



Cobalt Phosphide		Pricing >
Cobalt Phosphide Sputtering Target		Pricing >
Linear Formula	Co ₂ P	
Pubchem CID	71777639	
MDL Number	N/A	
EC No.	235-212-4	
Beilstein/Reaxys No.	N/A	
SMILES	P([Co])=[Co]	
Inchl Identifier	InChI=1S/2Co.P	
Inchl Key	XBWGSQZRPFGEBJ-UHFFFAOYSA-N	
Signal Word	Danger	
Hazard Statements	H301-H341-H317	
Hazard Codes	Xn, Xi	
Risk Codes	R22-68 R43	
Safety Statements	N/A	
Transport Information	N/A	
GHS Pictograms	GHS08 Health Hazard  GHS06 Skull and Crossbones 	

[Create Printable PDF](#)

SAFETY DATA SHEET

Date Accessed: 04/30/2024

Date Revised: 01/15/2022

SECTION 1. IDENTIFICATION

Product Identifiers: All applicable American Elements product codes for CAS #12134-02-0

Relevant identified uses of the substance:
Scientific research and development

Supplier details:
American Elements
10884 Weyburn Ave.
Los Angeles, CA 90024
Tel: +1 310-208-0551
Fax: +1 310-208-0351

Emergency telephone number:
Domestic, North America +1 800-424-9300
International +1 703-527-3887

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
GHS06 Skull and crossbones
Acute Tox. 3 H301 Toxic if swallowed.
GHS08 Health hazard
Muta. 2 H341 Suspected of causing genetic defects.
GHS07
Skin Sens. 1 H317 May cause an allergic skin reaction.
Classification according to Directive 67/548/EEC or Directive 1999/45/EC
Xn; Harmful
R22-68: Harmful if swallowed. Possible risk of irreversible effects.
Xi; Sensitizing
R43: May cause sensitization by skin contact.
Information concerning particular hazards for human and environment:
N/A
Hazards not otherwise classified
No data available
Label elements
Labelling according to Regulation (EC) No 1272/2008
The substance is classified and labeled according to the CLP regulation.
Hazard pictograms



GHS06

GHS08

Signal word

Danger

Hazard statements

H301 Toxic if swallowed.

H317 May cause an allergic skin reaction.

H341 Suspected of causing genetic defects.

Precautionary statements

P261 Avoid breathing

dust/fume/gas/mist/vapors/spray.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P281 Use personal protective equipment as required.

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor/...

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

WHMIS classification

D1B - Toxic material causing immediate and serious toxic effects

D2A - Very toxic material causing other toxic effects

Classification system

HMIS ratings (scale 0-4)

(Hazardous Materials Identification System)

HEALTH

FIRE

REACTIVITY

2

1

1

Health (acute effects) = 2

Flammability = 1

Physical Hazard = 1

Other hazards

Results of PBT and vPvB assessment

PBT:

N/A

vPvB:

N/A

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances

CAS No. / Substance Name:

12134-02-0 Cobalt phosphide

Identification number(s):

EC number:

235-212-4

SECTION 4. FIRST AID MEASURES

Description of first aid measures

If inhaled:

Supply patient with fresh air. If not breathing, provide artificial respiration. Keep patient warm.

Seek immediate medical advice.

In case of skin contact:

Immediately wash with soap and water; rinse thoroughly.

Seek immediate medical advice.

In case of eye contact:

Rinse opened eye for several minutes under running water. Consult a physician.

If swallowed:

Seek medical treatment.

Information for doctor

Most important symptoms and effects, both acute and delayed

No data available

Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5. FIREFIGHTING MEASURES

Extinguishing media

Suitable extinguishing agents

CO₂, sand, extinguishing powder. Do not use water.

Special hazards arising from the substance or mixture

If this product is involved in a fire, the following can be released:

Hydrogen phosphide (Phosphine)

Advice for firefighters

Protective equipment:

Wear self-contained respirator.

Wear fully protective impervious suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

Environmental precautions:

Do not allow material to be released to the environment without official permits.

Do not allow product to enter drains, sewage systems, or other water courses.

Do not allow material to penetrate the ground or soil.

Methods and materials for containment and cleanup:
Dispose of contaminated material as waste according to section 13.
Prevention of secondary hazards:
No special measures required.
Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7. HANDLING AND STORAGE

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Information about protection against explosions and fires:
No data available
Conditions for safe storage, including any incompatibilities
Requirements to be met by storerooms and receptacles:
No special requirements.
Information about storage in one common storage facility:
Store away from oxidizing agents.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well-sealed containers.
Specific end use(s)
No data available

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.
Control parameters
Components with limit values that require monitoring at the workplace:
Cobalt, elemental & inorganic compounds, as Co mg/m³
ACGIH TLV 0.02; Confirmed animal carcinogen
Austria Carcinogen

