

ETİ MINE WORKS
GENERAL MANAGEMENT

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TECHNOLOGY DEVELOPMENT
DEPARTMENT

BIGADIC COLEMANITE

HEALTH AND SAFETY DATA SHEET

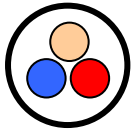
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**ETİ MINE WORKS GENERAL MANAGEMENT
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July 2007
(Safety Data Sheet in compliance with REACH Title IV / Annex II and ISO 11014)



1. Identification of the Substance / Preparation and the Company / Undertaking

1.1. Identification of the substance or preparation

Bigadiç Colemanite (Granulate)

CAS N° Registration number :

To be exempted from registration under REACH Regulation according to Article 2 § (7). Colemanite is a natural occurring mineral which is not chemically modified, therefore, considered within the scope of Annex V no: 7 of the REACH Regulation (CAS No: 12291-65-5).

Trade names : Bigadiç Colemanite

Chemical name/synonyms :

Colemanite, Calcium Borate, Di-calcium Hexaborate Pentahydrate

1.2. Use of the substance / preparation

The product is used in industrial manufacturing, in particular in:

- Textile grade fiberglass,
- Boron alloys,
- Metallurgical Fluxing,
- Borosilicate glass

1.3. Company/undertaking identification

Importer:

Name : AB ETIPRODUCTS OY,
Address : PIISPANPORTTI 9, 02240 ESPOO- FINLAND
Phone No: +358 9 819 4440
Fax No : +358 9 819 444 44
e-mail : sales@etiproducts.com

Manufacturer:

Name : ETİ MINE WORKS GENERAL MANAGEMENT
Address : Sıhhiye, Cihan Sok. No:2, 06430, Ankara, Türkiye.
Phone No: 00 90 312 294 23 42
Fax No : 00 90 312 232 59 10

1.4. Emergency phone number : 00 90 312 294 23 45 (Available office hours)

: 00 90 312 232 59 10 (Available office hours)

2. Hazards Identification

Potential Health Effects

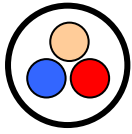
Primary Route(s) of Exposure : Inhalation, skin, eyes.

Inhalation : Occasional mild irritation effects to the nose and throat may occur from inhalation of borate dusts at levels greater than 10 mg/m³.

Eye Contact: May irritate the eyes upon contact.

Skin Contact: None known but may irritate the skin upon contact.

Ingestion: Colemanite is not intended for ingestion. Inorganic borate salts have low acute toxicity.



ACUTE (Short term) : This product may cause mild irritation, redness, tearing and blurred vision to the eyes, and may cause mouth, throat and gastrointestinal tract irritation.

3. Composition / Information on Ingredients

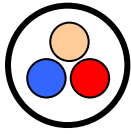
3.1. Chemical composition:

Chemical Nature of the Substance / Preparation

Common Name	Chemical Name	CAS No:	Wt. %
Colemanite	Di-calcium Hexaborate Pentahydrate	12291-65-5	65-95
Calcite/Dolomite	Dolomitic Limestone	16389-88-1	10-20
Ulexite	Sodium-Calcium Pentaborate Octahydrate	1319-33-1	2-6
Moisture	Water	7732-18-5	2-7
Realgar	Arsenic Sulphide	12044-30-3	as As ₂ O ₃
Orpiment	Arsenic Trisulphide	12255-89-9	max. 50 ppm

4. First aid measures

- Inhalation** : Move person to fresh air. Seek medical attention if irritation persists.
- Eye Contact** : Flush eyes with running water for at least 15 minutes. Seek medical attention if irritation persists.
- Skin Contact** : Wash with running water for at least 15 minutes. Seek medical Attention if irritation continues.
- Ingestion** : Observe individual; if large quantity is consumed and symptoms develop, seek medical attention. Drink water to dilute material in stomach.



5. Fire-fighting measures

Flash Point and Method	: Not applicable
Flammability Limits (%)	: Not applicable
Auto Ignition Temperature	: Not applicable
Extinguishing Media	: Water, foam, CO ₂ or dry chemical.
Unusual Fire and Explosion Hazards	: None
Fire Fighting Instructions	: None
Hazardous Combustion Products	: None

6. Accidental release measures

Land Spill	: Sweep up and take to officially authorised dump.
Water Spill	: This material will dissolve in water. See section 9.
Air Release	: This material will settle out of the air. It can then be scooped up for disposal as a non-hazardous waste.

7. Handling and Storage

Storage Temperature	: Store in dry, covered warehouse.
Storage Pressure	: Not applicable
General	: No special storage or handling procedures are required for this material.

