

[Nickel Cobalt Oxide Nanoparticles / Nanopowder](#)

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Linear Formula	(CoO)(NiO)
Pubchem CID	40721037
MDL Number	MFCD00016252
EC No.	261-346-8
IUPAC Name	oxocobalt; oxonickel
SMILES	[Co]=O.[Ni]=O
Inchl Identifier	InChI=1S/Co.Ni.2O
Inchl Key	YTBWYQYUOZHUKJ-UHFFFAOYSA-N
Signal Word	Danger
Hazard Statements	H302-H317-H350i-H372-H410
Hazard Codes	T, N
Risk Codes	49-22-43-48/23-50/53
Safety Statements	53-36/37-45-61
RTECS Number	UN 3077 9/PG 3
Transport Information	N/A
WGK Germany	3

GHS
Pictograms

**GHS09
Environment**



**GHS06 Skull and
Crossbones**



**GHS08 Health
Hazard**



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SAFETY DATA SHEET

Date Accessed: 04/26/2024

Date Revised: 01/15/2022

SECTION 1. IDENTIFICATION

Product Identifiers: All applicable American Elements product codes for CAS #58591-45-0

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

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

Acute toxicity, Oral (Category 3), H301

Acute toxicity, Inhalation (Category 2), H330

Respiratory sensitisation (Category 1), H334

Skin sensitisation (Category 1), H317

Carcinogenicity (Category 1A), H350

Specific target organ toxicity - repeated exposure,
Inhalation (Category 1), Lungs, H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

GHS Label elements, including precautionary
statements

Pictogram



Signal word

Danger

Hazard statement(s)

H301 Toxic if swallowed.

H317 May cause an allergic skin reaction.

H330 Fatal if inhaled.

H334 May cause allergy or asthma symptoms or
breathing difficulties if inhaled.

H350 May cause cancer.

H372 Causes damage to organs (Lungs) through
prolonged or repeated exposure if inhaled.

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.

P260 Do not breathe 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.

P272 Contaminated work clothing should not be
allowed out of the workplace.

P273 Avoid release to the environment.

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

P284 Wear respiratory protection.

P301 + P310 + P330 IF SWALLOWED: Immediately
call a POISON CENTER or doctor/ physician. Rinse
mouth.

P302 + P352 IF ON SKIN: Wash with plenty of soap
and water.

P304 + P340 + P310 IF INHALED: Remove person to
fresh air and keep comfortable for breathing.

Immediately call a POISON CENTER or doctor/
physician.

P308 + P313 IF exposed or concerned: Get medical
advice/ attention.

P333 + P313 If skin irritation or rash occurs: Get
medical advice/ attention.

P363 Wash contaminated clothing before reuse.

P391 Collect spillage.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.
Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Mixtures
Formula: NiCo_2O_4
Hazardous components
Component
Nickel monoxide
CAS-No. 1313-99-1
EC-No. 215-215-7
Index-No. 028-003-00-2
Classification
Skin Sens. 1; Carc. 1A; STOT
RE 1; Aquatic Chronic 4;
H317, H350, H372, H413
Concentration
>= 70 - < 90 %
Component
CAS-No. 1307-96-6
EC-No. 215-154-6
Index-No. 027-002-00-4
Classification
Acute Tox. 3; Acute Tox. 2;
Resp. Sens. 1B; Skin Sens. 1;
Aquatic Acute 1; Aquatic
Chronic 1; H301, H317, H330,
H334, H410
Concentration
>= 70 - < 90 %

SECTION 4. FIRST AID MEASURES

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. Take victim immediately to hospital. Consult a physician.
In case of eye contact
Flush eyes with water as a precaution.
If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
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
Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5. FIREFIGHTING MEASURES

Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special hazards arising from the substance or mixture
Nickel/nickel oxides, Cobalt/cobalt oxides
Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.
Further information
No data available

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation.
Avoid breathing Vapors, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.
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.
Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust.
Sweep up and shovel. Keep in suitable, closed containers for disposal.
Reference to other sections

For disposal see section 13.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.

Conditions for safe storage, including any incompatibilities

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

Keep in a dry place.

Specific end use(s)

Apart from the uses mentioned in section 1 no other specific uses are stipulated

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

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.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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, 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.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance

Form: powder

Odor

No data available

Odor Threshold

No data available

pH

No data available

Melting point/freezing point

No data available

Initial boiling point and boiling range

No data available

Flash point

N/A

Evaporation rate

No data available

Flammability (solid, gas)

