

Zirconium powder (non pyrophoric)



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IDENTIFICATION

Zirconium powder (non pyrophoric)

ZVG No: 520040
CAS No: 7440-67-7
INDEX No: 040-002-00-9

CHARACTERISATION

SUBSTANCE GROUP CODE

134000 Metals

STATE OF AGGREGATION

The substance is solid.

PROPERTIES

metal powder
dark grey

CHEMICAL CHARACTERISATION

Self-heating substance, may catch fire.

[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: 06002

FORMULA

Zr

Molar mass: 91,22 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

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

MELTING POINT

Melting point: 1857 °C

Reference: [00131](#)

BOILING POINT

Boiling Point: 3577 °C

Reference: [00131](#)

DENSITY

DENSITY

Value: 6,5 g/cm³

Reference: [00131](#)

SOLUBILITY IN WATER

practically insoluble in water

Reference: [01251](#)

HAZARDOUS REACTIONS

Thermal decomposition

Self-ignition.

Ignited metal powder burns on under water. Risk of explosion when heated to about 150 degree centigrade. Molten zirconium is self-igniting in the presence of air too, risk of explosion.

Hazardous chemical reactions

Electrostatic charging may cause explosions. Sun, heat, friction or impact and humidity may cause ignition or explosion.

Risk of explosion in contact with:

oxygen
alkali hydroxides/heat (rare)
heavy metal oxides (rare)
borax/heat
potassium compounds (rare)
carbon dioxide (zirconium powder)
metal chromates
metal nitrates
permanganates
carbon tetrachloride
hydrogen/heat
heat above 150 degree centigrade
oxygen containing materials
oxo salts of alkali metals

The substance can react dangerously with:

alkali metals
strong oxidizing agents
phosphorus
alkali carbonates
alkali compounds
chlorine/heat
hydrogen fluoride
nitryl fluoride
concentrated sulfuric acid
water (up to 10 %)

OCCUPATIONAL HEALTH AND FIRST AID

Occupational health check

OCCUPATIONAL HEALTH CHECK

Prophylaxis offer: Occupational medical prevention has to be offered, when activities with exposure to this substance are conducted.

Deadlines: Occupational medical prevention has to be offered to employees prior to taking up work. Deadlines for the proposal of regularly recurrent occupational medical prevention are to gather from the Occupational Health Rule (Arbeitsmedizinische Regel) "[AMR Nummer 2.1](#)".

SAFE HANDLING

Handling | Storage | Fire and explosion protection | Organisational measures | Personal protection | Disposal considerations | Accidental release measures | Fire fighting measures

TECHNICAL MEASURES - HANDLING

Workplace

Work areas should be physically separated if possible.

Provision of good ventilation in the working area.

The cleaned air should not be returned to the working area. Air that has been pumped out can only be returned if it has been sufficiently cleaned using an acknowledged method.

Washing facility at the workplace required.

When handling excessive amounts of the substance an emergency shower is required.

Equipment

Use only closed apparatus.

If release of the substance cannot be prevented, then it should be suctioned off at the point of exit.

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

Label containers and pipelines clearly.

Advice on safer handling

Take care to keep workplace clean and dry.

The substance must not be present at workplaces in quantities above that required for work to be progressed.

Do not leave container open.

Use leak-proof equipment with exhaust for refilling or transfer.

Avoid spillage.

Fill only into labelled container.

Avoid any contact when handling the substance.

Avoid rising dust.

Do not transport together with incompatible substances.

Use an appropriate exterior vessel when transporting in fragile containers.

Cleaning and maintenance

Clean daily.

Use protective equipment while cleaning if necessary.

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

Use tested explosion-proof industrial vacuum cleaners of class H.

Do not raise dust while cleaning.

Use of a blower for cleaning is not permitted.

Do not clean damp.

A device that has become dirty may only be used in other work areas after it has been cleaned.

Only conduct maintenance and other work on or in the vessel or closed spaces after obtaining written permission.

TECHNICAL MEASURES - STORAGE

Storage

Do not use any food containers - risk of mistake.

Containers have to be labelled clearly and permanently.

Store in the original container as much as possible.

Keep container tightly closed.

Storage temperature: Without any limitation.

Store in a dry place.

