

# Chromium, Powder

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## IDENTIFICATION

### Chromium, Powder

**ZVG No:** 8190  
**CAS No:** 7440-47-3  
**EC No:** 231-157-5

## CHARACTERISATION

### SUBSTANCE GROUP CODE

134000 Metals

### STATE OF AGGREGATION

The substance is solid.

### PROPERTIES

metal powder  
grey  
odourless

### CHEMICAL CHARACTERISATION

Combustible substance, poorly flammable.  
Practically insoluble in water.

[Substance information in Wikipedia](#)

### DUST EXPLOSIVENESS

There is a risk of a dust explosion if the following conditions are met:

- The substance is given in very finely distributed form (powder, dust).
- The substance is whirled up in sufficient quantity in the air.
- An ignition source is present (flame, spark, electrostatic discharge, etc.)

Quelle: 01211

## FORMULA

Cr

**Molar mass:** 52,00 g/mol

## PHYSICAL AND CHEMICAL PROPERTIES

[Melting point](#) | [Boiling point](#) | [Density](#) | [Solubility](#) | [Hazardous reactions](#)

### MELTING POINT

Melting point: 1863 °C

Reference: [01211](#)

### BOILING POINT

Boiling Point: 2670 °C

Reference: [01211](#)

### DENSITY

DENSITY

Value: 7,14 ... 7,20 g/cm<sup>3</sup>

Temperature: 20 °C

Reference: [00131](#)

### SOLUBILITY IN WATER

practically insoluble in water

Reference: [01211](#)

### HAZARDOUS REACTIONS

#### Thermal decomposition

Self-ignition.

#### Hazardous chemical reactions

Chromium powder is self-igniting in air. Chromium reacts with most nonmetals when heated; if chromium is used as a powder, various reactions proceed violently to explosively.

Risk of explosion in contact with:

hydrogen peroxide

ammonia nitrate

bromine pentafluoride (seldom)

Chlorates

carbon dioxide (heat)

nitrates

The substance can react dangerously with:

fluorine

oxidizing agents

lithium (molten)

sulfur dioxide

nitrogen oxides

halogen halogen compounds

## TOXICOLOGY / ECOTOXICOLOGY

### ECOTOXICOLOGICAL DATA

**LC50 Fish (96 hours)**

Minimum: 13,9 mg/l  
Maximum: 210 mg/l  
Median: 40,5 mg/l  
Study number: 16

Reference for median:

Dorn, P.B., J.P. Salanitro, S.H. Evans, and L. Kravetz 1993. Assessing the Aquatic Hazard of Some Branched and Linear Nonionic Surfactants by Biodegradation and Toxicity. *Environ.Toxicol.Chem.* 12(10):1751-1762; Hori, H., M. Tateishi, K. Takayanagi, and H. Yamada 1996. Applicability of Artificial Seawater as a Rearing Seawater for Toxicity Tests of Hazardous Chemicals by Marine Fish Species. *Nippon Suisan Gakkaishi (Bull.Jpn.Soc.Sci.Fish.)* (4):614-622 (JPN) (ENG ABS)

**LC50 Crustaceans (48 hours)**

Minimum: 0,022 mg/l  
Maximum: 100 mg/l  
Median: 0,53 mg/l  
Study number: 8

Reference for median:

Mount, D.I., and T.J. Norberg 1984. A Seven-Day Life-Cycle Cladoceran Toxicity Test. *Environ.Toxicol.Chem.* 3(3):425-434 (Author Communication Used); Govindarajan, S., C.P. Valsaraj, R. Mohan, V. Hariprasad, and R. Ramasubramanian 1993. Toxicity of Heavy Metals in Aquaculture Organisms: *Penaeus indicus*, *Perna viridis*, *Artemia salina* and *Skeletonema costatum*. *Pollut.Res.* 12(3):187-189

**EC50 Crustaceans (48 hours)**

Minimum: 0,07 mg/l  
Maximum: 0,07 mg/l  
Median: 0,07 mg/l  
Study number: 1

Reference for median:

Dorn, P.B., J.P. Salanitro, S.H. Evans, and L. Kravetz 1993. Assessing the Aquatic Hazard of Some Branched and Linear Nonionic Surfactants by Biodegradation and Toxicity. *Environ.Toxicol.Chem.* 12(10):1751-1762

