

## SAFETY DATA SHEET

Version 8.8  
Revision Date 11/27/2023  
Print Date 03/22/2025

**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1 Product identifiers**

Product name : 2,4-Difluorobenzylzinc bromide solution

Product Number : 520306  
Brand : Aldrich  
CAS-No. : 307496-26-0

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

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

Company : Sigma-Aldrich Inc.  
3050 SPRUCE ST  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765  
Fax : +1 800 325-5052

**1.4 Emergency telephone**

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-  
527-3887 CHEMTREC (International) 24  
Hours/day; 7 Days/week

**SECTION 2: Hazards identification****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 2), H225  
Acute toxicity, Oral (Category 4), H302  
Eye irritation (Category 2A), H319  
Carcinogenicity (Category 2), H351  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal Word

Danger

Hazard Statements

|      |                                    |
|------|------------------------------------|
| H225 | Highly flammable liquid and vapor. |
| H302 | Harmful if swallowed.              |
| H319 | Causes serious eye irritation.     |
| H335 | May cause respiratory irritation.  |
| H336 | May cause drowsiness or dizziness. |
| H351 | Suspected of causing cancer.       |

Precautionary Statements

|                    |                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------|
| P201               | Obtain special instructions before use.                                                                                          |
| 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.                                                                                                   |
| 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 dust/ fume/ gas/ mist/ vapors/ spray.                                                                            |
| 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 + P330 | IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.                                                      |
| P303 + P361 + P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.                             |
| P304 + P340 + P312 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.      |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P308 + P313        | IF exposed or concerned: Get medical advice/ attention.                                                                          |
| P337 + P313        | If eye irritation persists: Get medical advice/ attention.                                                                       |
| 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 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

## SECTION 3: Composition/information on ingredients

### 3.2 Mixtures

Formula :  $C_7H_5BrF_2Zn$   
Molecular weight : 272.41 g/mol

| Component              |                   | Classification                                                                        | Concentration  |
|------------------------|-------------------|---------------------------------------------------------------------------------------|----------------|
| <b>Tetrahydrofuran</b> |                   |                                                                                       |                |
| CAS-No.                | 109-99-9          | Flam. Liq. 2; Acute Tox. 4;                                                           | >= 70 - < 90 % |
| EC-No.                 | 5-53              | Eye Irrit. 2A; Carc. 2;                                                               |                |
| Index-No.              | 603-025-00-0      | STOT SE 3; H225, H302,                                                                |                |
| Registration           | 01-2119444314-46- | H319, H351, H335, H336                                                                |                |
| number                 | XXXX              | Concentration limits:<br>>= 25 %: Eye Irrit. 2,<br>H319; >= 25 %: STOT SE<br>3, H335; |                |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## SECTION 4: First aid measures

### 4.1 Description of first-aid measures

#### General advice

Consult a physician. Show this material safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

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

No data available

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## **SECTION 5: Firefighting measures**

### **5.1 Extinguishing media**

#### **Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

Carbon oxides

### **5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

### **5.4 Further information**

Use water spray to cool unopened containers.

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## **SECTION 6: Accidental release measures**

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

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

For personal protection see section 8.

### **6.2 Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

### **6.3 Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### **6.4 Reference to other sections**

For disposal see section 13.

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## **SECTION 7: Handling and storage**

### **7.1 Precautions for safe handling**

#### **Advice on safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

#### **Advice on protection against fire and explosion**

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

#### **Hygiene measures**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

For precautions see section 2.2.

## 7.2 Conditions for safe storage, including any incompatibilities

### Storage conditions

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

**Storage stability** Recommended storage temperature

2 - 8 °C

Store under inert gas. Dry residue is explosive. Test for peroxide formation periodically and before distillation. Dry residue is explosive. Store under inert gas. Test for peroxide formation periodically and before distillation.

