1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product identifier
Product Name  R 404 A

Other means of identification
No information available.

Recommended use of the chemical and restrictions on use
Recommended Use  Refrigerant for professional use in ultra-low temperature freezers.
Uses advised against  No Information available

Details of the supplier of the safety data sheet
Supplier  Eppendorf AG
Address  Barkhausenweg 1
D-22339  Hamburg
Postal Code  D-22339
Phone  +49 40 53801-0
Information provided by  Eppendorf Application-Hotline
telephone/fax:  +49 1803 66 67 89 / +49 4053 99 01 25
E-mail  support@eppendorf.com

Importer  Eppendorf North America, Inc.
Address  102 Motor Parkway
Postal Code  Hauppauge, NY 11788-5178, USA
Phone  +1 800 645 3050
FAX  +1 516 334 7506
E-mail  info@eppendorf.com

Emergency telephone number
For medical advice (in German and English):
+49 (0)551 192 40 (Giftinformationszentrum Nord)

2. HAZARDS IDENTIFICATION

GHS Classification
Gases under pressure  Liquefied gas

Label elements
Symbols/Pictograms

Signal word  Warning
Hazard Statements  Contains gas under pressure; may explode if heated
Precautionary Statements
Prevention  None.
Response  None.
Storage
Protect from sunlight. Store in a well-ventilated place.

Disposal
None.

Hazard not otherwise classified (HNOC)
No information available.

Unknown acute toxicity
No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical nature</th>
<th>Mixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Name</td>
<td>CAS No</td>
</tr>
<tr>
<td>Ethane, 1,1,1-trifluoro-</td>
<td>420-46-2</td>
</tr>
<tr>
<td>Pentafluoroethane</td>
<td>354-33-6</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane</td>
<td>811-97-2</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Description of first aid measures
In case of accident or unwellness, seek medical advice immediately. Remove contaminated clothing and shoes.

Inhalation
IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention immediately if symptoms occur.

Skin Contact
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation persists, call a physician.

Eye Contact
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Ingestion
Not an expected route of exposure.

Most important symptoms and effects, both acute and delayed
In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.
In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.

Indication of any immediate medical attention and special treatment needed
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Extinguishing media
Suitable extinguishing media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media No information available.

Specific hazards arising from the chemical
Thermal decomposition can lead to release of irritating and toxic gases and vapors: carbonyl fluoride, hydrogen fluoride, carbon monoxide.
Containers may explode when heated.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Evacuate personnel to safe areas. Ensure adequate ventilation, especially in confined areas. Avoid contact with skin, eyes or clothing. Do not breathe dust/fume/gas/mist/vapors/spray. Remove all sources of ignition. Use personal protection recommended in Section 8.

Methods and material for containment and cleaning up
Stop leak if you can do it without risk. Do not flush into surface water or sanitary sewer system.

7. HANDLING AND STORAGE

Precautions for safe handling
Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. Do not breathe dust/fume/gas/mist/vapors/spray. When using do not eat, drink or smoke. Remove all sources of ignition. Wash thoroughly after handling. Suck back of water into the container must be prevented. Do not allow backfeed into the container.

Conditions for safe storage, including any incompatibilities
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep container below 50°C in a well ventilated place. Secure cylinders to prevent them from falling.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Latvia</th>
<th>France</th>
<th>Finland</th>
<th>Germany</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane, 1,1,1-trifluoro- (CAS #: 420-46-2)</td>
<td>TWA: 3000 mg/m³ TWA: 2 ppm TWA: 20 mg/m³</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pentafluoroethane (CAS #: 354-33-6)</td>
<td>TWA: 2 ppm TWA: 20 mg/m³</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane (CAS #: 811-97-2)</td>
<td>-</td>
<td>-</td>
<td>STEL 8000 ppm STEL 33600 mg/m³ TWA: 1000 ppm TWA: 4200 mg/m³</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Poland</th>
<th>Portugal</th>
<th>Spain</th>
<th>Switzerland</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1,2-Tetrafluoroethane (CAS #: 811-97-2)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>TWA: 1000 ppm TWA: 4200 mg/m³</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Norway</th>
<th>United Kingdom</th>
<th>Australia</th>
<th>Austria</th>
<th>Belgium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1,2-Tetrafluoroethane (CAS #: 811-97-2)</td>
<td>-</td>
<td>TWA: 1000 ppm TWA: 4200 mg/m³</td>
<td>1000 ppm 4240 mg/m³</td>
<td>STEL 4000 ppm STEL 16800 mg/m³ TWA: 1000 ppm TWA: 4200 mg/m³</td>
<td>-</td>
</tr>
</tbody>
</table>

Appropriate engineering controls
Use with local exhaust ventilation.