Conditions of collocated storage

Storage class 4.3 (Substances liberating flammable gases in contact with water)

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.
- Gases.
- Aerosols (spray bottles).
- Flammable liquids of storage class 3.
- Other explosive substances of storage class 4.1A.
- Strongly oxidizing and oxidizing substances of storage classes 5.1A and 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.

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

- Flammable solid substances or desensitized substances of storage class 4.1B.
- Pyrophoric substances.
- Combustible toxic or chronically acting substances of storage class 6.1C.
- Noncombustible toxic or chronically acting substances of storage class 6.1D.
- Combustible corrosive substances of storage class 8A.
- Noncombustible corrosive substances of storage class 8B.
- Combustible liquids of storage class 10.
- Combustible solids of storage class 11.
- Noncombustible liquids of storage class 12.

The substance should not be stored with substances with which ha-zardous 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.

In case of risk of water contact and release of flammable gases in hazardous quantities, explosion protection measures in accordance with [TRGS 722](#) (prevention of formation), [TRGS 723](#) (prevention of ignition) and [TRGS 724](#) (constructive explosion protection) may be required.

Precaution on handling

Area with fire risk.

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.

Areas in which the substance may have contact with water are to be considered as at risk of explosion.

Keep at a distance from sources of ignition (e.g. electrical devices, open flames, heat sources, sparks).

Observe the smoking prohibition!

Absolutely no welding in the working area.

Only work with vessels and lines after these have been thoroughly rinsed and inerting.

Work done with fire or open flame should only be carried out with written permission if the risk of fire or explosion cannot be completely eliminated.

Do not use any tools that cause 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.

An escape and rescue plan must be prepared when the location, scale, and use of the work-site so demand.

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

The concentration of this substance in the air should be as far below the workplace limit value as possible.

The measurements must be recorded and kept on file.

The number of employees who work with the hazardous substance must be kept to a minimum.

Observe the restrictions on juvenile employment as defined in the "Jugendarbeitsschutzgesetz".

Only employees are permitted to enter the work areas. Signposting to this effect must be displayed.

PERSONAL PROTECTION

Body protection

Depending on the risk, wear a suitable protective clothing or a suitable chemical protection suit.
Wear flameproof protective clothing.

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 P2, colour code white.

Use insulating device for concentrations above the usage limits for filter devices, for oxygen concentrations below 17% volume, or in circumstances which are unclear.

Eye protection

Sufficient eye protection should be worn.

Wear glasses with side protection.

Hand protection

Use protective gloves. The glove material must be sufficiently impermeable and resistant to the substance. Check the tightness before wear. Gloves should be well cleaned before being removed, then stored in a well ventilated location. Pay attention to skin care.

Skin protection cremes do not protect sufficiently against the substance.

Textile or leather gloves are completely unsuitable.

Currently there is no information available regarding suitable glove materials.

Ask the manufacturer for suitable materials.

Occupational hygiene

Foods, beverages and other articles of consumption must not be consumed at the work areas.

Suitable areas are to be designated for these purposes.

Avoid contact with skin. In case of contact wash skin.

Avoid inhalation of dust.

Avoid contact with clothing. Contaminated clothes must be exchanged and cleaned carefully.

Provide washrooms with showers and if possible rooms with separate storage for street clothing and work clothing.

The skin must be washed with soap and water before breaks and at the end of work. Apply fatty skin-care products after washing.

Take care of personal hygiene.

DISPOSAL CONSIDERATIONS

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:

Collect in container for toxic, inorganic residues and heavy metal salts and their solutions.

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

Shut off all sources of ignition.

Evacuate area. Warn affected surroundings.

Wear personal protective equipment (see chapter Personal Protection).

Pick up without creating dust.

Use non-sparking tools.

Attention! Substance reacts with water. Avoid contact with water.

Afterwards ventilate area and wash spill site.

Endangerment of watert:

Low hazard to waters. Inform the responsible authorities when very large quantities get into water, drainage, sewer, or the ground.

FIRE FIGHTING MEASURES

Classes of fires

D combustible metals

Suitable extinguishing media

Dry sand

Metal fire extinguisher

Unsuitable extinguishing media

Water

Foam

Instructions

If possible, take container out of dangerous zone.

Shut off sources of ignition.

Explosion danger by penetration into sewerage.

Special protective equipment

In the case of a fire hazardous substances can be released.

Wear self-contained breathing apparatus.

