

1. Name of Substance or Mixture and Name of Company

- 1.1 Product identifier:
Name of substance: Indium phosphide
Chemical formula: InP
REACH registration No.: -
Molecular weight: 145,79 g/mol / 34 g/mol
- 1.2 Identified application: Application in the semiconductor industry as substrate material

not recommended applications: None
- 1.3 Information about supplier providing this product information:
Name of company: Freiberger Compound Materials GmbH (FCM)
Street: Am Junger-Löwe-Schacht 5
National symbol/zip code/city: D - 09599 Freiberg
Phone: +49 3731 280 - 0
Fax: +49 3731 280 - 106
E-mail: info@fcm-germany.com

Information provided by: Dept. occupational health & safety and quality management
- 1.4 Emergency number: +49 3731 280 – 0 (working days from 8:00 a. m. to 4:00 p. m.)
- Germany – FCM

2. Potential Hazards

- 2.1 Classification of substance or mixture:

Hazards caused by ingots / InP wafers :
InP (ingot and wafer) is a product in terms of title I article 3 No. 3 of the REACH Regulation (EG) No. 1907/2006. InP (ingot and wafer) consists 100 % of the substance InP.

Harmonised classification of the Regulation (EG) No. 1272/2008 [3. ATP to CLP VO]:
Carcinogenicity Category 1B (H350)
Reproductive toxicity Category 2 (H361f)
Toxicity to specific targeted organ - (repeated exposure) Category 1 (H372)
- 2.2 Classification elements: Not applicable
Danger warnings / safety instructions: Not applicable
- 2.3 Other hazards:

In case InP comes into contact with H₂O (water or humidity), gaseous phosphine can be released. Appropriate safety measures for handling InP (see chapter 5-8) must be taken in advance of any kind of handling.

3. Composition / Information on Ingredients

Chemical characterization:

Indiumphosphid: EG-No.: 244-959-5; CAS-No.: 22398-80-7 Purity: 100 %

4. First Aid Measures

4.1 Description of first aid measures

General Information

Consult a doctor. Show this product information to the doctor treating you.

After skin contact: Immediately rinse with plenty of water for at least 15 minutes and breathe fresh air immediately - risk of phosphine. In case skin irritation persists, consult a doctor.

After eye contact: Rinse the eye under running water for 10 minutes with the eyelids spread wide open (and breathe fresh air immediately - risk of phosphine. Ensure medical treatment.

After ingestion: Rinse mouth with water and breathe fresh air immediately - risk of phosphine, consult a doctor in case of any symptoms.

After inhalation: Getting some fresh air. In case of respiratory arrest, provide artificial respiration with additional oxygen. In case of symptoms, get medical attention.

4.2 Main acute and deferred symptoms and effects:
Reasonably unpredictable.

4.3 Immediate medical attention or special treatment: Treatment of symptoms

5. Fire Fighting Measures

5.1 Extinguishing agents:

Suitable extinguishing agents:

Use fire-fighting measures that are adapted to the local conditions and environment.
Use alcohol-resistant foam, dry extinguishing agent or carbon dioxide

Unsuitable extinguishing agents for safety reasons:

Water spray mist / water - phosphine danger!

5.2 Specific hazards caused by substance or mixture:
Thermal decomposition may lead to the release of irritant gases and vapours -
Phosphorus oxides, metal oxide smoke

5.3 Advice: environment independent breathing protection equipment/chemical protection suit

6. Accidental Release Measures

- 6.1 Individual precaution, protective equipment and emergency measures:
Ensure sufficient ventilation. Use personal protective equipment. Avoid dust build-up.
Avoid inhalation of dust. Prevent dust from coming into contact with humidity - risk of phosphine!
- 6.2 Environment protection:
Do not allow to enter the sewerage system. Avoid contact with humidity - risk of phosphine!
- 6.3 Methods and material for retention and cleaning:
Use special vacuum cleaner H. For disposal - place in suitable, dry and closed containers.
- 6.4 Reference to other sections:
See section 8