Individual protection measures, such as personal protective equipment
Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.
Hand Protection Wear protective gloves.
Eye/face protection Wear safety glasses with side shields (or goggles).
Skin and body protection Wear suitable protective clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties
Appearance Liquified Gas
Color Colourless
Odor
Odor Threshold
pH
Melting point/freezing point
Boiling point / boiling range
Flash point
Evaporation rate
Flammability (solid, gas)
Flammability Limit in Air
Vapor Pressure
Vapor density (air= 1)
Density
Relative density, gas
Relative density, liquid (Water=1)
Partition coefficient (LogPow)
Autoignition temperature
Decomposition temperature
Kinematic viscosity
Dynamic viscosity
Explosive properties
Oxidizing properties
Other information
Molecular weight
Critical temperature

10. STABILITY AND REACTIVITY

Reactivity
May react with aluminium.

Chemical stability
Stable under normal conditions.

Possibility of Hazardous Reactions
No information available.

Conditions to avoid
Keep away from sources of ignition — No smoking.

Incompatible materials
None known.

Hazardous Decomposition Products
Thermal decomposition yields toxic products which can be corrosive in the presence of moisture.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Inhalation
Eye contact
Skin Contact
Ingestion

Information on toxicological effects
**Acute toxicity**
May react with aluminium.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane, 1,1,1-trifluoro- (CAS #: 420-46-2)</td>
<td>-</td>
<td>-</td>
<td>practically nontoxic</td>
</tr>
<tr>
<td>Pentafluoroethane (CAS #: 354-33-6)</td>
<td>-</td>
<td>-</td>
<td>2910 g/m² 4h (Rat) &gt; 800000 ppm 4h (Rat)</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane (CAS #: 811-97-2)</td>
<td>-</td>
<td>-</td>
<td>1500000 mg/m³/4h (Rat)</td>
</tr>
</tbody>
</table>

**Skin corrosion/irritation**
No information available.

**Serious eye damage/eye irritation**
No information available.

**Sensitization**
No information available.

**Germ cell mutagenicity**
No information available.

**Carcinogenicity**
No information available.

**Reproductive toxicity**
No information available.

**STOT - single exposure**
No information available.

**STOT - repeated exposure**
No information available.

**Aspiration hazard**
No information available.

### 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants EC50</th>
<th>Fish LC50</th>
<th>Crustacea EC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane, 1,1,1-trifluoro- (CAS #: 420-46-2)</td>
<td>-</td>
<td>109 mg/L</td>
<td>115 mg/L</td>
</tr>
<tr>
<td>Pentafluoroethane (CAS #: 354-33-6)</td>
<td>142 mg/L 96h other: green algae</td>
<td>109 mg/L 96h Oncorhynchus mykiss</td>
<td>&gt; 100 mg/L 48h Daphnia magna</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane (CAS #: 811-97-2)</td>
<td>-</td>
<td>450 mg/L/96h (Oncorhynchus mykiss)</td>
<td>980 mg/L/48h (Daphnia magna)</td>
</tr>
</tbody>
</table>

**Persistence and degradability**
No information available.

**Bioaccumulative potential**
No information available.

**Mobility in soil**
No information available.

**Other adverse effects**
No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods
Disposal of wastes
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging
Dispose of in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT

| UN/ID No. | 3337 |
| UN Proper shipping name | REFRIGERANT GAS R 404A |
| Hazard Class | 2.2 |
| Packing Group | None |
| Special precautions | No information available |
| Marine pollutant | Not marine pollutant |

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>AICS</th>
<th>DSL/NDSL</th>
<th>EINECS/ELINCS</th>
<th>ENCS</th>
<th>IECSC</th>
<th>KECL</th>
<th>PICCS</th>
<th>TSCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane, 1,1,1-trifluoro-420-46-2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pentafluoroethane 354-33-6</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane 811-97-2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

"-" Not Listed
"X" Listed

US Federal Regulations

SARA 313
Not applicable

SARA 311/312 Hazard Categories
Not applicable

CWA (Clean Water Act)
Not applicable

CERCLA
Not applicable

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations
This product does not contain any substances regulated under applicable state right-to-know regulations

16. OTHER INFORMATION
Revision Note

Issue Date  06-May-2016
Revision date  06-May-2016
Revision Note  Not applicable

Key or legend to abbreviations and acronyms used in the safety data sheet

TWA  - TWA (time-weighted average)
STEL  - STEL (Short Term Exposure Limit)
Ceiling  - Maximum limit value
TSCA  - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL  - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS  - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS  - Japan Existing and New Chemical Substances
IECSC  - China Inventory of Existing Chemical Substances
KECL  - Korean Existing and Evaluated Chemical Substances
PICCS  - Philippines Inventory of Chemicals and Chemical Substances
AICS  - Australian Inventory of Chemical Substances

Disclaimer

The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

-------- End of Safety Data Sheet --------