Belgium TWA 0.05
Denmark TWA 0.05
Finland TWA 0.05 (skin)
Germany Carcinogen
Hungary TWA 0.1; 0.2-STEL
Japan OEL 0.05; 2B-Carcinogen
Korea TLV 0.02; Confirmed animal carcinogen
Netherlands MAC-TGG 0.05
Norway TWA 0.05
Poland TWA 0.05; 0.2-STEL
Russia 0.5-STEL
Sweden NGV 0.05
Switzerland MAK-W 0.1; Carcinogen
United Kingdom TWA 0.1
USA PEL 0.1 (dust and fume)
Additional information:
No data
Exposure controls
Personal protective equipment
Follow typical protective and hygienic practices for handling chemicals.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Maintain an ergonomically appropriate working environment.
Breathing equipment:
Use suitable respirator when high concentrations are present.
Protection of hands:
Impervious gloves
Inspect gloves prior to use.
Suitability of gloves should be determined both by material and quality, the latter of which may vary by manufacturer.
Eye protection:
Safety glasses
Body protection:
Protective work clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance:

Form: Powder or solid

Color: Grey

Odor: No data available

Odor threshold: No data available.

pH: N/A

Melting point/Melting range: 1386 °C (2527 °F)

Boiling point/Boiling range: No data available

Sublimation temperature / start: No data available
Flash point: N/A
Flammability (solid, gas)
No data available.
Ignition temperature: No data available
Decomposition temperature: No data available
Autoignition: No data available.
Danger of explosion: Product does not present an explosion hazard.
Explosion limits:
Lower: No data available
Upper: No data available
Vapor pressure: N/A

Density at 20 °C (68 °F): 6.4 g/cm³ (53.408 lbs/gal)
Relative density
No data available.
Vapor density
N/A
Evaporation rate
N/A
Solubility in Water (H₂O): Insoluble
Partition coefficient (n-octanol/water): No data available.
Viscosity:
Dynamic: N/A
Kinematic: N/A
Other information
No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity
No data available
Chemical stability
Stable under recommended storage conditions.
Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.
Possibility of hazardous reactions
No dangerous reactions known
Conditions to avoid
No data available
Incompatible materials:
Oxidizing agents
Hazardous decomposition products:
Metal oxide fume
Hydrogen phosphide (Phosphine)

SECTION 11. TOXICOLOGICAL

INFORMATION

Information on toxicological effects

Acute toxicity:

Harmful if swallowed.

LD/LC50 values that are relevant for classification:

No data

Skin irritation or corrosion:

Irritant to skin and mucous membranes.

Eye irritation or corrosion:

Irritating effect.

Sensitization:

May cause an allergic skin reaction.

Germ cell mutagenicity:

Suspected of causing genetic defects.

Carcinogenicity:

ACGIH A3: Animal carcinogen: Agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) not considered relevant to worker exposure.

Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans.

Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

IARC-2A: Probably carcinogenic to humans: limited human evidence; sufficient evidence in experimental animals

Reproductive toxicity:

No effects known.

Specific target organ system toxicity - repeated exposure:

No effects known.

Specific target organ system toxicity - single exposure:

No effects known.

Aspiration hazard:

No effects known.

Subacute to chronic toxicity:

Cobalt is an experimental neoplastigen and tumorigen. It is an experimental carcinogen of the connective tissue and lungs. Cobalt metal and inorganic compounds are classified as an animal carcinogen by the ACGIH.

Ingestion may cause burning in the mouth, esophagus, and stomach. Inhalation of dusts and fumes may cause irritation of the respiratory tract and labored breathing and coughing. Sensitization, nausea, flushing of the face and ringing in the ears is also possible.

Chronic ingestion may result in pericardial effusion, polycardial effusion, polycythemia, cardiac failure, vomiting, convulsions and thyroid enlargement.

Inorganic phosphorus compounds may cause irritation and hemorrhages in the stomach as well as liver and kidney damage. Bone structure may be attacked, especially the jaw and teeth.

Subacute to chronic toxicity:

No effects known.

Additional toxicological information:

To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity

Aquatic toxicity:

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Additional ecological information:

Do not allow material to be released to the environment without official permits.

Do not allow undiluted product or large quantities to reach groundwater, water courses, or sewage systems.

Avoid transfer into the environment.

Results of PBT and vPvB assessment

PBT:

N/A

vPvB:

N/A

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Recommendation

Consult official regulations to ensure proper disposal.

Uncleaned packagings:

Recommendation:

Disposal must be made according to official regulations.

SECTION 14. TRANSPORT INFORMATION

Not a hazardous material for transportation.

