

Material Safety Data Sheet

Date: February 5, 2009

Product Description: COLEMANITE

Reference: ULEX Empresa Minera S.A.

SECTION 1 – PRODUCT IDENTIFICATION

Chemical Name: Hydrated Calcium Borate

Chemical Family: inorganic/mineral borates

Trade Name: Colemanite

Synonyms: Colemanite, Boro-calcite

CAS N°: 1318-33-8

CAS N° (DOT/UN/NA): Colemanite has no UN number and is not affected by international rules regulating transportation by railway, road, sea and air.

Chemical Formula: $2\text{CaO} \cdot 3\text{B}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$; $\text{Ca}_2\text{B}_6\text{O}_{11} \cdot 5\text{H}_2\text{O}$

Formula Weight: 411.16

Theoretical Chemical Composition:

% B_2O_3 = 50, 81

% CaO = 27, 28

% H_2O = 21, 91

Trademark: COLEMANITA

Supplier: ULEX S.A.

Address: Asunción 2135 – Capital Federal – Buenos Aires – Argentina (C1419HFA)

Telephone: 54 011 4574-1555

FAX: 54 011 4574-2400

E-mail: informes@ulex.com.ar

WEB: www.ulex.com.ar

Hazard Classification (U.S.HAZ.COMM.):

Health:	0	Risk Scale:	
Fire:	0	0= Minimum	3= Serious
Reactivity:	0	1= Slight	4= Severe
		2= Mild	

SECTION 2 – COMPONENTS

Component: COLEMANITE – The commercial product is an enriched mineral.

CAS N. °: 1318-33-8

Concentration or Weight %: 80 approx.

OSHA/PEL: 10 mg/m³

ACGIH/TLV: 10 mg/m³

SECTION 3 – PHYSICAL AND CHEMICAL DATA

Aggregation State: White/grey powdery substance

Crystalline Form: Monoclinic

Transparency: Transparent to translucent (referred to the crystal in pure form)

Appearance and Odor: Powdery and odorless

Color: White/grey

Flavor: N/A*

Olfactory Threshold (ppm): N/A

Vapor Pressure (mm Hg): N/A

Vapor Density (Air=1): N/A

Evaporative Rate: N/A

Boiling Point (°C): N/A

Freezing Point (°C): N/A

Melting Point (°C): Over 900 °C

Solubility in Water at 20 °C: Insignificant (0.16 gr/100 mL)

pH: 10.5 (corresponds to isoelectric point)

Specific Density: 2.41

Operating Rate: 9 kWh/t

Mohs Hardness: 4.5

Magnetic Sensitivity: Diamagnetic, $K = -1.28 \cdot 10^{-8} \text{ m}^3/\text{Kg}$

N/A: Not Applicable

SECTION 4 – REACTIVITY

Chemical Stability: Colemanite is chemically stable. Temperature dehydrates it, losing crystallization water.

Incompatibility with other Substances: Not known

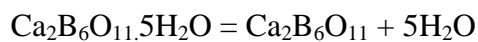
Reactivity: with mineral basis and acids

Hazardous Products: Reacting with mineral acids, it results in boric acid

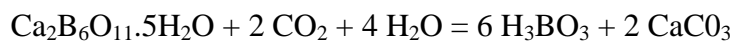
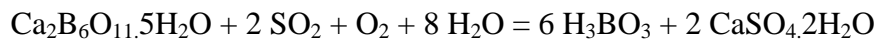
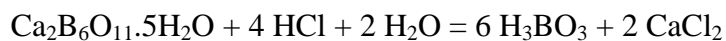
Hazardous Polymerization: None

Others:

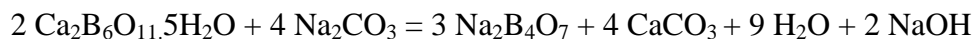
- a) Thermal Decomposition: decrepitates at 420 °C, losing its water of hydration according to the following reaction:



- b) Dissolving in acid solvent:



- c) Dissolving in Solvay soda:



SECTION 5 – FIRE AND EXPLOSION HAZARD

Flammability: Not Flammable. The product is FIRE-RETARDANT

Flash Point: N/A

Self-ignition Temperature: N/A

Flammability Limits:

UEL: N/A

LEL: N/A

Fire-fighting Means: Non-combustible Material. Use the proper extinguisher means for according to surrounding fire conditions.

Special Procedures for Fire Extinguishing: According to materials and surrounding fire conditions.

Toxic Gases Produced: According to materials and surrounding fire conditions.