No data available

Upper/lower flammability or explosive limits

No data available

Vapor pressure

No data available

Vapor density

No data available

Relative density

6.600 g/cm³ at 25 °C (77 °F)
Water solubility
No data available
Partition coefficient: n-octanol/water
No data available
Auto-ignition temperature
No data available
Decomposition temperature
No data available
Viscosity
No data available
Explosive properties
No data available
Oxidizing properties
No data available
Other safety information
No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity
No data available
Chemical stability
Stable under recommended storage conditions.
Possibility of hazardous reactions
No data available
Conditions to avoid
No data available
Incompatible materials
Strong oxidizing agents, Strong acids
Hazardous decomposition products
Other decomposition products-No data available
In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects
Acute toxicity
Dermal:
No data available
Skin corrosion/irritation
No data available
Serious eye damage/eye irritation
No data available
Respiratory or skin sensitisation
No data available
Germ cell mutagenicity
No data available
Carcinogenicity
IARC:

1 - Group 1: Carcinogenic to humans (Nickel monoxide)

NTP:

Known to be human carcinogen (Nickel monoxide)

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

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

Additional Information

RTECS: Not available

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 (Nickel monoxide)

SECTION 12. ECOLOGICAL INFORMATION

Toxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Results of PBT and vPvB assessment

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

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.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this

material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

DOT (US)

Not dangerous goods

IMDG

UN number: 3077

Class: 9

Packing group: III

EMS-No: F-A, S-F

Proper shipping name: ENVIRONMENTALLY
HAZARDOUS SUBSTANCE, SOLID, N.O.S.

(Cobalt(II) oxide, Nickel monoxide)

Marine pollutant: yes

IATA

UN number: 3077

Class: 9

Packing group: III

Proper shipping name: Environmentally hazardous
substance, solid, n.o.s. (Cobalt(II) oxide, Nickel
monoxide)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code
2.10.3) for single packagings and combination
packagings containing inner packagings with
Dangerous Goods > 5L for liquids or > 5kg for solids.

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

The following components are subject to reporting
levels established by SARA Title III, Section 313:

Nickel monoxide

CAS-No.

1313-99-1

Revision Date

1993-04-24

Cobalt(II) oxide

CAS-No.

1307-96-6

Revision Date

2009-07-17
SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard
Massachusetts Right To Know
Components
Nickel monoxide
CAS-No.
1313-99-1
Revision Date
1993-04-24
Pennsylvania Right To Know
Components
Nickel monoxide
CAS-No.
1313-99-1
Revision Date
1993-04-24
Cobalt(II) oxide
CAS-No.
1307-96-6
Revision Date
2009-07-17
New Jersey Right To Know
Components
Nickel monoxide
CAS-No.
1313-99-1
Revision Date
1993-04-24
Cobalt(II) oxide
CAS-No.
1307-96-6
Revision Date
2009-07-17
California Prop. 65 Components
WARNING! This product contains a chemical known
to the State of California to cause cancer.
Nickel monoxide
CAS-No.
1313-99-1
Revision Date
2007-09-28
Cobalt(II) oxide
CAS-No.
1307-96-6
Revision Date
2007-09-28

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

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- Additive-free macroscopic-scale synthesis of coral-like nickel cobalt oxides with hierarchical pores and their electrocatalytic properties for methanol oxidation. Mengqi Yu, Sunli Wang, Jiayi Hu, Zheyang Chen, Xuexiang Weng. Electrochimica Acta, Volume 145, 1 November 2014, Pages 300-306.
- Advanced asymmetric supercapacitor based on molybdenum trioxide decorated nickel cobalt oxide nanosheets and three-dimensional α -FeOOH/rGO. Fengjian Lin, Ming Yuan, Yuan Chen, Yunpeng Huang, Shunsheng Cao. Electrochimica Acta, Volume 320, 10 October 2019, Article 134580.
- Aligned nickel–cobalt oxide nanosheet arrays for lithium ion battery applications. Xiaohua Huang, Jianbo Wu, Renqing Guo, Yan Lin, Ping Zhang. International Journal of Hydrogen Energy, Volume 39, Issue 36, 12 December 2014, Pages 21399-21404.
- Bifunctional, Carbon-Free Nickel/Cobalt-Oxide Cathodes for Lithium-Air Batteries with an Aqueous Alkaline Electrolyte. Dennis Wittmaier, Simon Aisenbrey, Norbert Wagner, K. Andreas Friedrich. Electrochimica Acta, Volume 149, 10 December 2014, Pages 355-363.
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Volume 755, 30 July 2018, Pages 15-23.

- Cobalt-doped nickel oxide nanoparticles as efficient hole transport materials for low-temperature processed perovskite solar cells. Ryuji Kaneko, Towhid H. Chowdhury, Guohua Wu, Md. Emrul Kayesh, Joe Otsuki. Solar Energy, Volume 181, 15 March 2019, Pages 243-250.
- Design of nickel cobalt oxide and nickel cobalt oxide@nickel molybdenum oxide battery-type materials for flexible solid-state battery supercapacitor hybrids. Wei-Lun Hong, Lu-Yin Lin. Journal of Power Sources, Volume 435, 30 September 2019, Article 226797.
- Electronic structure of cobalt–nickel mixed oxides. Stephan Schmidt, Dieter Schmeißer. Solid State Ionics, Volume 225, 4 October 2012, Pages 737-741.