### Storage class

Storage class (TRGS 510): 3: Flammable liquids

## 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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## SECTION 8: Exposure controls/personal protection

### 8.1 Control parameters

#### Ingredients with workplace control parameters

| Component       | CAS-No.  | Value                                                                                          | Control parameters | Basis                                   |
|-----------------|----------|------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------|
| Tetrahydrofuran | 109-99-9 | TWA                                                                                            | 50 ppm             | USA. ACGIH Threshold Limit Values (TLV) |
|                 | Remarks  | Confirmed animal carcinogen with unknown relevance to humans<br>Danger of cutaneous absorption |                    |                                         |
|                 |          | STEL                                                                                           | 100 ppm            | USA. ACGIH Threshold Limit Values (TLV) |
|                 |          | Confirmed animal carcinogen with unknown relevance to humans<br>Danger of cutaneous absorption |                    |                                         |

|  |  |      |                      |                                                                                         |
|--|--|------|----------------------|-----------------------------------------------------------------------------------------|
|  |  | ST   | 250 ppm<br>735 mg/m3 | USA. NIOSH Recommended Exposure Limits                                                  |
|  |  | TWA  | 200 ppm<br>590 mg/m3 | USA. NIOSH Recommended Exposure Limits                                                  |
|  |  | TWA  | 200 ppm<br>590 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants        |
|  |  | PEL  | 200 ppm<br>590 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
|  |  | STEL | 250 ppm<br>735 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |

#### Biological occupational exposure limits

| Component       | CAS-No.  | Parameters                                               | Value  | Biological specimen | Basis                                     |
|-----------------|----------|----------------------------------------------------------|--------|---------------------|-------------------------------------------|
| Tetrahydrofuran | 109-99-9 | Tetrahydrofuran                                          | 2 mg/l | Urine               | ACGIH - Biological Exposure Indices (BEI) |
|                 | Remarks  | End of shift (As soon as possible after exposure ceases) |        |                     |                                           |

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and

components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### **Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

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## **SECTION 9: Physical and chemical properties**

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

|                                                 |                                  |
|-------------------------------------------------|----------------------------------|
| a) Appearance                                   | Form: liquid                     |
| b) Odor                                         | No data available                |
| c) Odor Threshold                               | No data available                |
| d) pH                                           | No data available                |
| e) Melting point/freezing point                 | No data available                |
| f) Initial boiling point and boiling range      | No data available                |
| g) Flash point                                  | -17.22 °C (1.00 °F) - closed cup |
| h) Evaporation rate                             | No data available                |
| i) Flammability (solid, gas)                    | No data available                |
| j) Upper/lower flammability or explosive limits | No data available                |
| k) Vapor pressure                               | No data available                |
| l) Vapor density                                | No data available                |
| m) Density                                      | 0.995 g/cm <sup>3</sup>          |
| Relative density                                | No data available                |
| n) Water solubility                             | No data available                |
| o) Partition coefficient: n-octanol/water       | No data available                |
| p) Autoignition temperature                     | No data available                |
| q) Decomposition temperature                    | No data available                |
| r) Viscosity                                    | No data available                |
| s) Explosive properties                         | Not classified as explosive.     |
| t) Oxidizing properties                         | none                             |

### **9.2 Other safety information**

No data available

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## **SECTION 10: Stability and reactivity**

### **10.1 Reactivity**

No data available

### **10.2 Chemical stability**

Stable under recommended storage conditions.

### **10.3 Possibility of hazardous reactions**

Vapors may form explosive mixture with air.

### **10.4 Conditions to avoid**

Heat, flames and sparks. Extremes of temperature and direct sunlight.

### **10.5 Incompatible materials**

Oxidizing agents, Oxygen

### **10.6 Hazardous decomposition products**

In the event of fire: see section 5

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## **SECTION 11: Toxicological information**

### **11.1 Information on toxicological effects**

#### **Mixture**

#### **Acute toxicity**

Oral: No data available

Inhalation: No data available

Dermal: No data available

#### **Skin corrosion/irritation**

No data available

#### **Serious eye damage/eye irritation**

No data available

#### **Respiratory or skin sensitization**

No data available

#### **Germ cell mutagenicity**

No data available

#### **Carcinogenicity**

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Tetrahydrofuran)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

#### **Reproductive toxicity**

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No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**11.2 Additional Information**

Central nervous system depression, Cough, chest pain, Difficulty in breathing, Exposure to high airborne concentrations can cause anesthetic effects., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

**Components**

**Tetrahydrofuran**

**Acute toxicity**

LD50 Oral - Rat - male and female - 1,650 mg/kg

Remarks: (ECHA)

Symptoms: Irritation of mucous membranes

LC50 Inhalation - Rat - male and female - 6 h - > 14.7 mg/l - vapor  
(US-EPA)

LD50 Dermal - Rat - male and female - > 2,000 mg/kg  
(OECD Test Guideline 402)

**Skin corrosion/irritation**

Skin - Rabbit

Result: No skin irritation - 72 h

(Draize Test)

Remarks: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

**Serious eye damage/eye irritation**

Eyes - Rabbit

Result: Causes serious eye irritation.

