

## Material Safety Data Sheet

### Lithium Manganese Iron Phosphate (LMFP) Powder

Report No.: VIH240920006-1  
Version: 2.1  
Preparation Date: 20/09/2024  
Revision Date: 20/09/2024

## 1. Identification of the substance/mixture and of the company/undertaking

### 1.1 Product identifier

|              |                                                                             |
|--------------|-----------------------------------------------------------------------------|
| Product Name | Lithium Manganese Iron Phosphate (LMFP)                                     |
| Product No.  | 032526150800PD                                                              |
| Formula      | $\text{LiMn}_{(x)}\text{Fe}_{(1-x)}\text{PO}_4$                             |
| CAS No.      | /                                                                           |
| Synonyms     | LMFP, Lithium iron manganese phosphate,<br>Lithium ferromanganese phosphate |

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

|                      |                                           |
|----------------------|-------------------------------------------|
| Identified uses      | Laboratory chemicals, Scientific research |
| Uses advised against | Consulting manufacturers                  |

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

|              |                                                             |
|--------------|-------------------------------------------------------------|
| Company Name | VI HALBLEITERMATERIAL GmbH                                  |
| Street       | Mannheimer Straße 14.,                                      |
| City         | Laatzen                                                     |
| State        | Niedersachsen                                               |
| Zip Code     | 30880                                                       |
| Country      | Germany                                                     |
| Tel          | 0049 1626484175                                             |
| Email        | info@vimaterial.de                                          |
| Website      | <a href="https://vimaterial.de/">https://vimaterial.de/</a> |

### 1.4 Emergency telephone number

|                   |                 |
|-------------------|-----------------|
| Emergency Phone # | 0049 1626484175 |
|-------------------|-----------------|

## 2. Hazards Identification

### 2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 (CLP)

### Physical hazards

Not Classified

### Health hazards

|                          |                   |
|--------------------------|-------------------|
| STOT - single exposure   | Category 3 (H335) |
| STOT - repeated exposure | Category 2 (H373) |

### Environmental hazards

Not Classified

*Full text of Hazard Statements: see section 16*

## 2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

|             |                                                                                    |
|-------------|------------------------------------------------------------------------------------|
| Signal Word | Warning                                                                            |
| Pictograms  |  |

### Hazard Statements

|      |                                                                    |
|------|--------------------------------------------------------------------|
| H335 | May cause respiratory irritation                                   |
| H373 | May cause damage to organs through prolonged or repeated exposure. |

### Precautionary Statements

|             |                                                                               |
|-------------|-------------------------------------------------------------------------------|
| Prevention  |                                                                               |
| P260        | Do not breathe dust or vapours                                                |
| P280        | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| Response    |                                                                               |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention.                       |
| Storage     |                                                                               |
| P403 + P233 | Store in a well-ventilated place. Keep container tightly closed.              |
| Disposal    |                                                                               |
| P501        | Dispose of contents/ container to an approved waste disposal plant.           |

## 2.3 Other hazards

This product does not contain any substances classified as PBT or vPvB.

This product does not contain any known or suspected endocrine disruptors.

Dust may form explosive dust-air mixtures under certain conditions.

### 3. Composition/information on ingredients

#### 3.1 Substances

|                 |           |
|-----------------|-----------|
| Chemical Family | Phosphate |
|-----------------|-----------|

| Component                               | CAS No. | EC No. | Concentration |
|-----------------------------------------|---------|--------|---------------|
| Lithium Manganese Iron Phosphate (LMFP) | /       | /      | ≥99%          |

### 4. First aid measures

#### 4.1 Description of first aid measures

|                   |                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General Treatment | If symptoms persist, seek medical attention. Show this Safety Data Sheet to the medical personnel.                                                              |
| Inhalation        | Remove victim to fresh air. If breathing is irregular or stopped, immediately seek medical assistance and start first aid actions.                              |
| Skin              | Take off immediately all contaminated clothing. Rinse skin with water/ shower. If skin irritation occurs, seek medical attention.                               |
| Eyes              | Rinse with pure water for at least 15 minutes. Remove contact lenses, if present and easy to do. Seek medical attention.                                        |
| Ingestion         | Rinse mouth with water(only if the person is conscious). Do not induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention. |

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

Most important symptoms and effects, both acute and delayed, are included on labelling (Section 2.2) and in Section 11.