7. Handling and Storage

- 7.1 Protective measures for safe handling:
Wear personal protection equipment. Ensure sufficient ventilation. Do not get into eyes, skin or clothing. Do not ingest or inhale. Prevent dust build-up.
- Hygiene measures:
Handle with good industrial hygiene and safety techniques.
Keep away from food, drink and animal feed.
Do not eat, drink or smoke while using. Remove soiled clothing and wash before reuse.
Wash hands before breaks and at the end of your work.
- 7.2 Conditions for safe storage considering intolerances:
Keep container dry and well closed and store in a dry and properly ventilated place.
- 7.3 Specific end use:
No additional information

8. Exposure Limits and Control of Exposure/ Personal Protection Equipment

8.1. Parameters subject to control in contact with dusts:

Permissible limits in air at working place:

Air pollution limits:

Applicable limits (country)	Controlled substance	EG-No.	CAS-No.	Permissible limit at working place		Recommended control methods	Maximum limit	Source/ Remark
				Long term	Short term			
AGW (DE)	Indium-phosphide (dust, aerosol)	244-959-5	22398-80-7	0,0001 A mg/m ³		No suitable method known	8 (II)	TRGS900
AGW (DE)	Phosphine	215-114-8	7803-51-2	0,1 ppm		Stationary gas monitoring MSA AUER Ultimax XE/XIR Portable gas detector PAC7000 Sensor PH3 0-20 ppm	2 (II)	TRGS900 / DFG, Y Guideline 2006/15/EG
	Phosphine	215-114-8	7803-51-2	0,1 ppm	0,2 ppm			

A - Alveolar fraction

For preventive medical examinations, an examination according to G40 (carcinogenic hazardous substances - in general) is recommended (German law).

8.2 Exposition limits and control of exposure

In case of contact with dusts / aerosols occurring during processing.

Technical measures:

- Processes preferably in closed plants
- Provide system vacuum extraction also in the lower plant area
- Vacuum facilities / covers / wet processing for manual work steps
- Prevent release of phosphine during wet processing e.g. via flue extraction
- Use gas detectors if phosphine might be released. (Type: see also Table 8.1)

Organisational measures

- To make a risk assessment
- When working manually - avoid contact with water, otherwise use local vacuum extraction
- To prepare working instructions
- To train staff

General rules of conduct

- To avoid skin contact
- Do not eat, drink and smoke during work
- Do not release systems with compressed air / vacuum with safety vacuum cleaner class H
- Do not store food in the operating rooms
- To wear appropriate clothing
- To change soiled clothing
- To wash hands after work

Personal protection equipment for InPRespiratory protection:

Depending on working place full or half face-piece respirator
Dusts / aerosols and vapours / gases: BP2 (EU EN 143)

Hand protection:

Protective gloves

Recommended glove material: Polychloroprene, nitrile rubber, butyl rubber, fluorinated rubber and polyvinyl chloride

Penetration time of glove material: Depending on mechanical and additional chemical exposure

Protective gloves should be replaced at first signs of wear.

Eye protection:

Depending on working place (protective glasses, full face-piece mask only in case of aerosols/ vapours)

Body protection:

Depending on the workplace (overalls, chemical protection suit)
Keep chemical protection suit ready for emergencies

Environmental exposure limit and control of environmental exposureTechnical measures to avoid environmental exposure:

Exhaust air: Dust / gases generated during handling - Provide suitable exhaust air treatment.

Waste water: Collect separately - provide appropriate waste water treatment

9. Physical and Chemical Properties

9.1 Basic physical and chemical properties:

Appearance:	Physical State:	Solid substance
	Colour:	grey - metallic
	Odour:	odourless
pH:		non applicable
Physical and safety data:		
	Melting point / melting area:	1062 °C
	Thermal decomposition:	from 400 °C
	Start of boiling:	1062°C / 27 bar
	Flash point / flammability:	no data available
	Evaporation rate:	non applicable
	Risk of explosion:	no data available
	Explosion limits:	no data available
	Vapour pressure:	27 bar / 1062 °C
	Density:	4,79 g/cm ³ bei 20 °C
	Odour threshold:	non applicable
	Solubility:	easily soluble in acids insoluble in water
	Self-ignition temperature:	no data available
	Viscosity:	non applicable
	Oxidizing characteristics:	barely