Remarks: (IUCLID)

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

**Respiratory or skin sensitization**

Local lymph node assay (LLNA) - Mouse

Result: negative  
(OECD Test Guideline 429)

**Germ cell mutagenicity**

Test Type: Ames test

Test system: *S. typhimurium*

Result: negative

Test Type: In vitro mammalian cell gene mutation test

Test system: Chinese hamster ovary cells

Result: negative

Test Type: Chromosome aberration test in vitro

Test system: Chinese hamster ovary cells

Result: negative

Method: OECD Test Guideline 474

Species: Mouse - male and female - Red blood cells (erythrocytes)

Result: negative

**Carcinogenicity**

Suspected of causing cancer.

**Reproductive toxicity**

No data available

**Specific target organ toxicity - single exposure**

Inhalation - May cause respiratory irritation. - Central nervous system

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

May cause drowsiness or dizziness.

Acute oral toxicity - Irritation of mucous membranes

**Specific target organ toxicity - repeated exposure**

**Aspiration hazard**

No data available

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## SECTION 12: Ecological information

### 12.1 Toxicity

**Mixture**

No data available

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Endocrine disrupting properties

No data available

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## 12.7 Other adverse effects

No data available

### Components

#### Tetrahydrofuran

|                                                     |                                                                                                                |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Toxicity to fish                                    | flow-through test LC50 - Pimephales promelas (fathead minnow) - 2,160 mg/l - 96 h<br>(OECD Test Guideline 203) |
| Toxicity to daphnia and other aquatic invertebrates | static test EC50 - Daphnia magna (Water flea) - 3,485 mg/l - 48 h<br>(OECD Test Guideline 202)                 |
| Toxicity to fish(Chronic toxicity)                  | flow-through test NOEC - Pimephales promelas (fathead minnow) - 216 mg/l - 33 d<br>Remarks: (ECHA)             |

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## SECTION 13: Disposal considerations

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

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## SECTION 14: Transport information

#### DOT (US)

UN number: 2056    Class: 3    Packing group: II  
Proper shipping name: TetrahydrofuranSOLUTION

Reportable Quantity (RQ): 1158 lbs  
Poison Inhalation Hazard: No

#### IMDG

UN number: 2056    Class: 3    Packing group: II EMS-No: F-E, S-D  
Proper shipping name: TETRAHYDROFURANSOLUTION

**IATA**

UN number: 2056 Class: 3

Packing group: II

Proper shipping name: TetrahydrofuranSOLUTION

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**SECTION 15: Regulatory information****SARA 302 Components**

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

|                 | CAS-No.  | Revision Date |
|-----------------|----------|---------------|
| Tetrahydrofuran | 109-99-9 | 1993-02-16    |

|                 | CAS-No.  | Revision Date |
|-----------------|----------|---------------|
| Tetrahydrofuran | 109-99-9 | 1993-02-16    |

**Pennsylvania Right To Know Components**

|                 | CAS-No.  | Revision Date |
|-----------------|----------|---------------|
| Tetrahydrofuran | 109-99-9 | 1993-02-16    |

|                                 |             |
|---------------------------------|-------------|
| 2,4-Difluorobenzylzinc bromided | 307496-26-0 |
|---------------------------------|-------------|

|                 | CAS-No.  | Revision Date |
|-----------------|----------|---------------|
| Tetrahydrofuran | 109-99-9 | 1993-02-16    |

**New Jersey Right To Know Components**

|                 | CAS-No.  | Revision Date |
|-----------------|----------|---------------|
| Tetrahydrofuran | 109-99-9 | 1993-02-16    |

|                                 |             |
|---------------------------------|-------------|
| 2,4-Difluorobenzylzinc bromided | 307496-26-0 |
|---------------------------------|-------------|

**California Prop. 65 Components**

, which is/are known to the State of California to cause cancer. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov). Tetrahydrofuran

| CAS-No.  | Revision Date |
|----------|---------------|
| 109-99-9 | 2021-12-31    |

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## SECTION 16: Other information

### Further information

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The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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