UN-Number
DOT, IMDG, IATA
None
UN proper shipping name
DOT, IMDG, IATA
None
Transport hazard class(es)
DOT, ADR, IMDG, IATA
Class
None
Packing group
DOT, IMDG, IATA
None
Environmental hazards:
N/A
Special precautions for user
N/A
Transport in bulk according to Annex II of
MARPOL73/78 and the IBC Code
N/A
Transport/Additional information:
Not dangerous according to the above specifications.
DOT
Marine Pollutant (DOT): No

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental
regulations/legislation specific for the substance or
mixture
National regulations
All components of this product are listed in the U.S.
Environmental Protection Agency Toxic Substances
Control Act Chemical substance Inventory.
All components of this product are listed on the
Canadian Non-Domestic Substances List (NDSL).
SARA Section 313 (specific toxic chemical listings)
12134-02-0 Cobalt phosphide
California Proposition 65
Prop 65 - Chemicals known to cause cancer
Substance is not listed.
Prop 65 - Developmental toxicity
Substance is not listed.
Prop 65 - Developmental toxicity, female
Substance is not listed.
Prop 65 - Developmental toxicity, male
Substance is not listed.
Information about limitation of use:
For use only by technically qualified individuals.
This product contains cobalt and is subject to the
reporting requirements of section 313 of the
Emergency Planning and Community Right to Know

Act of 1986 and
40CFR372.
Other regulations, limitations and prohibitive
regulations
Substance of Very High Concern (SVHC) according to
the REACH Regulations (EC) No. 1907/2006.
Substance is not listed.
The conditions of restrictions according to Article 67
and Annex XVII of the Regulation (EC) No 1907/2006
(REACH) for the manufacturing, placing on the market
and use must be observed.
Substance is not listed.
Annex XIV of the REACH Regulations (requiring
Authorisation for use)
Substance is not listed.
REACH - Pre-registered substances
Substance is listed.
Chemical safety assessment:
A Chemical Safety Assessment has not been carried
out.

16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. American Elements shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. COPYRIGHT 1997-2022 AMERICAN ELEMENTS. LICENSED GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY.

Research

- Bifunctional cobalt phosphide nanoparticles with convertible surface structure for efficient electrocatalytic water splitting in alkaline solution. Miao Wang, Chung-Li Dong, Yu-Cheng Huang, Shaohua Shen. Journal of Catalysis, Volume 371, March 2019, Pages 262-269.
- Cobalt phosphide microsphere as an efficient bifunctional oxygen catalyst for Li-air batteries. Feng Zhang, Minghui Wei, Jing Sui, Chao

Jin, Ruizhi Yang. *Journal of Alloys and Compounds*, Volume 750, 25 June 2018, Pages 655-658.

- Cobalt phosphide microspheres integrated with cadmium sulfide nanowires as an efficient photocatalyst for hydrogen evolution reaction. Yanna He, Renjie Cui, Chencheng Gao, Jian Zhang, Xing'ao Li. *Molecular Catalysis*, Volume 469, May 2019, Pages 161-166.
- Cobalt phosphide nanocage@ferric-zinc mixed-metal phosphide nanotube hierarchical nanocomposites for enhanced overall water splitting. Xiaowei Hu, Yongheng Yin, Wei Liu, Xingwang Zhang, Hongxiu Zhang. *Chinese Journal of Catalysis*, Volume 40, Issue 7, July 2019, Pages 1085-1092.
- Microwave-assisted synthesis of cobalt phosphide using ionic liquid as Co and P dual-source for hydrogen evolution reaction. Tianhao Li, Daomei Tang, Chang Ming Li. *Electrochimica Acta*, Volume 295, 1 February 2019, Pages 1027-1033.
- Cobalt phosphide nanoparticles embedded in 3D N-doped porous carbon for efficient hydrogen and oxygen evolution reactions. Saisai Yang, Meng Xie, Linlin Chen, Wei Wei, Jimin Xie. *International Journal of Hydrogen Energy*, Volume 44, Issue 10, 22 February 2019, Pages 4543-4552.
- Cobalt phosphide nanorods as an efficient electrocatalyst for the hydrogen evolution reaction. Zhipeng Huang, Zhongzhong Chen, Zhibo Chen, Cuncai Lv, Chi Zhang. *Nano Energy*, Volume 9, October 2014, Pages 373-382.
- Cobalt phosphide nanowire arrays grown on carbon cloth as novel electrode material for supercapacitors. Guangzhi Zhang, Jin Fang, Lijun Sun, Shijie Li, Kaibing Xu. *Materials Science in Semiconductor Processing*, Volume 66, 1 August 2017, Pages 140-143.
- Cobalt phosphide nanowires as efficient co-catalyst for photocatalytic hydrogen evolution over Zn_{0.5}Cd_{0.5}S. Pengfei Wang, Sihui Zhan, Haitao Wang, Yuguo Xia, Ramasamy Rajesh Kumar. *Applied Catalysis B: Environmental*, Volume 230, 15 August 2018, Pages 210-219.
- Heterogeneous cobalt phosphides nanoparticles anchored on carbon cloth realizing the efficient hydrogen generation reaction. Bai Xiang Tao, Cui Ye, Xiao Lin Li, Xiao Hu Wang, Nian Bing Li. *International Journal of Hydrogen Energy*, Volume 44, Issue 2, 8 January 2019, Pages 531-539.