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

|   |                                                                |
|---|----------------------------------------------------------------|
| 1 | Based on the symptoms that appear, provide targeted treatment. |
| 2 | Be aware that symptoms may be delayed.                         |

### 5. Firefighting Measures

#### 5.1 Extinguishing Media

|                                |                                                                                   |
|--------------------------------|-----------------------------------------------------------------------------------|
| Suitable extinguishing media   | Use suitable extinguishing media such as dry chemical, CO <sub>2</sub> , or foam. |
| Unsuitable extinguishing media | N/A                                                                               |

## 5.2 Special hazards arising from the substance or mixture

|   |                            |
|---|----------------------------|
| 1 | Lithium oxides             |
| 2 | Manganese/manganese oxides |
| 3 | Iron oxides                |
| 4 | Oxides of phosphorus       |

## 5.3 Advice for firefighters

|   |                                                                                                                                        |
|---|----------------------------------------------------------------------------------------------------------------------------------------|
| 1 | As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. |
| 2 | Fight fire from a safe distance and with adequate protection.<br>Do not allow firefighting water to enter drains or water courses.     |
| 3 | Collect contaminated firefighting water separately.                                                                                    |

# 6. Accidental Release Measures

## 6.1 Personal precautions, protective equipment and emergency procedures

|                             |                                                                                                                                                                                     |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| For non-emergency personnel | Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas. |
| For emergency responders    | Wear breathing apparatus if exposed to vapours/dust/spray/gases.                                                                                                                    |

## 6.2 Environmental Precautions

|   |                                   |
|---|-----------------------------------|
| 1 | Avoid release to the environment. |
|---|-----------------------------------|

## 6.3 Methods and material for containment and cleaning up

|                                                   |                                                                        |
|---------------------------------------------------|------------------------------------------------------------------------|
| Advice on how to contain a spill                  | Covering of drains, Take up mechanically.                              |
| Advice on how to clean up a spill                 | Take up mechanically. Take care not to raise dust.                     |
| Other information relating to spills and releases | Place in appropriate containers for disposal. Ventilate affected area. |

## 6.4 Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

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## 7. Handling and Storage

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### 7.1 Precautions for safe handling

|                  |                                                                                                                                                                                                                                                                                                                  |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recommendations  | Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Use only in a well ventilated area. Do not ingest. If swallowed then seek immediate medical assistance.                                                                                   |
| Hygiene Measures | Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash hands before breaks and after work. |

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

|                          |                                                                                    |
|--------------------------|------------------------------------------------------------------------------------|
| Ventilation requirements | Keep containers tightly closed in a dry, cool and well-ventilated place.           |
| Flammability hazards     | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. |
| Incompatible materials   | See Section 10.5                                                                   |

### 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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## 8. Exposure Controls/Personal Protection

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### 8.1 Control parameters

#### Occupational exposure limit values (Workplace Exposure Limits)

This information is not available.

### 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

Wear safety glasses with side shields (or goggles) (European standard - EN166) and face protection.

### Skin protection

#### -Hand Protection

Protective gloves (The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.)

#### -Other protection measures

Wear appropriate protective gloves and clothing to prevent skin exposure. Wash hands thoroughly after handling.

### Respiratory Protection

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly.

|                                   |                                                                                                                                                                                                                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Large scale/emergency use</b>  | Use a NIOSH/MSHA or European Standard EN 136 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced<br>Recommended Filter type: Particulates filter conforming to EN 143                                                          |
| <b>Small scale/Laboratory use</b> | Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.<br>Recommended half mask:- Particle filtering: EN149:2001<br>When RPE is used a face piece Fit Test should be conducted |

### Environmental exposure controls

Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

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## 9. Physical and Chemical Characteristics

### 9.1 Information on basic physical and chemical properties

|                           |                                  |
|---------------------------|----------------------------------|
| Physical State            | Powder                           |
| Colour                    | Black                            |
| Odor                      | Odorless                         |
| Melting Point/Range       | Not determined                   |
| Boiling Point/Range       | Not applicable                   |
| Flammability (liquid)     | Not applicable                   |
| Flammability (solid, gas) | No data available                |
| Explosion limits          | No data available                |
| Flash Point               | Not applicable (inorganic solid) |
| Autoignition Temperature  | Not determined                   |
| Decomposition             | No data available                |

|                                            |                   |
|--------------------------------------------|-------------------|
| Temperature                                |                   |
| pH                                         | Not applicable    |
| Viscosity                                  | Not applicable    |
| Water Solubility                           | Insoluble         |
| Solubility in other solvents               | No data available |
| Partition Coefficient<br>(n-octanol/water) | No data available |
| Vapor Pressure                             | No data available |
| Density / Specific Gravity                 | No data available |
| Vapor Density                              | Not applicable    |
| Particle characteristics                   | No data available |