**EC50 Algae (72 or 96 hours)**

Test duration: 72 hours  
Minimum: 0,1 mg/l  
Maximum: 17,8 mg/l  
Median: 8,75 mg/l  
Study number: 4

Reference for median:

Stauber, J.L. 1995. Toxicity Testing Using Marine and Freshwater Unicellular Algae. *Australas.J.Ecotoxicol.* 1(1):15-24

Reference: [02072](#)

**OCCUPATIONAL HEALTH AND FIRST AID**

[Routes of exposure](#) | [Toxic effects](#) |  
[First Aid](#)

**ROUTES OF EXPOSURE**

**Main routes of exposure**

The main route of exposure for metallic chromium (MC) is via the respiratory tract.[07744]

**Respiratory tract**

Special studies on the resorption kinetics of MC dusts or vapours via the lungs are not available.[99983]

It is assumed that particles with aerodynamic diameters  $< 2 \mu\text{m}$  reach the alveoli where they are proportionately deposited.[00454]

Analogous to insoluble chromium compounds, elimination is probably performed via the phagocytosis mechanism.

Larger particles deposited in the upper respiratory tract are subject to mucociliary clearance mechanisms and can thus be transferred to the digestive tract.[00083]

**Skin**

Resorption of MC via the skin is not regarded as quantitatively significant.[07744]

Specific kinetic studies are not available.[99983]

**Gastrointestinal tract**

Data on the resorption of MC dusts via the gastrointestinal tract are not available in the present literature.[99983]

Analogous to anorganic chromium compounds (e.g., chromium(III) oxide) or other metals, the resorption of MC is expected to be low.[99999]

**TOXIC EFFECTS****Main toxic effects**

Acute effects:

No signs of significant acute damage;

Chronic effects:

Available information is insufficient.[99983]

**Acute toxicity**

Animal experiments revealed a good tissue compatibility for MC: Metal that was implanted in rabbit eyes was well tolerated over an observation period of one year.[07979]

After exposure of the eye mucosa or the skin to metal dusts the casualty is expected to suffer from mechanical damage only.

However, allergic skin reactions might occur in individual cases (see also 'Chronic toxicity').[99999]

Acute reactions after short-term inhalation of high dust concentrations have not been reported.

It is regarded as hardly possible that irreversibly damaging doses can be resorbed within approx. 30 minutes.

To be on the safe side, an IDHL (immediately dangerous to life or health value) was determined for MC.[07930]

Cases of toxicity after accidental oral resorption of MC dusts have not been reported.[99983].

**Chronic toxicity**

The respiratory tract is principally regarded as potential target organ after the inhalation of MC dust.[00454]

Workers exposed to iron chrome alloy concentrations of approx. 0.26 mg Cr/m<sup>3</sup> at their workplaces (in addition to further dusts) developed in individual cases respiratory illnesses with pulmonary dysfunctions.

It was assumed that these disorders were allergic reactions.

Furthermore, there are reports on radiographically verifiable changes in the lung tissue of workers exposed to chromite (ferrous chrome ore), i.e. pneumoconiotic changes with slight thickening of the interstitial tissues and the interalveolar septa).[07744]

It was verified that MC does not cause any interstitial lung diseases (pneumoconioses, fibroses).[07748]

However, another source pointed to the fact that it has not been clarified to date whether MC has contributed to the development of a 'hard metal lung' disease in welders.[07639]

Likewise, it is unclear whether and the extent to which MC on metal surfaces can induce allergic reactions or a sensitisation in persons allergic to chromates.[07619]

**Reproductive toxicity, mutagenicity, carcinogenicity**

Reproductive toxicity:

Appropriate information pertaining to MC is not available.[99983]

Mutagenicity:

A mutagenic potential of metal dust was not confirmed in in-vitro tests.

An in-vivo test on rodents yielded positive findings; however, the test facility permitted a simultaneous exposure to chromium oxides.

