

Safety data sheet according to (EC) No 1907/2006 Boric acid (> 95 % enriched in ¹⁰B)

Date: 27.08.2013 Date of change: - valid from: 27.08.2013 Version: 1 replaces Version: -

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Material name / Trade name: Boric acid (> 95 % enriched in ¹⁰B)
CAS-No: 13813-79-1
REACH-registration number: 01-2119486683-25-0041

1.2 Relevant identified uses of the substance or mixture and uses advised against:

Identified uses Enriched Boric Acid for use as a chemical shim for excess neutron absorption in the primary circuit of pressurized water reactors (PWRs) using high burn-up or MOX fuel cores.

Uses advised against -

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier NUKEM Isotopes GmbH
Industriestr. 13
D-63755 Alzenau
Germany
Further information obtainable from:
Tilo Glaeser
Phone: +49 60 23 - 91 14 74
e-mail: tilo.glaeser@nukemisotopes.de

1.4 Emergency telephone number

24 hr. Emergency Telephone: **+1-703-253-4254** (English / Contract No.: 01009)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

according to Regulation (EC) No 1272/2008

Hazard class and category: Reproductive toxicity, category 1B (Rep. 1B):
Hazard phrases: H360FD: May damage fertility. May damage the unborn child.

according to Directive 67/548/EEC

T - Repr. Cat. 2; R60: May impair fertility.
R61: May cause harm to the unborn child.

2.2 Label elements

Regulation (EC) No 1272/2008

Hazard pictograms:



GHS08

Danger

Signal word

Hazard phrases

H360DF

May damage fertility. May damage the unborn child.

Precautionary statements

Prevention P201

Obtain special instructions before use.

P281

Use personal protective equipment as required.

Response P308 + P313

IF exposed or concerned: Get medical advice/ attention.

Storage P405

Store locked up.

Disposal P501

Dispose of contents/container according to the official regulations.

2.3 Other hazards: None known.

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3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances

Main constituent of the substance	
Chemical name	boric acid (> 95 % enriched in ¹⁰ B)
CAS-No.	13813-79-1
EC-No.	237-478-7
Index-No.	005-007-00-2 (annex VI, CLP, for boric acid, CAS-No. 10043-35-3)
Formula	H ₃ BO ₃

4. FIRST AID MEASURES

4.1 Description of first aid measures

General information

Consult a physician. Show this safety data sheet to the doctor.

After inhalation

Remove victim to fresh air. Consult a doctor.

After skin contact

Wash affected skin with plenty of water and soap. In case of disorders consult a doctor.

After eye contact

Rinse cautiously with water for several (15) minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Consult a doctor.

After swallowing

Wash the mouth repeatedly. Never give anything by mouth to an unconscious person. Do not induce vomiting. If larger amounts are swallowed, give two glasses of water to drink and seek medical attention.

4.2 Most important symptoms and effects, both acute and delayed

May damage fertility. May damage the unborn child.

Drop in temperature, agitation, spasm, diarrhoea, nausea, vomiting, tiredness, ataxia (impaired locomotor coordination)

4.3 Indication of any immediate medical attention and special treatment needed:

Observation only is required for adult ingestion of less than 6 grams of boric acid. For ingestion in excess of 6 grams, maintain adequate kidney function and force fluids.

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

applicable: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

not applicable: For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Boric acid is not flammable, combustible or explosive. The substance is a flame retardant.

5.3 Advice for firefighters

Self-contained breathing apparatus, protective suit. Remove persons from danger area and stay on the windward side. Co-ordinate fire-fighting measures to the fire surroundings. Prevent fire extinguishing water from contaminating surface water or the ground water system.

6. ACCIDENTAL RELEASE MEASURES

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6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and material for containment and cleaning up

Pick up dry and arrange disposal without creating dust. Keep in suitable, closed containers for disposal. Clean up affected area. Discharge according to section 13.

6.4 Reference to other sections

See section 7 for handling and storage, see section 8 for personal protective measures and see section 13 for disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Information on safe handling

Avoid formation of dust and aerosols. Avoid exposure - obtain special instructions before use. Provide appropriate exhaust ventilation at places where dust is formed. Do not eat, drink or smoke at the work place. Wash hands thoroughly after handling. Remove contaminated clothes immediately. Observe label precautions.

Information on fire- and explosion protection

Keep away from sources of ignition. Observe the general rules of industrial fire prevention. No special measures required.

7.2 Conditions for safe storage, including any incompatibilities

Information on storage conditions

Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Moisture sensitive.