8. Exposure controls / Personal protection

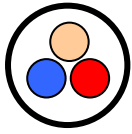
8.1. Exposure limit values

More commonly encountered colemanite and its respective acute toxicity data are shown in the following table:

	<u>Acute Toxicity of Colemanite (Calcium Borate)</u> LD50 in Rats, Oral Dosage ^a (milligrams per kilogram)	Toxicity Rating
Colemanite (Calcium Borate) nontoxic	5.600	Practically

a. Lethal dose killing 50% of the population

SOURCE : Registry of Toxic Effects of Chemical Substances (RTECS), U.S. National Library of Medicine, Toxicology Data Network (TOXNET), National Institute for Occupational Safety and Health (NIOSH).



8.2. Exposure controls

8.2.1. OCCUPATIONAL EXPOSURE CONTROLS

Personal protection:

- Respiratory Protection** : Not required unless there is heavy dust occurrence in which case a protective mask is recommended.
- Skin Protection** : Use of gloves recommended.
- Eye Protection** : Safety goggles recommended in dusty areas.
- Other Information** : Not absorbed when in contact with healthy skin or eye, wash with plenty of water.

Engineering Controls : General dilution ventilation and/or local exhaust ventilation should be provided as necessary to maintain exposures below regulatory limits. Dust collection systems may be necessary in some operations.

8.2.2. ENVIRONMENTAL EXPOSURE CONTROLS

No special requirement. Borates are naturally occurring and are widely spread on earth.

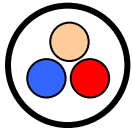
9. Physical and chemical properties

9.1. General information

- Appearance** : Light grey to tan stones granulate
(25-125 mm, 3-25 mm, 0,2-3 mm)
- Odor** : Odorless

9.2. Important health, safety and environmental information

- pH** : 9.1
- Boiling point** : Not applicable
- Flash point** : Not applicable
- Flammability** : Not applicable
- Explosive properties** : Not applicable
- Oxidising properties** : Not applicable
- Vapour Pressure** : Not applicable
- Density** : 2400 kg/m³ at (20°C)
- Solubility in water** : 0.81 g/l (25°C)
- Viscosity** : Not applicable
- Vapour density (Air=1)** : Not applicable
- Evaporation Rate** : Not applicable
- Bulk density** : 1460-1520 kg/m³ at (20°C)
- Freezing point** : Not applicable
- Melting point** : 986°C
- Chemical formula** : Ca₂B₆O₁₁.5H₂O,(2CaO.3B₂O₃.5H₂O)
- Molecular weight** : 411.084
- Physical state** : Granular



10. Stability and Reactivity

Stability : Stable under ordinary conditions of use and storage.

Incompatible Materials and Conditions to avoid : None.

Hazardous Decomposition Products : None.

Hazardous Polymerization : Will not occur.

Thermal Decomposition : When heated above 260°C in the oven, it starts losing water of hydration. On continued heating, dehydration proceeds until all the water is removed at around 415°C.

11. Toxicological information

11.1. Acute effects

Acute Toxicity : Not tested. Similar inorganic borate compounds are low in acute oral toxicity; LD₅₀ of colemanite in rats is expected to be greater than 5,600 mg/kg of body weight.

Skin : Not tested. Similar inorganic borate compounds are low in acute dermal toxicity; LD₅₀ of colemanite in rabbits is expected to be greater than 2,000 mg/kg of body weight.

Skin Irritation : Not tested. Not expected to be irritating to skin based experience with other similar inorganic borate compounds.

Eye Irritation : Not tested. Not expected to be irritating to eyes based experience with other similar inorganic borate compounds.

11.2. Chronic effects

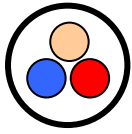
Carcinogenicity/Mutagenicity: Colemanite has not been tested. However, studies conducted with the chemically similar substance boric acid have reported no evidence of carcinogenicity in mice and mutagenic activity in a battery of short-term mutagenicity assays.

Reproductive : Colemanite has not been tested. However, human study of occupationally exposed borate worker population showed no adverse reproductive effects.

According to investigations on the health effects of boron and its compounds in Bigadiç, Kırka and Emet-Hisarçık Areas (Şaylı B.S., 1998);

1- Exposure to the mineral does not interfere with human reproduction primarily, for the frequency of infertile marriages are not higher than the general population, and most probably secondarily. The incidence of infertility runs 2-4%

2- Spontaneous abortions, stillbirths and fetuses and newborns with congenital malformations similarly display figures to be met in any segment of the country. Childless families due to such defects are around 1%



- 3- Infant mortality seems to be rather high in proband families; yet the rates approximates to the general population. And families without offspring because of infant deaths remain about 1%
- 4- Complaints and diseases mostly involve gastro-intestinal, cardio-vascular and cerebrovascular systems and are crowded in arthritis-arthrosis group.
- 5- Deaths with a malignant condition appear to be rare event among probands.