## 9.2 Other information

|                   |                                             |
|-------------------|---------------------------------------------|
| Molecular formula | $\text{LiMn}_x\text{Fe}_{(1-x)}\text{PO}_4$ |
| Molecular weight  | No data available                           |
| Evaporation Rate  | Rate Not applicable - Solid                 |

## 10. Stability and reactivity

### 10.1 Reactivity

None known, based on information available.

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

**Hazardous Polymerization:** No data available.

**Hazardous Reactions:** No data available.

### 10.4 Conditions to avoid

Avoid exposure to moisture and humidity.

### 10.5 Incompatible materials

Strong oxidizing agents, Chlorates, Nitrates.

### 10.6 Hazardous decomposition products

Other decomposition products: No data available.

In the event of fire: see section 5

## 11. Toxicological information

### 11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

|                                   |                                                                    |                    |
|-----------------------------------|--------------------------------------------------------------------|--------------------|
| Acute toxicity                    | Oral:                                                              | No data available  |
|                                   | Dermal:                                                            | No data available  |
|                                   | Inhalation:                                                        | No data available  |
| Skin corrosion/irritation         | No data available.                                                 |                    |
| Serious eye damage/irritation     | No data available.                                                 |                    |
| Respiratory or skin sensitization | Respiratory                                                        | No data available. |
|                                   | Skin                                                               | No data available. |
| Germ cell mutagenicity            | No data available.                                                 |                    |
| Carcinogenicity                   | No data available.                                                 |                    |
| Reproductive toxicity             | No data available.                                                 |                    |
| STOT - single exposure            | May cause respiratory irritation.                                  |                    |
| STOT - repeated exposure          | May cause damage to organs through prolonged or repeated exposure. |                    |
| Aspiration hazard                 | Not applicable. Solid                                              |                    |

## 11.2 Information on other hazards

**Endocrine Disrupting Properties:** Assess endocrine disrupting properties for human health. This product does not contain any known or suspected endocrine disruptors.

## 12. Ecological Information

### 12.1 Toxicity

|                     |                    |
|---------------------|--------------------|
| Ecotoxicity effects | No data available. |
|---------------------|--------------------|

### 12.2 Persistence and degradability

|               |                    |
|---------------|--------------------|
| Persistence   | No data available. |
| Degradability | No data available. |

### 12.3 Bioaccumulative potential

|                           |                    |
|---------------------------|--------------------|
| Bioaccumulative potential | No data available. |
|---------------------------|--------------------|

### 12.4 Mobility in soil

|                  |                    |
|------------------|--------------------|
| Mobility in soil | No data available. |
|------------------|--------------------|

### 12.5 Results of PBT and vPvB assessment

|                                    |                                                                                                        |
|------------------------------------|--------------------------------------------------------------------------------------------------------|
| Results of PBT and vPvB assessment | In accordance with Annex XIII of the REACH Regulation, inorganic substances do not require assessment. |
|------------------------------------|--------------------------------------------------------------------------------------------------------|



## 12.6 Endocrine disrupting properties

|                                 |                                                                            |
|---------------------------------|----------------------------------------------------------------------------|
| Endocrine Disruptor Information | This product does not contain any known or suspected endocrine disruptors. |
|---------------------------------|----------------------------------------------------------------------------|

## 12.7 Other adverse effects

|                              |                                                                |
|------------------------------|----------------------------------------------------------------|
| Persistent Organic Pollutant | This product does not contain any known or suspected substance |
| Ozone Depletion Potential    | This product does not contain any known or suspected substance |

## 13. Disposal Considerations

### 13.1 Waste treatment methods

Dispose of in accordance with all applicable local and national regulations. Use recovery/recycling where feasible, otherwise incineration is the recommended method of disposal. Empty containers may contain hazardous residues. Do not cut, puncture or weld on or near to the container. Labels should not be removed from containers until they have been cleaned. Contaminated containers must not be treated as household waste. Containers should be cleaned by appropriate methods and then re-used or disposed of by landfill or incineration as appropriate. Do not incinerate closed containers.