Requirements for store rooms and containers

Keep locked up or in an area accessible only to qualified or authorised persons.

Storage class 6.1 D (Non-combustible toxic substances or substances with chronic effects)
(German VCI/TRGS 510)

7.3 Specific end use(s)

Branch and sector- specific guidelines: none known

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Limit values for the exposure at the workplace and/or biological limit values

Basis: TRGS 900, Germany

workplace limit value for boric acid (CAS-No. 10043-35-3): 0.5 mg/m³ (refers to the amount of boron)

A risk of damaging fertility doesn't need be feared if compliance is assured with the workplace limit value or biological limit value.

8.1.2 DNEL- and PNEC- values

Based on published data from Registration dossier at ECHA webpage:

DNEL (inhalation): 4.15 mg/m³ (long term exposure)

PNEC aqua (freshwater): 2.02 mg/L

PNEC aqua (marine water): 2.02 mg/L

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Ensure adequate ventilation. Use local exhaust ventilation to keep airborne concentrations of dust below permissible exposure limits.

8.2.2 Individual protection measures, such as personal protective equipment

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Eye/face protection: Wear safety goggles conforming to EN166.
Skin protection: Wear protective clothing.
Hand protection: Wear gloves. The glove material has to be impermeable and resistant to the product/ the substance/ the mixture. Suitable material: rubber, nitrile, butyl.
Respiratory protection: Where airborne concentrations are expected to exceed exposure limits, respirators should be used (CEN149).

8.2.3 Environmental exposure controls
Do not allow to enter the environment.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

H₃BO₃ (purity: > 99.95 %)
Appearance: crystalline
- Form: solid
- Colour: white
Odour: odourless
Melting point: 168 - 171 °C (fast heating in a closed system)
Boiling point: No information available.
Density: 1489 kg/m³ (23 °C)
Vapour pressure: 0.000099 Pa (25 °C)
Partition coefficient (n-octanol/water): Log Pow: -1.09 (22 °C, pH: 7.5)
Water solubility: 48.4 g/L (20 °C, pH: 3.6)
pH-value: 3.8 - 4.8 (at 33 g/L, 20 °C)
Flash point: Does not flash.
Flammability: non flammable
Auto flammability: non self-heating
Explosiveness (lower and upper explosion limit): not applicable
Oxidising properties: none
Dissociation constant: pKa: 8.94 (20 °C)
Viscosity: No information available.
Decomposition temperature: No information available.
Bulk density: ca. 400-600 kg/m³
Ignition temperature: non combustible
Evaporation rate: No information available.

9.2 Other information: -

10. STABILITY AND REACTIVITY

10.1 Reactivity

No decomposition under normal conditions of use.

10.2 Chemical stability

Boric acid is stable under normal conditions of use, storage and transport.

10.3 Possibility of hazardous reactions

Exothermic reaction with acetic anhydride (risk of explosion). Reaction with strong reducing agents such as metal hydrides or alkali metals will generate hydrogen gas which could create an explosive hazard.

10.4 Conditions to avoid

Exposure to moisture, high temperatures

10.5 Incompatible materials

Alkali metals (potassium), metal hydrides, acid anhydrides (acetic anhydride)

10.6 Hazardous decomposition products

No information available.

11. TOXICOLOGICAL INFORMATION

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11.1 Information on toxicological effects

Acute toxicity	oral: LD ₅₀ > 2600 mg/kg bw (rat, [1]) dermal: LD ₅₀ >2000 mg/kg bw (rabbit, [2]) Inhalation: LC ₅₀ (4 h) > 2.12 mg/L air (rat, [3])
Skin corrosion/irritation	rabbit: not irritating [2]
Serious eye damage/irritation	rabbit: slightly irritating [4]
Sensitisation	sensitisation test: guinea pig: not sensitising [5]
Genetic toxicity in vitro	type of study: bacterial reverse mutation assay (e.g. Ames test) results: <u>negative</u> [6]
Genetic toxicity in vivo	type of study: micronucleus assay, type of genotoxicity: chromosome aberration, results: negative [7]
Carcinogenicity	No evidence of carcinogenicity. [8]
Reproductive toxicity	May damage fertility.
Teratogenicity	May damage the unborn child.
Specific target organ toxicity (single and repeated exposure)	Boric acid is not classified as specific target organ toxicant.
Aspiration hazard	Based on available data the classification criteria are not met.

