

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : Ferrocene

Product Number : F408  
Brand : Aldrich

CAS-No. : 102-54-5

#### 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  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

#### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

##### GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 1), H228  
Acute toxicity, Oral (Category 4), H302  
Acute toxicity, Inhalation (Category 4), H332  
Reproductive toxicity (Category 2), H361  
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Liver, H373  
Acute aquatic toxicity (Category 2), H401  
Chronic aquatic toxicity (Category 1), H410

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 statement(s)

|             |                                                                                       |
|-------------|---------------------------------------------------------------------------------------|
| H228        | Flammable solid.                                                                      |
| H302 + H332 | Harmful if swallowed or if inhaled                                                    |
| H361        | Suspected of damaging fertility or the unborn child.                                  |
| H373        | May cause damage to organs (Liver) through prolonged or repeated exposure if inhaled. |
| H401        | Toxic to aquatic life.                                                                |
| H410        | Very toxic to aquatic life with long lasting effects.                                 |

|                            |                                                                                                                            |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Precautionary statement(s) |                                                                                                                            |
| 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.                                                           |
| P240                       | Ground/bond container and receiving equipment.                                                                             |
| P241                       | Use explosion-proof electrical/ ventilating/ lighting/ equipment.                                                          |
| P260                       | Do not breathe dust/ fume/ gas/ mist/ vapours/ 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.                                                                            |
| P273                       | Avoid release to the environment.                                                                                          |
| 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.                                                 |
| P304 + P340 + P312         | IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. |
| P308 + P313                | IF exposed or concerned: Get medical advice/ attention.                                                                    |
| P370 + P378                | In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.                                       |
| P391                       | Collect spillage.                                                                                                          |
| 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 - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

|                  |                                                         |
|------------------|---------------------------------------------------------|
| Synonyms         | : Bis(cyclopentadienyl)iron<br>Di(cyclopentadienyl)iron |
| Formula          | : C <sub>10</sub> H <sub>10</sub> Fe                    |
| Molecular weight | : 186.03 g/mol                                          |
| CAS-No.          | : 102-54-5                                              |
| EC-No.           | : 203-039-3                                             |

#### Hazardous components

| Component        | Classification                                                                                                                | Concentration |
|------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Ferrocene</b> | Flam. Sol. 1; Acute Tox. 4; Repr. 2; STOT RE 2; Aquatic Acute 2; Aquatic Chronic 1; H228, H302 + H332, H361, H373, H401, H410 | 90 - 100 %    |

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

Consult a physician. Show this 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**

Flush eyes with water as a precaution.

**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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**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**

No data available

**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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**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Avoid breathing dust. 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. Discharge into the environment must be avoided.

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

Sweep up and shovel. 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). Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a 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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**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place.

Heat sensitive.

Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

**7.3 Specific end use(s)**

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

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

| Component | CAS-No.  | Value        | Control parameters | Basis                                                                                   |
|-----------|----------|--------------|--------------------|-----------------------------------------------------------------------------------------|
| Ferrocene | 102-54-5 | TWA          | 15.000000 mg/m3    | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants        |
|           |          | TWA          | 5.000000 mg/m3     | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants        |
|           |          | TWA          | 10 mg/m3           | USA. ACGIH Threshold Limit Values (TLV)                                                 |
|           | Remarks  | Liver damage |                    |                                                                                         |
|           |          | PEL          | 10 mg/m3           | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
|           |          | PEL          | 5 mg/m3            | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |

### 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

Safety glasses with side-shields conforming to EN166 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.

##### Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

##### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

##### 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 particle respirator type N100 (US) or type P3 (EN 143) 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. Discharge into the environment must be avoided.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |                                                 |                                                                                                                                                   |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| a) Appearance                                   | Form: crystalline                                                                                                                                 |
| b) Odour                                        | No data available                                                                                                                                 |
| c) Odour Threshold                              | No data available                                                                                                                                 |
| d) pH                                           | No data available                                                                                                                                 |
| e) Melting point/freezing point                 | Melting point/range: 172 - 174 °C (342 - 345 °F) - lit.                                                                                           |
| f) Initial boiling point and boiling range      | 249 °C (480 °F) - lit.                                                                                                                            |
| g) Flash point                                  | No data available                                                                                                                                 |
| h) Evaporation rate                             | No data available                                                                                                                                 |
| i) Flammability (solid, gas)                    | The substance or mixture is a flammable solid with the category 1.                                                                                |
| j) Upper/lower flammability or explosive limits | No data available                                                                                                                                 |
| k) Vapour pressure                              | No data available                                                                                                                                 |
| l) Vapour density                               | No data available                                                                                                                                 |
| m) Relative density                             | No data available                                                                                                                                 |
| n) Water solubility                             | 0.0001 g/l - slightly soluble                                                                                                                     |
| o) Partition coefficient: n-octanol/water       | log Pow: 2.66 - The preceding data, or interpretation of data, was determined using Quantitative Structure Activity Relationship (QSAR) modeling. |
| p) Auto-ignition temperature                    | No data available                                                                                                                                 |
| q) Decomposition temperature                    | No data available                                                                                                                                 |
| r) Viscosity                                    | No data available                                                                                                                                 |
| s) Explosive properties                         | No data available                                                                                                                                 |
| t) Oxidizing properties                         | No data available                                                                                                                                 |

### 9.2 Other safety information

No data available

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## 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

No data available

#### 10.4 Conditions to avoid

Heat, flames and sparks.