## 14. Transport information

### IMDG

|                                  |                                            |
|----------------------------------|--------------------------------------------|
| 14.1. UN number                  | Not applicable.                            |
| 14.2. UN Proper shipping name    | Not classified as hazardous for transport. |
| 14.3. Transport hazard class(es) | Not applicable.                            |
| 14.4. Packaging group            | Not applicable.                            |

### ADR/RID/ADN

|                                  |                                            |
|----------------------------------|--------------------------------------------|
| 14.1. UN number                  | Not applicable.                            |
| 14.2. UN Proper shipping name    | Not classified as hazardous for transport. |
| 14.3. Transport hazard class(es) | Not applicable.                            |
| 14.4. Packaging group            | Not applicable.                            |

### ICAO-IATA/DGR

|                                  |                                            |
|----------------------------------|--------------------------------------------|
| 14.1. UN number                  | Not applicable.                            |
| 14.2. UN Proper shipping name    | Not classified as hazardous for transport. |
| 14.3. Transport hazard class(es) | Not applicable.                            |

|                                                                      |                                  |
|----------------------------------------------------------------------|----------------------------------|
| <b>14.4. Packaging group</b>                                         | Not applicable.                  |
| <b>14.5. Environmental hazards</b>                                   | No hazards identified.           |
| <b>14.6. Special precautions for user</b>                            | No special precautions required. |
| <b>14.7. Maritime transport in bulk according to IMO instruments</b> | Not applicable, packaged goods.  |

## 15. Regulatory information

### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This Safety Data Sheet is prepared in accordance with Commission Regulation (EC) 1907/2006, amended by Commission Regulation (EU) 2020/878.

#### Authorisations/Restrictions

|                                                                                                                                              |                |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Regulation (EC) 1907/2006, REACH, Annex XIV list of substances subject to authorisation:                                                     | Not applicable |
| Regulation (EC) 1907/2006, REACH, Annex XVII restrictions on the manufacture, placing on the market and use of certain dangerous substances: | Not applicable |
| Regulation (EC) 1005/2009 on substances that deplete the ozone layer:                                                                        | Not applicable |
| Regulation (EC) 850/2004 on persistent organic pollutants, amended by (EU) No 2019/1021:                                                     | Not applicable |

### 15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this substance.

## 16. Other information

### Revision information

|                  |            |
|------------------|------------|
| Preparation date | 20/09/2024 |
| Revision date    | 20/09/2024 |
| Revision reason  | Creation.  |

### Abbreviations and acronyms

|      |                                                                                     |
|------|-------------------------------------------------------------------------------------|
| CAS  | Chemical Abstracts Service                                                          |
| ADR  | European Agreement concerning the International Carriage of Dangerous Goods by Road |
| RID  | Regulation concerning the International Carriage of Dangerous Goods by Rail         |
| IATA | International Air Transportation Association                                        |
| IMDG | International Maritime Dangerous Goods                                              |
| LC50 | Lethal Concentration 50%                                                            |
| LD50 | Lethal Dose 50%                                                                     |
| TWA  | Time Weighted Average                                                               |
| STOT | Specific target organ toxicity                                                      |
| PBT  | Persistent, Bioaccumulative, Toxic                                                  |
| vPvB | Very Persistent, very Bioaccumulative                                               |
| WEL  | Workplace exposure limit                                                            |

## References

- [1] CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>
- [2] ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>
- [3] eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: [http://www.echemportal.org/echemportal/index?pageID=0&request\\_locale=en](http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en)
- [4] Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
- [5] HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- [6] IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>
- [7] IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>
- [8] ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>

## List of relevant phrases (code and full text as stated in chapter 2 and 3)

|      |                                                                    |
|------|--------------------------------------------------------------------|
| H335 | May cause respiratory irritation                                   |
| H373 | May cause damage to organs through prolonged or repeated exposure. |

## Disclaimer

The information of this safety data sheet is based on our knowledge of this product, at the time of publication. It is given in good faith. The attention of the user is drawn to the possible risks incurred by using the product for any other purpose other than that for which it was intended. This does not in any way excuse the user from knowing and applying all the regulations governing his activity. It is the sole responsibility of the user to take all precautions required in handling the product. The aim of the mandatory regulations mentioned is to help the user to fulfill his obligations regarding the use of hazardous products. For further information please contact [info@vimaterial.de](mailto:info@vimaterial.de).