11.2 Further Information:

After absorption of large quantities: Drop in temperature, agitation, spasm, diarrhoea, nausea, vomiting, tiredness, ataxia (impaired locomotor coordination). Handle in accordance with good industrial hygiene and safety practice.

12. ECOLOGICAL INFORMATION

12.1 Toxicity	fish: LC ₅₀ (96 h): 725 mg/L (<i>Oncorhynchus tshawytscha</i>) [9] daphnia: LC ₅₀ (48 h): 133 mg/L (<i>Daphnia magna</i>) [10] algae: EC ₅₀ (48 h): 66 mg/L (growth rate, <i>Phaeodactylum tricornutum</i>) [11]
12.2 Persistence and degradability	The methods for determining the biological degradability are not applicable to the inorganic substance boric acid.
12.3 Bioaccumulative potential	Log Pow: -1.09 (22 °C, pH: 7.5) Bioaccumulation is not expected.
12.4 Mobility in soil	No information available.
12.5 Results of PBT and vPvB assessment	Not PBT and not vPvB.
12.6 Other adverse effects	Entry into the environment must be avoided.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Overview of regulations:

- Directive 75/442/EEC on waste, - Directive 91/689/EEC on hazardous waste, - waste listing regulation (AVV)

Dispose of waste according to applicable legislations. The allocation of waste identity numbers / waste descriptions must be carried out according to the EEC, specific to the industry and process. Do not allow product to reach sewage system. Must not be disposed together with household garbage.

Treatment of contaminated packaging:

Handle contaminated packages in the same way as the substance itself.

14. TRANSPORT INFORMATION

14.1 UN number: -

14.2 UN proper shipping name: -

14.3 Transport hazard class(es): -

14.4 Packing group: -

14.5 Environmental hazards:

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Characteristic environmentally hazardous materials
ADR/RID / IMDG-Code / ICAO-TI / IATA-DGR: no
Marine pollutant: no

14.6 Special precautions for user

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14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable, product is shipped in packaged form.

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EU-Regulations e. g.

Regulation (EC) No 1907/2006 (REACH)

Regulation (EC) No 1272/2008 (CLP)

Major Accident Hazard Legislation:

Occupational restrictions:

The Directive 96/82/EC does not apply.

Take note of Directive 94/33/EC (amended by Directive 2007/30/EC) on the protection of young people at work.

Take note of Directive 92/85/EEC (amended by Directive 2007/30/EC) on the safety and health work of pregnant workers.

National regulations (Germany) e. g.

Gefahrstoffverordnung 2010

Technische Regeln

Merkblätter der Berufsgenossenschaft

TRGS 510, TRGS 900

M039 (BGI 537) „Fruchtschädigungen - Schutz am Arbeitsplatz“

M050 (BGI 546) „Tätigkeit mit Gefahrstoffen“

Wassergefährdungsklasse

WGK 1 schwach wassergefährdend

Lagerklasse

6.1 D Nichtbrennbare giftige oder chronisch wirkende Stoffe

Further relevant regulations

Refer to national regulations in the respective member country.

15.2 Chemical safety assessment

Chemical safety assessment was not performed by the supplier.

16. OTHER INFORMATION

List of relevant hazard statements and/or precautionary statements, which are not written out in full under sections 2 to 15: not applicable

Changes in relation to the last version: -

Abbreviations:

EC50: effective concentration, 50 percent

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)

IMDG: International Maritime Code for Dangerous Goods

IATA: International Air Transport Association

IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)

IBC-code: International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk.

ICAO: International Civil Aviation Organization

ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO)

GHS: Globally Harmonized System of Classification and Labelling of Chemicals

CAS: Chemical Abstracts Service (division of the American Chemical Society)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

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Literature data and data sources:

The following literature data and data sources [1] to [11] are from: European Chemical Agency (ECHA), Information on chemicals, registered substances (boric acid).

[1] study report (1996), report date: 1996-03-06

[2] publication (1982), report date: 1982-03-15

[3] study report (1997)

[4] study report (1989), report date: 1989-02-07

[5] study report (1994)

[6] study report (1991), report date: 1991-08-11

[7] study report (1991), report date: 1991-08-18

[8] publication (1987)

[9] publication: Hamilton, SJ and KJ Buhl, Arch. Environ. Contam. Toxicol. 19, 366-373 (1990)

[10] publication: Gersich, FM, Environ. Toxicol. Chem., 3, #1, 89-94 (1984)

[11] study report (2011)

-Own company data

-Safety data sheets of boric acid from other companies

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.