Unusual Fire and Explosion Hazard: None

Sensitivity to Impact: None

Sensitivity to Electric Shocks: None

SECTION 6 – HEALTH HAZARD

LD₅₀ for acute oral toxicity (Ingestion): There is no data of trial tests. LD₅₀ in rats is estimated to be over 2000 mg/m³, based on data taken from other borates.

LD₅₀ for acute skin toxicity (Skin irritation): There is no data of trial tests. Low acute skin toxicity is estimated based on data taken from other borates.

LC₅₀ for acute inhalation toxicity: There is no data of trial tests. Other borates show low acute inhalation toxicity. Several years of occupational exposure to boric acid and other borates show no increase of pulmonary diseases.

Overexposure Effects

Inhalation: Colemanite should be treated as an unpleasant powder with a TLV (Threshold Limit Value) of 10 mg/m³. If this limit is kept, no pulmonary diseases are observed.

Skin Contact: There is no trial test data. Other borates do not cause irritation.

Eye Contact: There is no trial test data. Over more than 50 years of work exposure to boric acid and other borates, no side effects to the human eye were observed.

Ingestion: There is no trial test data. The product is not developed for consumption. Should this accidentally occur, first-aid measures should be taken.

Effects of Chronic Exposure

Carcinogenicity: Colemanite is not known to be carcinogenic.

Teratogenicity: Not available

Effects on Reproduction: some studies on oral administration of soluble borates at high doses carried out to animals like rats, mice and dogs, revealed effects on fertility and on the testicles (Weir. et al, 1972). Other studies in which boric acid is used at high doses on rats, mice and rabbits revealed growth effects on the fetus, such as weight loss and minor variations in the skeleton. Doses were administered at quantities several times in excess in comparison with the ones a human could be exposed to (Fail et al., 1991 and Heindel et al., 1992).

Mutagenicity: No effects were observed *in vitro* in the presence of the metabolic activation system.

Synergic Products: Not available

Data on Humans: Studies on human epidemiology revealed no increase of pulmonary diseases in working populations subject to chronic exposure to boric acid and sodium borate powder particles. A recent study on epidemiology under normal exposure working conditions does not reveal any effects on fertility.

Emergency and First Aid Procedures

Ingestion: The product when consumed in small amounts (teaspoon) is not harmful to healthy adults. In case of consuming higher doses, wash the mouth whenever the victim is conscious. Give great amounts of water or milk for the victim to have in order to dissolve the product. DO NOT INDUCE VOMITING (Perforation Risk). Do not provide any oral administration to an unconscious person. Call the doctor immediately.

Inhalation: Take the victim to have some fresh air. If the victim is not breathing, give mouth-to-mouth resuscitation. If breathing becomes difficult, give oxygen. Keep the victim warm and at rest. Call the doctor immediately.

Skin: No treatment is necessary as the product is not irritant.

Eyes: In case of eye contact, wash with water immediately for at least 5 minutes keeping the eyelids open. If irritation persists, call the doctor immediately.

NOTE FOR THE DOCTOR: If a person consumed less than 6 gr of Colemanite, then he should only be kept in observation. If more than 6 gr were consumed, keep the kidneys functions and administer liquids. Gastric lavage is advisable for symptomatic patients only. Hemodialysis should only be applied in case of massive ingestion or for patients suffering from kidney failure. Urine/blood tests on boron only show the degree of exposure, and they should not be used to evaluate the severity of intoxication or as a guideline for further treatment (Litovitz et al, 1986).

SECTION 7 – ECOLOGICAL HAZARD

General Information: Boron naturally occurs in sea water at an average concentration of 5 mg B/l; in fresh water it occurs at 1 mg B/l or less. In dissolved aqueous solutions, predominant Boron is non-dissociated boric acid (To convert Colemanite into its Boron content (B), it should be multiplied by 0.1578).

Phytotoxicity: Boron is an essential micronutrient for the healthy growth of plants. For plants sensitive to this substance, however, it generally results harmful when present in great amounts. Great care should be taken to reduce the amount of borates spread to the environment.

Toxicity on Algae (Guhl W, 1992):

Green algae, *Scenedesmus subspicatus*: 96 h, EC10 = 24 mg B/l

Toxicity on Invertebrates (Schoberl et al, 1988):

Dafnis, *Daphnia magna* Straus: 24 hr, LC50= 242 mg B/l
(Essay substance: Sodium Tetraborate)

Toxicity on fish:

Sea water (Hugman et al, 1983):

Platija, *Limanda limanda*: 96 h, LC50 = 74 mg B/l

Fresh water (Birge W, 1977):

Salmon Trout, *Salmo gairdneri* (embryolarval stage):

24 days, LC50 = 88 mg B/l

32 days, LC 50 = 54 mg B/l

Color fish, *Carassius auratus* (embryolarval stage):

7 days, LC50= 65 mg B/l

3 days, LC50= 71 mg B/l

Information about the ecological destination:

Persistence/decomposition: Boron is ubiquitous and naturally occurs in the environment. Colemanite decomposes into natural Boron in the environment. In aqueous solution, Colemanite turns into non-dissociated boric acid.