Carcinogenicity:

It was verified that the available data from animal experiments are not sufficient to permit conclusions with regard to the potential carcinogenic characteristics of chromium metal dust.  
[07980]

### **Biotransformation and excretion**

Studies on the metabolism of MC are not reported in the available literature.[99983]

According to the results of a few studies on chemical stability, it is possible that under physiological conditions Cr(VI) ions can be released from chromium metal powders.

This effect was also verified after implantation of a chromium-cobalt alloy in the muscle tissue of rats.

Quantitative information on this subject is not available.[07980]

Trivalent chromium, which is required for the formation of the glucose tolerance factor (organic Cr(III) complex; activator of the effects of insulin), possesses physiological significance.[07639]

### **Annotation**

This occupational health information was compiled on 02.07.1999.

It will be updated if necessary.

This information was translated from German into English by Übersetzungsbüro Branco.

## **FIRST AID**

### **Eyes**

Rinse the affected eye with widely spread lids for 10 minutes under running water whilst protecting the unimpaired eye.

Arrange medical treatment.

[07750]

### **Skin**

MC can easily be removed by mechanical means.

Then thoroughly clean contaminated skin with soap and water.

When irritations appear or the skin burned by splashes of molten metal or mechanical injuries occur:

Arrange for medical treatment.

[07639, 07750, 99999]

### **Respiratory tract**

When metal vapours or massive amounts of dusts were inhaled:

Whilst protecting yourself remove the casualty from the hazardous area and take him to the fresh air.

Lay the casualty down in a quiet place and protect him against hypothermia.

In the case of breathing difficulties have the casualty inhale oxygen.

Arrange medical treatment.

When symptoms of irritations of the respiratory tract/allergic reactions occur:

As soon as possible repeatedly have the casualty deeply breathe a glucocorticoid inhalation spray in.

[07750, 99999]

### **Swallowing**

Rinse the mouth and spit the fluids out.

If the casualty is conscious have him drink 1 glass of water (ca 200 ml).

Arrange medical treatment.

[07750]

### **Information for physicians**

MC is biologically largely inactive.

In general, the only effects to be expected are those of inert dusts.[07639]

However, allergic reactions cannot be ruled out.[07619]

The picture of a metal-fume lung (compressed hili and net-like drawings with little spots) might be radiographically verifiable after prolonged exposure.

Clinically, there are neither symptoms nor functional restrictions.[99992]

- First medical assistance:

Particles on the cornea and the sclera must be removed; the casualty should be referred to an ophthalmologist.

The diagnostic use of fluorescein vital staining is recommended to rule out mechanically caused cornea lesions.

Mechanical injuries or skin burns might require treatment.

In the case of allergic reactions, a corticoid should be applied to large areas.

Expectorants/secretolytics can be administered to promote dust elimination after inhalation.

If signs of allergic/irritative reactions of the respiratory tract are observed, the casualty should undergo the administration of glucocorticoids (via inhalation, i.v.) and oxygen supply.

Further treatment depends on the symptoms.

In the case of accidental oral intake, even of large doses, the application of dietary fibres and a mild laxative might be sufficient.

Postobservation in hospital.[99999]

### Recommendations

Provide the physician information about the substance/product and treatment already administered.

### Annotation

This first aid information was compiled on 02.07.1999.

It will be updated if necessary.

This information was translated from German into English by Übersetzungsbüro Branco.

## SAFE HANDLING

[Handling](#) | [Storage](#) | [Fire and explosion protection](#) | [Organisational measures](#) | [Personal protection](#) | [Disposal considerations](#) | [Accidental release measures](#) | [Fire fighting measures](#) | [Further Information](#)

## TECHNICAL MEASURES - HANDLING

### Workplace

Select ventilation measures according to the other used substances.

If there is a chance that dusts may be released, then the work room must provide adequate ventilation.

Washing facility at the workplace required.

### Equipment

Suction off dust at the point of exit.

Consider emission limit values, a purification of waste gases if necessary.

Containers are to be marked clearly.

### Advice on safer handling

Do not leave container open.

Sufficient ventilation must be guaranteed for refilling, transfer, or open use.

Avoid spillage.

Fill only into clearly marked containers.

Avoid rising dust.

### Cleaning and maintenance

Avoid dust formation. Dust formation that cannot be avoided must be collected regularly.