12. Ecological information

The environmental effects of boron are minimal and most noticeable in the world of plants. Minimal quantities of this element is essential for plant growth and hence boron is added to fertilisers used in boron deficient soils. However concentrations as low as 1 ppm boron could be critical for sensitive plants (lemon. etc.) and 10 ppm for semi tolerant plants (mustard, radish). There is no permanent effect as boron gradually soluble in water. In diluted aqueous solutions the predominant boron species present is undissociated boric acid.

Phytotoxicity: Boron is an essential micronutrient for plants. However, it can be harmful to boron sensitive plants in higher quantities. Acute toxicity (72-hr EC₅₀) for alga (*selenastrum capricornutum*) was determined as 53 mg B/l.

Environmental Fate: Boron and calcium are both ubiquitous in the enviroment and occur naturally in various mineral forms. Colemanite should be expected to decompose in the environment to stable calcium and boron containing mineral species.

Fish Toxicity: Boron naturally occurs in sea water and average concentration of 5 mg B/l. Acute toxicity (96-hr LC₅₀) for under-yearling Coho salmon (*oncorhynchus kisutch*) in fresh water was determined as 447 mg B/l.

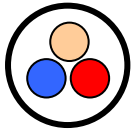
Bioaccumulation:

Species	: Crassostrea gigas
Exposure Period	: 47 days at 8°C
Concentration	: 40.5 B mg/l
BCF	: ca 4.5-8.5
Test Substance	: Sodium Metaborate

Low BCFs and reduction of tissue concentrations during exposures suggest regulation and that boron will not accumulate to high concentration.

12.1. Mobility

Colemanite is poorling soluble in water and is leachable through normal soil.



12.2. Persistence and Degradability

Colemanite is naturally occurring and ubiquitous in the environment. Colemanite decomposes in the environment to natural borate.

12.3. Bioaccumulative Potential

Boron does not fulfil the PBT-criteria.

13. Disposal considerations

Danger Class ADR/RID : Non-hazardous material.

14. Transport information

IATA-DGR : Not applicable.
IMDG-Code : Not applicable.
Packing : Not applicable.
Labelling/Marking
(Acc. to EEC regulations) : Not applicable.

15. Regulatory information

See section 8,13 and 14 for additional information.

16. Other information

NFPA Ratings:

Health: 0

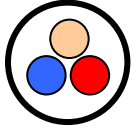
Flammability: 0

Reactivity: 0

Label Hazard Warning: May be harmful if swallowed or inhaled.
Causes irritation if absorbed through damaged skin.

Label Precautions :

- Avoid breathing dust.
- Use with adequate ventilation.
- Avoid contact with eyes and damaged skin.
- Wash after handling.



- Label First Aid :**
- Do not ingest.
 - If inhaled, remove to fresh air.
 - In case of contact with eyes and skin, flush with plenty of water. If irritation develops, get medical attention.

This list contains abbreviations which appear in the Material Safety Data Sheet:

- CAS** : Chemical Abstracts Services
WGK : German Water Pollution Risk Classes
IMDG : International Maritime Code for Dangerous Goods
ADR : Road Transport
LDL : Lowest Lethal Dose

Sources of key data used to compile the data sheet:

1. Merck Catalogue 1992/1993.
2. Colemanite Healthy and Safety Data Sheet, Etibank Boron Research Centre, Menderes, İZMİR February 1994.
3. The Economics of Boron “Eleventh Ed., 2006 Roskill Information Services Ltd.
4. SME Mineral Processing Handbook, Vol. 2, N.L. Weiss, Ed.
5. Etibank Pazarlama Satış Dairesi Başkanlığı, Ankara
6. Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd Ed. Noyes, Publications. Park Ridge, NJ. 1985. pp. 137-139.
7. Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. Quarterly Updates. ED4550000.
8. Weast, R.C., M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 67th Ed. CRC Press, Inc. Boca Raton, FL. 1986.
9. Şaylı B.S., Investigations on The Health Effects of Boron and Its Compounds in Bigadiç, Kırka and Emet-Hisarçık Areas, 1998, Ankara

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guide. ETİ MADEN İŞLETMELERİ GENEL MÜDÜRLÜĞÜ shall not be held liable for any damage resulting from contact with the above product.