

# (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol

## Safety Data Sheet 23013Z4

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 02/08/2017

Version: 1.0

### SECTION 1: Identification

#### 1.1. Identification

Product form : Substance  
 Substance name : (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol  
 CAS No : 91600-37-2  
 Product code : 2301-3-Z4  
 Formula : C<sub>4</sub>H<sub>4</sub>F<sub>4</sub>O  
 Synonyms : cis-2,4,4,4-Tetrafluorobut-2-en-1-ol  
 Other means of identification : MFCD07784255

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Laboratory chemicals  
 Manufacture of substances  
 Scientific research and development

#### 1.3. Details of the supplier of the safety data sheet

SynQuest Laboratories, Inc.  
 P.O. Box 309  
 Alachua, FL 32615 - United States of America  
 T (386) 462-0788 - F (386) 462-7097  
[info@synquestlabs.com](mailto:info@synquestlabs.com) - [www.synquestlabs.com](http://www.synquestlabs.com)

#### 1.4. Emergency telephone number

Emergency number : (844) 523-4086 (3E Company - Account 10069)

### SECTION 2: Hazard(s) identification

#### 2.1. Classification of the substance or mixture

##### Classification (GHS-US)

Flam. Liq. 3 H226 - Flammable liquid and vapour  
 Acute Tox. 4 (Oral) H302 - Harmful if swallowed  
 Skin Irrit. 2 H315 - Causes skin irritation  
 Eye Irrit. 2A H319 - Causes serious eye irritation  
 STOT SE 3 H335 - May cause respiratory irritation

Full text of H-phrases: see section 16

#### 2.2. Label elements

##### GHS-US labeling

Hazard pictograms (GHS-US) :



GHS02



GHS07

Signal word (GHS-US) :

Warning

Hazard statements (GHS-US) :

H226 - Flammable liquid and vapor  
 H302 - Harmful if swallowed  
 H315 - Causes skin irritation  
 H319 - Causes serious eye irritation  
 H335 - May cause respiratory irritation

Precautionary statements (GHS-US) :

P210 - Keep away from heat/sparks/open flames/hot surfaces. No smoking  
 P233 - Keep container tightly closed  
 P240 - Ground/bond container and receiving equipment  
 P241 - Use explosion-proof electrical/ventilating/lighting equipment  
 P242 - Use only non-sparking tools  
 P243 - Take precautionary measures against static discharge  
 P261 - Avoid breathing fumes, mist, spray, vapors  
 P264 - Wash skin thoroughly after handling  
 P270 - Do not eat, drink or smoke when using this product  
 P271 - Use only outdoors or in a well-ventilated area  
 P280 - Wear protective gloves/protective clothing/eye protection/face protection  
 P301+P312 - If swallowed: Call a POISON CENTER or doctor/ physician if you feel unwell

# (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

P302+P352 - If on skin: Wash with plenty of soap and water  
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  
P312 - Call a POISON CENTER or doctor/physician if you feel unwell  
P321 - Specific treatment (see supplemental first aid instructions on this label)  
P330 - Rinse mouth  
P332+P313 - If skin irritation occurs: Get medical advice/attention  
P337+P313 - If eye irritation persists: Get medical advice/attention  
P362+P364 - Take off contaminated clothing and wash it before reuse  
P370+P378 - In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish  
P403+P233 - Store in a well-ventilated place. Keep container tightly closed  
P403+P235 - Store in a well-ventilated place. Keep cool  
P405 - Store locked up  
P501 - Dispose of contents/container to an approved waste disposal plant

### 2.3. Other hazards

No additional information available

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/information on ingredients

### 3.1. Substance

Substance type : Mono-constituent

| Name                                                       | Product identifier  | %      | Classification (GHS-US)                                                                                          |
|------------------------------------------------------------|---------------------|--------|------------------------------------------------------------------------------------------------------------------|
| (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol<br>(Main constituent) | (CAS No) 91600-37-2 | <= 100 | Flam. Liq. 3, H226<br>Acute Tox. 4 (Oral), H302<br>Skin Irrit. 2, H315<br>Eye Irrit. 2A, H319<br>STOT SE 3, H335 |

Full text of H-phrases: see section 16

### 3.2. Mixture

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general : In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Move the affected personnel away from the contaminated area.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Get immediate medical advice/attention.