Use a tested industrial vacuum cleaner or suction device.  
Do not raise dust while cleaning.  
Use of a blower for cleaning is not permitted.

## TECHNICAL MEASURES - STORAGE

### Storage

Do not use any food containers - risk of mistake.  
Containers have to be marked clearly and permanently.  
Keep container tightly closed.  
Storage temperature: Without any limitation.  
Store in a dry place.

### Conditions of collocated storage

Storage class 10 - 13 (Other liquids and solids)

Only substances of the same storage class should be stored together.

Collocated storage with the following substances is prohibited:

- Pharmaceuticals, foods, and animal feeds including additives.
- Infectious, radioactive und explosive substances.
- Strongly oxidizing substances of storage class 5.1A.

Under certain conditions the collocated storage with the following sub-stances is permitted (For more details see [TRGS 510](#)):

- Gases.
- Flammable liquids of storage class 3.
- Other explosive substances of storage class 4.1A.
- Pyrophoric substances.
- Substances liberating flammable gases in contact with water.
- Oxidizing substances of storage class 5.1B.
- Ammonium nitrate and preparations containing ammonium nitrate.
- Organic peroxides and self reactive substances.
- Combustible and non combustible acutely toxic substances of storage classes 6.1A and 6.1B.

The substance should not be stored with substances with which hazardous chemical reactions are possible.

## TECHNICAL MEASURES - FIRE AND EXPLOSION PROTECTION

### Technical, constructive measures

Substance is combustible.

Fire fighting equipment must be available.

If there is a risk of a dust explosion due to the dust-like distribution and the quantities used, measures according to [TRGS 722](#) (prevention of formation), 723 (prevention of ignition) and [TRGS 724](#) (constructive explosion protection) may become necessary.

### Precaution on handling

Areas in which the substance can arise as a dust in such quantities that a dust explosion could occur are to be considered as at a risk of explosion.

Keep away from sources of ignition (e.g. open flames, heat sources and sparks).

## ORGANISATIONAL MEASURES

Instruction on the hazards and the protective measures using instruction manual ([TRGS 555](#)) are required with signature if just more than one minor hazard was detected.

Instruction must be provided before employment and then at a minimum of once per annum thereafter.

It must be assured that the workplace limit values are being maintained. If the limit values are exceeded, additional protection measures are necessary.

The measurements must be recorded and kept on file.

## PERSONAL PROTECTION

### **Body protection**

Wear an apron or a lab coat.

### **Respiratory protection**

In an emergency (e.g.: unintentional release of the substance, exceeding the occupational exposure limit value) respiratory protection must be worn. Consider the maximum period for wear.

Respiratory protection: Particle filter P1, colour code white.

### **Eye protection**

Wear glasses with side protection.

### **Hand protection**

Select hand protection according to the other used substances.

### **Occupational hygiene**

Take heed of usual occupational hygiene measures when handling chemical substances, especially wash the skin with soap and water before breaks and at the end of work and apply fatty skin-care products after washing.

## **DISPOSAL CONSIDERATIONS**

Non-hazardous waste according to Waste Catalogue Ordinance (AVV).

If there is no way of recycling it must be disposed of in compliance with the respective national and local regulations.

Collection of small amounts of substance:

Residues should be recycled.

Collect in container for recyclable metal residues. All metals should be collected separately.

Collection vessels must be clearly labelled with a systematic description of their contents. Store the vessels in a well-ventilated location. Entrust them to the appropriate authorities for disposal.

## **ACCIDENTAL RELEASE MEASURES**

Wear a dust mask.

Pick up without creating dust.

Afterwards ventilate area and wash spill site.

Endangerment of watert:

No hazards to sources of water are to be feared if released into water, drainage, sewer, or the ground.

## **FIRE FIGHTING MEASURES**

### **Classes of fires**

D combustible metals

### **Suitable extinguishing media**

Metal fire extinguisher

Dry sand

Cement

### **Unsuitable extinguishing media**

Water

Foam

Carbon dioxide

### **Instructions**

Seek immediate cover in case of sudden release and raising of large quantities of dust.



Cool surrounding containers with water spray.  
If possible, take container out of dangerous zone.  
Shut off sources of ignition.

### Special protective equipment

In the case of a fire hazardous substances can be released.  
Metal oxide fume  
Wear self-contained breathing apparatus.