9.2 Other Information: Phosphine formation in contact with humidity

10. Reactivity and Stability

- 10.1 Reactivity: none known according to available information
- 10.2 Chemical stability: stable under normal conditions
- 10.3 Potential hazardous reactions: No dangerous reactions are known when used as intended
- 10.4 Conditions to be avoided: excessive heat
- 10.5 Substances to be avoided: Humidity, water, acids
- 10.6 Hazardous decomposition products: on contact with water / humidity - formation of phosphine

11. Toxicological Information

11.1 Toxicological effects:

Acute toxicity	For compact InP applies: Oral, dermal absorption and inhalation are practically excluded. Test results for compact InP are not available. When processing compact wafers there may arise dusts. To counteract the carcinogen, reprotox and specific lung toxic effects, the measures under # 8.2 must be strictly observed.
Cauterization/inflammation of skin	
Severe damage/irritation of eyes	
Specific target organ toxicity by one-time exposure	
Aspiration	
Deferred and chronic toxicological effects, symptoms	
Allergization of respiratory tracts/skin	
Germ cell mutagenicity	
Carcinogenity	
Reproduction toxicity	
Specific target organ toxicity by repeated exposure	

11.2 Toxicological effects of dusts:

Hazard classes (substances)

Acute toxicity	low
Cauterization/inflammation of skin	no data available
Severe damage/irritation of eyes	no data available
Specific target organ toxicity by one-time exposure	no data available
Aspiration	no data available
Deferred and chronic toxicological effects, symptoms	no data available
Allergization of respiratory tracts/skin	no data available
Germ cell mutagenicity	Reference in literature: not genotoxic
Carcinogenity	Category 1B
Reproduction toxicity	Category 2

Specific target organ toxicity by repeated exposure	Category 1
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Signs and symptoms after exposure:
Additional information: No information available

12. Ecological Information

12.1	Ecological toxicity:	no data available
12.2	Persistency and degradability:	no data available
12.3	Biological accumulation (food chain):	no data available
12.4	Mobility in soil:	no data available
12.5	Results of PBT and vPvB evaluation:	no data available
12.6	Other deleterious effects:	no data available

13. Disposal Information

Waste treatment procedure:

Hazardous waste according to the Waste List Regulation (German AVV). If recycling is not possible, waste must be disposed of in compliance with local official regulations. Check the exact waste code with the waste collector.

Soiled package:

Completely emptied containers must be disposed of as containers with harmful residues.
ASN 15 01 10 (Packaging containing residues of or contaminated by dangerous substances)

14. Transport Information

Transport categories:

14.1	UN-No.:	unregulated
14.2	Correct UN shipping identification:	not applicable
14.3	Transport risk class:	not applicable
14.4	Packaging group:	not applicable
14.5	Environmental perils:	not applicable
14.6	Specific precaution measures for users:	
	Information on transport:	see sections 6 to 8
14.7	Bulk material transportation pursuant to Annex II of the MARPOL Agreement 73/78 and IBC Code:	non applicable



15. Regulatory Information

15.1 Safety, health and environment regulations / specific legal regulations for substance or mixture

EC Regulations:

Packaging materials or their components are not subject to Annex XVII; EC 1907/2006

National Regulations:

Statutory order on hazardous incidents
(12. BImSchV):

undisclosed

Water hazard class:

WGK 1 (according to AwSV Annex 1 No. 5.2.)

TRGS 510:

Storage: 4.3
(hazardous substances (InP), which in contact
with water, emit flammable gases – phosphine)

Technical Instruction Air (TA-Air):

Chapter 5.2.7.1.1 Carcinogenic substances
(class. 1)
Mass flow rate: 0,15 g/h
or mass concentration: 0,05 mg/m³

Classification according to
Industrial Safety Regulation (BetrSichV):

undisclosed

Notes on employment restrictions:

The restrictions according to the German law
Maternity Protection Act (MuSchuG) / Youth
Protection Act (JugendSchG) serve the
protection against hazardous substances

15.2 Chemical Safety Assessment: none

16. Other Information

Revised sections: none

Above data are based on the current status of our knowledge and experience. The Product Information InP, describes our intermediate product / product with regard to safety requirements and does not guarantee any properties. It is the responsibility of the receiver of our products to observe all laws and legal regulations.