First-aid measures after skin contact : Wash with plenty of soap and water. Get immediate medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

First-aid measures after ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth out with water. Get immediate medical advice/attention.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

### 4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Alcohol resistant foam. Carbon dioxide. Dry powder. Water spray. Use extinguishing media appropriate for surrounding fire.

### 5.2. Special hazards arising from the substance or mixture

Fire hazard : Thermal decomposition generates: Carbon oxides. Hydrogen fluoride.

Explosion hazard : Risk of explosion if heated under confinement. Use water spray or fog for cooling exposed containers. May form flammable/explosive vapor-air mixture.

# (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### 5.3. Advice for firefighters

- Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.
- Protection during firefighting : Wear gas tight chemically protective clothing in combination with self contained breathing apparatus. For further information refer to section 8: "Exposure controls/personal protection".

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

- General measures : Evacuate unnecessary personnel. Ensure adequate air ventilation. Do not breathe gas, fumes, vapor or spray.

#### 6.1.1. For non-emergency personnel

- Emergency procedures : Only qualified personnel equipped with suitable protective equipment may intervene.

#### 6.1.2. For emergency responders

- Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".
- Emergency procedures : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level. Consider the risk of potentially explosive atmospheres. Eliminate every possible source of ignition.

### 6.2. Environmental precautions

Avoid release to the environment. Notify authorities if product enters sewers or public waters.

### 6.3. Methods and material for containment and cleaning up

- For containment : Stop leak if safe to do so. Dike for recovery or absorb with appropriate material.
- Methods for cleaning up : Take up large spills with pump or vacuum and finish with dry chemical absorbent. Use explosion-proof equipment. Take up small spills with dry chemical absorbent. Sweep or shovel spills into appropriate container for disposal. Ventilate area.
- Other information : For disposal of solid materials or residues refer to section 13 : "Disposal considerations".

### 6.4. Reference to other sections

No additional information available

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

- Additional hazards when processed : Handle empty containers with care because residual vapors are flammable.
- Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Ensure good ventilation of the work station. Do not breathe fumes, mist, spray, vapors. Wear personal protective equipment. Avoid contact with skin and eyes. Keep away from ignition sources (including static discharges). Proper grounding procedures to avoid static electricity should be followed. Use only non-sparking tools.
- Hygiene measures : Handle in accordance with good industrial hygiene and safety procedures. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

### 7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Comply with applicable regulations.
- Storage conditions : Keep container closed when not in use. Keep away from ignition sources. Keep contents under inert gas.
- Incompatible materials : Refer to Section 10 on Incompatible Materials.
- Storage temperature : 2 - 8 °C Use explosion proof refrigerator
- Storage area : Store in dry, well-ventilated area.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

No additional information available

### 8.2. Exposure controls

- Appropriate engineering controls : Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
- Hand protection : Protective gloves. 29 CFR 1910.138: Hand Protection.
- Eye protection : Chemical goggles or safety glasses. Face shield. 29 CFR 1910.133: Eye and Face Protection.
- Skin and body protection : Wear suitable protective clothing.

# (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

|                        |                                                                                                           |
|------------------------|-----------------------------------------------------------------------------------------------------------|
| Respiratory protection | : In case of inadequate ventilation wear respiratory protection. 29 CFR 1910.134: Respiratory Protection. |
| Other information      | : Safety shoes. 29 CFR 1910.136: Foot Protection.                                                         |