## FURTHER INFORMATION

All the information on handling and usage concerns exclusively the usage of chromium powder or procedures where occur chromium dust.

## REGULATIONS

[GHS Classification/Labelling](#) | [Workplace labelling](#) | [Water hazard class](#) | [Air quality control](#) | [Transport Regulations](#) | [Threshold limit values](#) | [EC-Threshold limit values](#) | [Technical rules](#) | [Regulations of accident insurers](#)

## EUROPEAN GHS CLASSIFICATION AND LABELLING

Not a dangerous substance according to GHS.  
Registration entry of the manufacturer on the ECHA website

Reference: [07520](#)

State: 2022

Checked: 2022

## WORKPLACE LABELLING ACCORDING TO GERMAN [ASR A1.3](#)

### Prohibition label



Do not extinguish with  
water

## GERMAN WATER HAZARD CLASS

Substance No: 10831

non-hazardous to waters

Chromium,  $0,063 \leq \text{particle size} < 1 \text{ mm}$

Classification according to the announcement of the list of substances hazardous to water in the Federal Register of 10.08.2017, last update 24.11.2023

## TECHNICAL INSTRUCTIONS ON AIR QUALITY CONTROL ([TA LUFT](#))

Chapter 5.2.2 Inorganic dusts

Class III

Also with the presence of several substances of the same class, the following values are in all not allowed to be exceeded in the exhaust gas:

Mass flow: 5 g/hr

or

Mass conc.: 1 mg/m<sup>3</sup>

Specified as Cr.

## TRANSPORT REGULATIONS

Not subject to transport regulations.

Reference: [07520](#)

### [TRGS 900 - GERMAN OCCUPATIONAL EXPOSURE LIMIT VALUES](#)

2 mg/m<sup>3</sup>

with reference to the inhalable fraction

Peak limitation: Excursion factor 1

Duration 15 min, mean; 4 times per shift; interval 1 hour

Category I - Substances for which local irritant effects determine the exposure limit value, also respiratory allergens

Source: EU

Scope:

Chromium and inorganic Chromium(II) and (III)-compounds (except those mentioned by name)

The occupational exposure limit value refers to the element content of the corresponding Metal.

### [EC OCCUPATIONAL EXPOSURE LIMIT VALUES](#)

Directive 2006/15/EC

**Recommended indicative occupational exposure limit value** for the European Union

A national occupational exposure limit value has to be set.

8 hours limit value: 2 mg/m<sup>3</sup>

### [TECHNICAL RULES FOR HAZARDOUS SUBSTANCES](#)

#### [TRGS 402](#)

Ermitteln und Beurteilen der Gefährdungen bei Tätigkeiten mit Gefahrstoffen: Inhalative Exposition; Ausgabe September 2023

#### [TRGS 500](#)

Schutzmaßnahmen; Ausgabe September 2019

#### [TRGS 509](#)

Lagern von flüssigen und festen Gefahrstoffen in ortsfesten Behältern sowie Füll- und Entleerstellen für ortsbewegliche Behälter; Ausgabe Juni 2022

#### [TRGS 510](#)

Lagerung von Gefahrstoffen in ortsbeweglichen Behältern; Ausgabe Januar Dezember 2020

#### [TRGS 800](#)

Brandschutzmaßnahmen; Ausgabe Dezember 2010

### [TRGS 720](#)

Gefährliche explosionsfähige Gemische - Allgemeines; Ausgabe Juli 2020, zuletzt berichtigt März 2021

### [TRGS 721](#)

Gefährliche explosionsfähige Gemische - Beurteilung der Explosionsgefährdung; Ausgabe Oktober 2020, zuletzt berichtigt Dezember 2020

### [TRGS 722](#)

Vermeidung oder Einschränkung gefährlicher explosionsfähiger Atmosphäre, Ausgabe Februar 2021

### [TRGS 723](#)

Gefährliche explosionsfähige Gemische - Vermeidung der Entzündung gefährlicher explosionsfähiger Gemische; Ausgabe Juli 2019, zuletzt geändert Oktober 2020