#### 10.5 Incompatible materials

Strong oxidizing agents

#### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Iron oxides

Other decomposition products - No data available

In the event of fire: see section 5

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### 11. TOXICOLOGICAL INFORMATION

#### 11.1 Information on toxicological effects

##### Acute toxicity

LD50 Oral - Rat - 1,320 mg/kg

Inhalation: Harmful by inhalation.

LD50 Dermal - Rat - > 3,000 mg/kg  
(OECD Test Guideline 402)

No data available

##### Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation

(OECD Test Guideline 404)

##### Serious eye damage/eye irritation

Eyes - Rabbit

Result: No eye irritation

(OECD Test Guideline 405)

##### Respiratory or skin sensitisation

Maximisation Test - Guinea pig

Result: Does not cause skin sensitisation.

(OECD Test Guideline 406)

##### Germ cell mutagenicity

Hamster

ovary

Sister chromatid exchange

##### Carcinogenicity

Carcinogenicity - Rat - Intramuscular

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Tumorigenic: Tumors at site of application.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component 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 identified as a carcinogen or potential carcinogen by OSHA.

##### Reproductive toxicity

Suspected of damaging fertility or the unborn child. Suspected human reproductive toxicant

##### Specific target organ toxicity - single exposure

No data available

##### Specific target organ toxicity - repeated exposure

Inhalation - May cause damage to organs through prolonged or repeated exposure. - Liver

##### Aspiration hazard

No data available

**Additional Information**

RTECS: LK0700000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

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**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to fish - Leuciscus idus melanotus - 12.3 mg/l - 96 h  
(OECD Test Guideline 203)

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 1.17 mg/l - 48 h  
(OECD Test Guideline 202)

NOEC - Daphnia magna (Water flea) - 0.0015 mg/l

Toxicity to algae EC50 - Desmodesmus subspicatus (Scenedesmus subspicatus) - 1.03 mg/l - 72 h  
(OECD Test Guideline 201)

**12.2 Persistence and degradability**

Biodegradability Result: 73 % - Inherently biodegradable.  
(OECD Test Guideline 301B)

**12.3 Bioaccumulative potential**

No bioaccumulation is to be expected (log Pow <= 4).

**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 Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Very toxic to aquatic life with long lasting effects.

No data available

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**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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**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 1325 Class: 4.1 Packing group: II  
Proper shipping name: Flammable solids, organic, n.o.s. (Ferrocene)  
Reportable Quantity (RQ):  
Poison Inhalation Hazard: No

**IMDG**

UN number: 1325 Class: 4.1 Packing group: II EMS-No: F-A, S-G  
Proper shipping name: FLAMMABLE SOLID, ORGANIC, N.O.S. (Ferrocene)  
Marine pollutant:yes

**IATA**

UN number: 1325      Class: 4.1      Packing group: II  
Proper shipping name: Flammable solid, organic, n.o.s. (Ferrocene)

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## 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 |
|-----------|----------|---------------|
| Ferrocene | 102-54-5 | 1994-04-24    |

### Pennsylvania Right To Know Components

|           | CAS-No.  | Revision Date |
|-----------|----------|---------------|
| Ferrocene | 102-54-5 | 1994-04-24    |

### New Jersey Right To Know Components

|           | CAS-No.  | Revision Date |
|-----------|----------|---------------|
| Ferrocene | 102-54-5 | 1994-04-24    |

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

|                 |                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------|
| Acute Tox.      | Acute toxicity                                                                                     |
| Aquatic Acute   | Acute aquatic toxicity                                                                             |
| Aquatic Chronic | Chronic aquatic toxicity                                                                           |
| Flam. Sol.      | Flammable solids                                                                                   |
| H228            | Flammable solid.                                                                                   |
| H302            | Harmful if swallowed.                                                                              |
| H302 + H332     | Harmful if swallowed or if inhaled                                                                 |
| H332            | Harmful if inhaled.                                                                                |
| H361            | Suspected of damaging fertility or the unborn child.                                               |
| H373            | May cause damage to organs (/*_2ORG_REP_INH/*/) through prolonged or repeated exposure if inhaled. |
| H401            | Toxic to aquatic life.                                                                             |
| H410            | Very toxic to aquatic life with long lasting effects.                                              |

### HMIS Rating

|                        |   |
|------------------------|---|
| Health hazard:         | 2 |
| Chronic Health Hazard: | * |
| Flammability:          | 3 |
| Physical Hazard        | 3 |

### NFPA Rating

|                    |   |
|--------------------|---|
| Health hazard:     | 2 |
| Fire Hazard:       | 3 |
| Reactivity Hazard: | 3 |

### Further information

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 4.14

Revision Date: 10/24/2017

Print Date: 12/12/2017