### SECTION 9: Physical and chemical properties

#### 9.1. Information on basic physical and chemical properties

|                                             |                     |
|---------------------------------------------|---------------------|
| Physical state                              | : Liquid            |
| Color                                       | : No data available |
| Odor                                        | : No data available |
| Odor threshold                              | : No data available |
| pH                                          | : No data available |
| Melting point                               | : No data available |
| Freezing point                              | : No data available |
| Boiling point                               | : No data available |
| Flash point                                 | : No data available |
| Relative evaporation rate (butyl acetate=1) | : No data available |
| Flammability (solid, gas)                   | : No data available |
| Explosion limits                            | : No data available |
| Explosive properties                        | : No data available |
| Oxidizing properties                        | : No data available |
| Vapor pressure                              | : No data available |
| Relative density                            | : No data available |
| Relative vapor density at 20 °C             | : No data available |
| Molecular mass                              | : 144.07 g/mol      |
| Solubility                                  | : No data available |
| Log Pow                                     | : No data available |
| Auto-ignition temperature                   | : No data available |
| Decomposition temperature                   | : No data available |
| Viscosity                                   | : No data available |
| Viscosity, kinematic                        | : No data available |
| Viscosity, dynamic                          | : No data available |

#### 9.2. Other information

No additional information available

### SECTION 10: Stability and reactivity

#### 10.1. Reactivity

No additional information available

#### 10.2. Chemical stability

The product is stable at normal handling and storage conditions.

#### 10.3. Possibility of hazardous reactions

No additional information available

#### 10.4. Conditions to avoid

Keep away from heat, sparks and flame.

#### 10.5. Incompatible materials

Strong acids. Strong bases. Strong oxidizing agents. Strong reducing agents.

#### 10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. Hazardous decomposition products in case of fire, see Section 5.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

|                |                               |
|----------------|-------------------------------|
| Acute toxicity | : Oral: Harmful if swallowed. |
|----------------|-------------------------------|

# (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol (91600-37-2)

|                                                    |                                     |
|----------------------------------------------------|-------------------------------------|
| ATE US (oral)                                      | 500.000 mg/kg body weight           |
| Skin corrosion/irritation                          | : Causes skin irritation.           |
| Serious eye damage/irritation                      | : Causes serious eye irritation.    |
| Respiratory or skin sensitization                  | : Not classified                    |
| Germ cell mutagenicity                             | : Not classified                    |
| Carcinogenicity                                    | : Not classified                    |
| Reproductive toxicity                              | : Not classified                    |
| Specific target organ toxicity (single exposure)   | : May cause respiratory irritation. |
| Specific target organ toxicity (repeated exposure) | : Not classified                    |
| Aspiration hazard                                  | : Not classified                    |

## SECTION 12: Ecological information

### 12.1. Toxicity

No additional information available

### 12.2. Persistence and degradability

No additional information available

### 12.3. Bioaccumulative potential

No additional information available

### 12.4. Mobility in soil

No additional information available

### 12.5. Other adverse effects

No additional information available

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

|                                |                                                                                               |
|--------------------------------|-----------------------------------------------------------------------------------------------|
| Waste treatment methods        | : Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber.   |
| Waste disposal recommendations | : Dispose of contents/container in accordance with licensed collector's sorting instructions. |
| Additional information         | : Recycle the material as far as possible.                                                    |

## SECTION 14: Transport information

### Department of Transportation (DOT)

In accordance with DOT

|                                  |                                                                 |
|----------------------------------|-----------------------------------------------------------------|
| Transport document description   | : UN1993 Flammable liquids, n.o.s., 3, III                      |
| UN-No.(DOT)                      | : UN1993                                                        |
| Proper Shipping Name (DOT)       | : Flammable liquids, n.o.s.                                     |
| Transport hazard class(es) (DOT) | : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120 |
| Hazard labels (DOT)              | : 3 - Flammable liquid                                          |



|                                         |                                                 |
|-----------------------------------------|-------------------------------------------------|
| Packing group (DOT)                     | : III - Minor Danger                            |
| DOT Packaging Non Bulk (49 CFR 173.xxx) | : 203                                           |
| DOT Packaging Bulk (49 CFR 173.xxx)     | : 242                                           |
| DOT Symbols                             | : G - Identifies PSN requiring a technical name |