Mobility: The product is slightly soluble in water and filters on normal soil.

General Aspects: Colemanite is a water soluble material (low solubility). If absorbed in high concentrations by plant roots, it may harm trees and vegetation.

Measures in case of Spreading or Unloading of Colemanite on the Ground: To dispose of Colemanite, gather it by means of a vacuum cleaner, a broom or a shovel, using a container under current regulations. Avoid contaminating adjacent water and clean and dispose of the Colemanite that was spread. When doing this, wearing particular protective clothes is not necessary.

Measures in case of Spreading or Unloading of Colemanite in Water: If possible, take intact containers out of the water in case the product is packed. Inform the official local authorities responsible for water matters so that water is not used for irrigation or as drinking water until natural dissolving reveals that Boron values are normal again.

Disposal Procedure: A small amount of Colemanite can be thrown on dumps. No special treatment is necessary, but local authorities should be consulted in case a local requirement should be met. When great amounts are involved (tons), dumps are not advisable. If possible, the product should be applied properly.

SECTION 9 – PROTECTIVE INDUSTRIAL EQUIPMENT

Ventilation: Use local exhaust ventilation to keep Colemanite powder concentrations below permitted levels.

Breathing Protection: When concentration of the substance in the air might surpass permitted limits, oxygen masks should be worn.

Skin and Eye Protection: Neither safety goggles nor gloves are necessary in case of normal exposure to the product in the industrial environment, unless the environment turns too powdery.

Other Equipment for Personal Protection: N/A

SECTION 10 – PRECAUTIONARY MEASURES FOR HANDLING AND STORAGE

General Aspects: No special precautions should be taken when handling the product. However, it is advisable to keep it in a dry place. Older packages should be removed from store first in order to keep covering in good state and minimize the possibility for the product to stick together. Further, warehouse should be kept clean and in good state to reduce dust development and accumulation to a minimum.

Recommendations for Storage of the Product

Storage Temperature: Room temperature

Storage Pressure: Atmospheric pressure

Special Sensitivity: Moisture (product stuck together)

SECTION 11 – OTHER INFORMATION

Information on Current Regulations: Make sure to meet current local and state regulations. Clean Air Act (Montreal Protocol): Colemanite neither contains nor benefit from any substances of Class I or Class II that eliminates the ozone layer.

SECTION 12 – EMERGENCY TELEPHONES

In Argentina

Capital Federal:

1. - Children Hospital: “Dr Ricardo Gutierrez”

Tel: (011) 4-962-2247

Tel: (011) 4-962-6666

2. - General Hospital “Profesor A. Posadas”

Tel: (011) 4-654-6648

Tel: (011) 4-658-7777

Switchboard: (011) 4-658-3001 al 3020 Ext. 1102 (TOXICOLOGY CENTER)

SECTION 13 – BIBLIOGRAPHY

1. Litovitz T L, Norman S A, Veltri J C, Annual Report of the American Association of Poison Control Centers Data Collection System. Am. J. Emerg. Med. (1986), 4, 427-458
2. Weir R J, Fisher R S, Toxicol. Appl. Pharmacol., (1972), 23, 351-364
3. National Toxicology Program (NTP) – Technical Report Series No. TR324, NIH Publication No. 88-2580 (1987), PB88 213475/XAB
4. Fail et al., Fund. Appl. Toxicol. (1991) 17, 225-239
5. Heindel et al., Fund. Appl. Toxicol. (1992) 18, 266-277
6. Guhl W, SÖFW-Journal (1992) 181 (18/92), 1159-1168
7. Schöberl P, Marl and Huber L (1988) Tenside Surfactants Detergents 25, 99-107
8. Hugman S J and Mance G (1983) Water Research Centre Report 616-M
9. Birge W J, Black J A, EPA-560/-76-008 (April 1977) PB 267 085
10. Flores, Horacio Ricardo, El Beneficio de los Boratos, CRISOL EDICIONES, ISBN: 987-1209-03-7, Chapter 5 and 13, December 2004.

For general information about borate toxicology, please refer to Technical Report No. 63 of ECETOC (1995). Patty's Industrial Hygiene and Toxicology, 4th Edition Vol. II, (1994) Chap. 42, 'Boron'.

Prepared by:

ULEX S.A.

Asunción 2135

Capital Federal – Buenos Aires (C1419HFA)

Argentina