mg/L (measured concentration - OECD 202)

LOEC (48 h), algae (Pseudokirchneriella subcapitata): 0.494 mg/L (measured concentration - OECD 201)

NOEC (48 h), algae (Pseudokirchneriella subcapitata): 2.27 mg/L (measured concentration - OECD 201)

No effects were observed on algae (Pseudokirchneriella subcapitata) after 72 h, at the solubility limit of the substance.

Toxicity to aquatic microorganisms

No inhibition effects were observed on activated sludge of a predominantly domestic sewage, in a study conducted according to OECD 209 Guideline, with a structurally related substance tested at the solubility limit.

• **Persistence and degradability**

Alpha-pinene is readily biodegradable: biodegradation of 90 - 95% was achieved in 28 days in a study conducted according to OECD 301C Guideline (oxygen consumption). In addition, two structurally related substances were found readily biodegradable in OECD 301D studies.

• **Behavior in environmental systems:**

• **Bioaccumulative potential** No further relevant information available.

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- **Mobility in soil** No further relevant information available.
- **Results of PBT and vPvB assessment**
- **PBT:** Not a PBT.
- **vPvB:** Not vPvB.
- **Other adverse effects** No further relevant information available.

13 Disposal considerations

- **Waste treatment methods**
- **Recommendation:**
Incineration in accordance with applicable regulations is the recommended disposal method. Disposal should be in accordance with applicable Federal, State and local regulations.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

- | | |
|---|--------------------------------------|
| · UN-Number | UN2368 |
| · DOT, ADR, IMDG, IATA | |
| · UN proper shipping name | alpha-Pinene |
| · DOT | 2368 alpha-Pinene |
| · ADR | alpha-PINENE |
| · IMDG, IATA | |
| · Transport hazard class(es) | |
| · DOT | |
|   | |
| · Class | 3 Flammable liquids |
| · Label | 3 |
| ----- | |
| · ADR | |
|   | |
| · Class | 3 Flammable liquids
Non-regulated |

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· Label	3
· IMDG	
	
· Class	3 Flammable liquids
· Label	3
· IATA	
	
· Class	3 Flammable liquids
· Label	3
· Packing group	III
· DOT, ADR, IMDG, IATA	III
· Environmental hazards:	
· Marine pollutant:	Yes (DOT) Symbol (fish and tree)
· Special marking (ADR):	Symbol (fish and tree)
· Special precautions for user	Warning: Flammable liquids
· Danger code (Kemler):	30
· EMS Number:	F-E,S-E
· Stowage Category	A
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.
· Transport/Additional information:	
· DOT	
· Remarks:	Special marking with the symbol (fish and tree).
· ADR	
· Excepted quantities (EQ)	Code: E1 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 1000 ml
· IMDG	
· Limited quantities (LQ)	5L
· Excepted quantities (EQ)	Code: E1 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 1000 ml

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· **UN "Model Regulation":** UN 2368 ALPHA-PINENE, 3, III

15 Regulatory information

· **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):**

This product does not contain any chemicals subject to reporting under Section 313 of Title III of the Superfund Amendments and Reauthorization Act and 40CFR372.

Substance is not listed.

· **SECTIONS 302/304**

This product is not an Extremely Hazardous Substance subject to reporting under 40CFR355.

· **SECTION 311 AND 312**

HC-1: Acute health hazard

HC-3: Fire hazard

· **CERCLA**

This product does not contain any chemicals subject to reporting as a CERCLA Hazardous Substance under 40CFR302.4.

· **RCRA**

This product exhibits the following characteristics listed in 40CFR261, Subpart C; ignitability (D-001). Disposal of unused product must comply with the hazardous waste regulations.

· **TSCA (Toxic Substances Control Act):** Substance is listed.

· **Proposition 65**

· **Chemicals known to cause cancer:** Substance is not listed.

· **Chemicals known to cause reproductive toxicity for females:** Substance is not listed.

· **Chemicals known to cause reproductive toxicity for males:** Substance is not listed.

· **Chemicals known to cause developmental toxicity:** Substance is not listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)** Substance is not listed.

· **TLV (Threshold Limit Value established by ACGIH) A4**

· **NIOSH-Ca (National Institute for Occupational Safety and Health)** Substance is not listed.

· **Canadian substance listings:**

· **Canadian Domestic Substances List (DSL)** Substance is listed.

· **Canadian Non-Domestic Substances List (NDSL)** Substance is not listed.

· **GHS label elements**

The substance is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**



GHS02 GHS07 GHS08 GHS09

· **Signal word** Danger

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· **Hazard statements**

- H226 Flammable liquid and vapor.
- H315 Causes skin irritation.
- H317 May cause an allergic skin reaction.
- H304 May be fatal if swallowed and enters airways.
- H400 Very toxic to aquatic life.
- H410 Very toxic to aquatic life with long lasting effects.

· **Precautionary statements**

- P202 Do not handle until all safety precautions have been read and understood.
- P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- P233 Keep container tightly closed.
- P243 Take precautionary measures against static discharge.
- P261 Avoid breathing dust/fume/gas/mist/vapors/spray
- P264 Wash thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
- P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
- P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P330 Rinse mouth.
- P331 Do NOT induce vomiting.
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P337+P313 If eye irritation persists: Get medical advice/attention.
- P363 Wash contaminated clothing before reuse.
- P403+P235 Store in a well-ventilated place. Keep cool.
- P405 Store locked up.
- P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- **Chemical safety assessment:** A Chemical Safety Assessment has been carried out.

16 Other information

DISCLAIMER: The information and recommendations contained in this Safety Data Sheet have been compiled from sources believed to be reliable and to represent the most reasonable current opinion on the subject when the SDS was prepared. No warranty, guaranty or representation is made as to the correctness or sufficiency of the information. The user of this product must decide what safety measures are necessary to safely use this product, either alone or in combination with other products, and determine its environmental regulatory compliance obligations under any applicable federal or state laws.

- **Date of preparation / last revision** 05/25/2017 / 2

· **Abbreviations and acronyms:**

RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)

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ICAO: International Civil Aviation Organisation

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

EINECS: European Inventory of Existing Commercial Chemical Substances

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

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

Flam. Liq. 3: Flammable liquids – Category 3

Skin Irrit. 2: Skin corrosion/irritation – Category 2

Skin Sens. 1: Skin sensitisation – Category 1

Asp. Tox. 1: Aspiration hazard – Category 1

Aquatic Acute 1: Hazardous to the aquatic environment - acute aquatic hazard – Category 1

Aquatic Chronic 1: Hazardous to the aquatic environment - long-term aquatic hazard – Category 1

• **Sources Literature and company data**

US