REGULATIONS

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

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification

Self-heating substances, Category 1; H251



Signal Word "Danger"

Hazard Statement - H-phrases

H251: Self-heating: may catch fire.

Registration entry of the manufacturer on the ECHA website
No P-phrases have been assigned.

Reference: [07520](#)

State: 2022

Checked: 2023

The substance is listed in appendix VI, table 3 of CLP regulation.

The given classification can deviate from the listed classification, since this classification is to be complemented concerning missing or divergent danger classes and categories for the respective substance.

Reference: [99999](#)

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

Prohibition label



No open flame; fire, open ignition sources and smoking prohibited



Do not extinguish with water



No admittance for unauthorized persons

Warning label



Caution - inflammable material

Precept label



Use safety goggles



Wear safety gloves

GERMAN WATER HAZARD CLASS

Substance No: 10888

WGK 1 - low hazard to waters

Zirconium, particle size < 1 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 5.2.1 Overall Dust, including fine dust

The emissions of dust in the exhaust gas are not allowed to exceed the following values:

Mass flow: 0,20 kg/hr

or

Mass conc.: 20 mg/m³

The mass per unit volume of 0,15 g/m³ in exhaust gas is not allowed to be exceeded also on observance or lower deviation of a mass flow of 0,20 kg/h.

TRANSPORT REGULATIONS

UN Number: 2008

Shipping name: Zirconium powder, dry

Class: 4.2 (Substances liable to spontaneous combustion)

Hazard Identification Number: 43

Packing Group: I (high danger)

Hazard Identification Number: 40

Packing Group: II/III (medium/low danger)

Danger Label: 4.2



Classification code: S4

Tunnel restrictions:

Depending on the packing group.

Reference: [07902](#)

UN Number: 1358

Shipping name: Zirkonium powder, wetted with not less than 25 % water

Hazard Identification Number: 40

Class: 4.1 (Flammable solids)

Packing Group: II (medium danger)

Danger Label: 4.1



Classification code: F3

Tunnel restrictions:

Passage forbidden through tunnels of category E.

Reference: [07902](#)

TRGS 900 - GERMAN OCCUPATIONAL EXPOSURE LIMIT VALUES

1 mg/m³

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

Risk of sensitization of respiratory tract and skin

Source: DFG

RECOMMENDATIONS OF [MAK-COMMISSION](#)

This data is recommended by scientific experience and is not established law.

II b) substances, for which (still) no MAK-values can be established

TECHNICAL RULES FOR HAZARDOUS SUBSTANCES

[TRGS 201](#)

Einstufung und Kennzeichnung bei Tätigkeiten mit Gefahrstoffen; Ausgabe Februar 2017, zuletzt geändert und ergänzt April 2018

[TRGS 400](#)

Gefährdungsbeurteilung für Tätigkeiten mit Gefahrstoffen; Ausgabe Juli 2017

[TRGS 555](#)

Betriebsanweisung und Information der Beschäftigten; Ausgabe Februar 2017

[TRGS 600](#)

Substitution; Ausgabe Juli 2020

[TRGS 402](#)

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

[TRGS 401](#)

Gefährdung durch Hautkontakt, Ermittlung - Beurteilung - Maßnahmen; Ausgabe Oktober 2022

[TRGS 406](#)

Sensibilisierende Stoffe für die Atemwege; Ausgabe Juni 2008, korrigiert März 2009

[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](#)

[The MAK Collection for Occupational Health and Safety](#)

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: 00131

The Merck-Index; 14th Edition 2006

Quelle: 01219

Archiviertes Sicherheitsdatenblatt, Merck

Archived Material Safety Data Sheet, Merck

Quelle: 01251

GHS-Sicherheitsdatenblatt, Alfa Aesar (eine Marke von Thermo Fisher Scientific)

GHS Material Safety Data Sheet, Alfa Aesar (A Thermo Fisher Scientific Brand)

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: 07635

AUERDATA 98

Quelle: 07902

BAM: Datenbank [Gefahrgut-Schnellinfo](#)

Quelle: 08112

DFG Deutsche Forschungsgemeinschaft: MAK- und BAT-Werte-Liste 2023, Senatskommission zur
Prüfung gesundheitsschädlicher Arbeitsstoffe, Mitteilung 59; GMS PUBLISSO

Quelle: 99999

Angabe des Bearbeiters

Indication of the editor

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