### [TRGS 724](#)

Gefährliche explosionsfähige Gemische - Maßnahmen des konstruktiven Explosionsschutzes, welche die Auswirkung einer Explosion auf ein unbedenkliches Maß beschränken, Ausgabe Juli 2019

## REGULATIONS OF GERMAN ACCIDENT INSURERS

### [DGUV Regel 112-190](#)

Benutzung von Atemschutzgeräten, Ausgabe November 2021  
(in German only)

## LINKS

### [International Limit Values](#)

[DGUV Information 213-098: List of substances - lesson in schools \(in German only\)](#)

## REFERENCES

Quelle: 00001

IFA: Erfassungs- und Pflegehandbuch der GESTIS-Stoffdatenbank (nicht öffentlich)  
Data acquisition and maintenance manual of the GESTIS substance database (non-public)

Quelle: 00083

Environmental Health Criteria (Serie), WHO, Genf

Quelle: 00131

The Merck-Index; 14th Edition 2006

Quelle: 00454

Hazardous Substances Data Bank (HSDB)

Quelle: 01211

GHS-Sicherheitsdatenblatt, Merck  
GHS Material Safety Data Sheet, Merck

Quelle: 02072

Ecotoxicological Data, compiled by the US Environmental Protection Agency (EPA), selected and distributed by Technical Database Services (TDS), New York, 2009

Quelle: 05300

[TRGS 510](#) "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern" Ausgabe Dezember 2020

Quelle: 05350

[TRGS 900](#) "Arbeitsplatzgrenzwerte" Ausgabe Januar 2006, zuletzt geändert und ergänzt Juni 2023

Quelle: 06002

L. Roth, U. Weller

"Gefährliche Chemische Reaktionen" Loseblattsammlung mit Ergänzungslieferungen, ecomed-Verlag  
("Dangerous chemical reactions" loose-leaf collection with supplement deliveries)

Quelle: 07520

Europäische Chemikalienagentur ECHA: Informationen über registrierte Substanzen

European Chemicals Agency ECHA: Information on registered substances

Quelle: 07580

Bekanntmachung der Liste der wassergefährdenden Stoffe im Bundesanzeiger vom 10.08.2017,  
zuletzt geändert 24.11.2023

Quelle: 07619

DFG Deutsche Forschungsgemeinschaft: The MAK-Collection for Occupational Health and Safety,  
nach Veröffentlichungsdatum zu finden unter:

bis 2002 Verlag Chemie

ab 2002 Online: <http://onlinelibrary.wiley.com/book/10.1002/3527600418/topics?filter=#>

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Quelle: 07639

J. Konietzko, H. Dupuis (Hrsg.) "Handbuch der Arbeitsmedizin, Arbeitsphysiologie,  
Arbeitspathologie, Prävention" Loseblattausgabe, ecomed-Verlagsgesellschaft mbH, Landsberg ab  
1989

Quelle: 07744

NIOSH OSHA "Occupational Health Guidelines for Chemical Hazards" Cincinnati 1988

Quelle: 07748

American Conference of Governmental Industrial Hygienists "Documentation of the threshold limit  
values and biological exposure indices Loseblattsammlung mit Ergänzungslieferungen

Quelle: 07750

R. E. Lenga "The Sigma-Aldrich Library of Chemical Safety Data" 2nd edition, Sigma-Aldrich,  
Milwaukee 1988

Quelle: 07930

NIOSH IDLHs "Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs)"

U.S. Department of Health and Human Service, Cincinnati Mai 1994; Online:

[www.cdc.gov/niosh/idlh](http://www.cdc.gov/niosh/idlh)

Quelle: 07979

W.M. Grant, J.S. Schuman: Toxicology of the eyes; 4th Edition, Charles C Thomas Publisher,  
Springfield, Illinois; 1993

Quelle: 07980

IARC - International Agency for research on cancer: Monographs on the evaluation of carcinogenic  
risks to humans WHO, Lyon; Serie

Quelle: 99983

Liste arbeitsmedizinisch-toxikologischer Standardwerke (2)

List of standard references regarding occupational health and toxicology (2)

Quelle: 99992

Projektgebundene Literatur zur Ersten Hilfe

(Project related bibliographical references regarding first aid)

Quelle: 99999

Angabe des Bearbeiters

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