# (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

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|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOT Special Provisions (49 CFR 172.102)                          | : B1 - If the material has a flash point at or above 38 C (100 F) and below 93 C (200 F), then the bulk packaging requirements of 173.241 of this subchapter are applicable. If the material has a flash point of less than 38 C (100 F), then the bulk packaging requirements of 173.242 of this subchapter are applicable.<br>B52 - Notwithstanding the provisions of 173.24b of this subchapter, non-reclosing pressure relief devices are authorized on DOT 57 portable tanks.<br>IB3 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1 and 31HA2, 31HB2, 31HN2, 31HD2 and 31HH2). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized, except for UN2672 (also see Special Provision IP8 in Table 2 for UN2672).<br>T4 - 2.65 178.274(d)(2) Normal..... 178.275(d)(3)<br>TP1 - The maximum degree of filling must not exceed the degree of filling determined by the following: Degree of filling = $97 / 1 + a (tr - tf)$ Where: tr is the maximum mean bulk temperature during transport, and tf is the temperature in degrees celsius of the liquid during filling.<br>TP29 - A portable tank having a minimum test pressure of 1.5 bar (150.0 kPa) may be used provided the calculated test pressure is 1.5 bar or less based on the MAWP of the hazardous materials, as defined in 178.275 of this subchapter, where the test pressure is 1.5 times the MAWP. |
| DOT Packaging Exceptions (49 CFR 173.xxx)                        | : 150                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) | : 60 L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)     | : 220 L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| DOT Vessel Stowage Location                                      | : A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Other information                                                | : No supplementary information available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

### TDG

No additional information available

### Transport by sea

|                             |                                          |
|-----------------------------|------------------------------------------|
| UN-No. (IMDG)               | : 1993                                   |
| Proper Shipping Name (IMDG) | : FLAMMABLE LIQUID, N.O.S.               |
| Class (IMDG)                | : 3 - Flammable liquids                  |
| Packing group (IMDG)        | : III - substances presenting low danger |

### Air transport

|                             |                            |
|-----------------------------|----------------------------|
| UN-No. (IATA)               | : 1993                     |
| Proper Shipping Name (IATA) | : Flammable liquid, n.o.s. |
| Class (IATA)                | : 3 - Flammable Liquids    |
| Packing group (IATA)        | : III - Minor Danger       |

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory except for:

|                                      |                   |      |
|--------------------------------------|-------------------|------|
| (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol | CAS No 91600-37-2 | 100% |
|--------------------------------------|-------------------|------|

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

### 15.2. International regulations

#### CANADA

No additional information available

#### EU-Regulations

No additional information available

#### National regulations

No additional information available

# (Z)-2,4,4,4-Tetrafluorobut-2-en-1-ol

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### 15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer and/or reproductive harm

## SECTION 16: Other information

Full text of H-phrases:

|                     |                                                             |
|---------------------|-------------------------------------------------------------|
| Acute Tox. 4 (Oral) | Acute toxicity (oral) Category 4                            |
| Eye Irrit. 2A       | Serious eye damage/eye irritation Category 2A               |
| Flam. Liq. 3        | Flammable liquids Category 3                                |
| Skin Irrit. 2       | Skin corrosion/irritation Category 2                        |
| STOT SE 3           | Specific target organ toxicity (single exposure) Category 3 |
| H226                | Flammable liquid and vapor                                  |
| H302                | Harmful if swallowed                                        |
| H315                | Causes skin irritation                                      |
| H319                | Causes serious eye irritation                               |
| H335                | May cause respiratory irritation                            |

NFPA health hazard

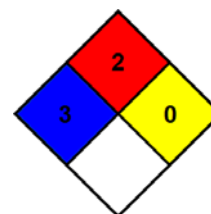
: 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard

: 2 - Must be moderately heated or exposed to relatively high temperature before ignition can occur.

NFPA reactivity

: 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health

: 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability

: 2 Moderate Hazard - Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. Includes liquids having a flash point at or above 100 F but below 200 F. (Classes II & IIIA)

Physical

: 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

SDS US (GHS HazCom 2012)

*The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is offered solely for your consideration, investigation, and verification. It does not represent any guarantee of the properties of the product nor that the hazard precautions or procedures described are the only ones which exist. SynQuest shall not be held liable for any damage resulting from handling or from contact with the above product.*