1 Identification

GHS Product Identifier

HYDRATED LIME (WHITE & BROWN)

Other means of identification

CAS:	1305-62-0
EC:	215-137-3
RTECS:	EW2800000
ICSC:	0408
Chemical Family:	Hydroxides
Synonyms:	Calcium hydrate Hydrated lime Slaked lime
Proper Shipping Name:	Not regulated for transport
Chemical Formula:	$Ca(OH)_2$

Recommended use of the chemical and restriction on use

Industrial Water Treatment.

Supplier's details

AQUATRADE WATER TREATMENT CHEMICALS (PTY) LTD

4A Spanner Road
Spartan, Kempton Park
Gauteng, South Africa
1619
www.aquatradesa.co.za
sheq@aquatradesa.co.za

PO Box 357
Isando
Gauteng, South Africa
1600
Tel: +27 11 394 0752
Tel: +27 87 654 3326 (SDS Enquiries)

Emergency phone number

E le Sar: +27 82 921 0643 (Available Mon - Fri, GMT 5:00 to 20:00)
Spilltech: +27 861 000 366 (Available 24/7)

2 Hazard(s) identification

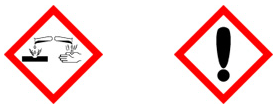
Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Skin Corrosion/Skin Irritation (Category 2), H315
Serious Eye Damage/Eye Irritation (Category 1), H318
Specific Target Organ Toxicity - Single Exposure, Inhalation - Respiratory system, (Category 3), H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

GHS label elements

Danger



Causes skin irritation

Causes serious eye damage

May cause respiratory irritation

Avoid breathing dust/fume/gas/mist/vapours/spray.

Wash thoroughly after handling.

Use only outdoors or in a well-ventilated area.

Wear protective gloves/protective clothing/eye protection/face protection.

IF ON SKIN: Wash with plenty of soap and water.

IF INHALED: Remove victim to fresh air and Keep at rest in a position comfortable for breathing.

Immediately call a POISON CENTER or doctor/physician.

Specific treatment (see P351+P352 on this label).

If skin irritation occurs: Get medical advice/attention.

Take off contaminated clothing and wash it before reuse.

Store in a well-ventilated place. Keep container tightly closed.

Store locked up.

Dispose of contents and container in accordance with local, regional, national, international regulations.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Other hazards which do not result in classification

According to Annex XIII of REACH regulation 1907/2006 the PBT and vPvB assessment does not apply to inorganic substances.

3 Composition/information on ingredients

Description	CAS Number	EINECS Number	%	Note
Calcium Dihydroxide	1305-62-0	215-137-3	95 - 99	Skin Irrit. 2; Eye Dam. 1; STOT SE 3; H315, H318, H335

4 First-aid measures

Description of necessary first-aid measures

Call 112 or 10177 or your local emergency help number immediately, for emergency assistance. Call the Poison Control Center at +27 21 931 6129 – Tygerberg or +27 21 658 5308 – Red Cross, Email: poisonsinformation@uct.ac.za, Website: https://www.afritox.co.za for further instructions. Provide them with information such as the compound taken, quantity and time of ingestion, age, weight and general health status of affected individual. Carefully remove the individual from the exposure area.

Eyes
Rinse eyes immediately with plenty of water and seek medical advice.

Inhalation
Move to fresh air and obtain medical attention.

Ingestion
Clean mouth with water and drink afterwards plenty of water. **DO NOT** induce vomiting. Obtain medical attention.

Skin
Carefully and gently brush the contaminated body surfaces in order to remove all traces of product. Wash affected area immediately with plenty of water Remove contaminated clothing. If necessary seek medical advice.

General advice
No known delayed effects. Consult a physician for all exposures except for minor instances.

Most important symptoms/effects, acute and delayed

Symptoms
Irritation eyes, skin, upper respiratory system; eye, skin burns; skin vesiculation; cough, bronchitis, pneumonitis.

Inhalation Symptoms
Sore throat. Cough. Burning sensation.

Skin Symptoms
Redness. Roughness. Pain. Dry skin. Skin burns. Blisters.

Eye Symptoms
Redness. Pain. Severe deep burns.

Ingestion Symptoms
Burning sensation. Abdominal pain. Abdominal cramps. Vomiting.

Target Organs
Eyes, skin, respiratory system.

Indication of immediate medical attention and special treatment needed, if necessary

Treat symptomatically and supportively.

5 Fire-fighting measures

Suitable extinguishing media

Flammability
The substance is not flammable, and non-combustible, it inhibits the spread of flame.

Extinguishing media
Suitable
The product is not combustible. Use a dry powder, foam or CO_2 extinguisher to extinguish surrounding fire.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable
DO NOT use water.

Specific hazards arising from the chemical

None.

Special protective actions for fire-fighters

Wear self-contained breathing apparatus for firefighting if necessary.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

Avoid contact with skin and eyes, keep dust levels to a minimum, and ensure that sufficient ventilation or suitable respiratory protective equipment is used.

Environmental precautions

Contain the spillage. Keep the material dry if possible. Cover area if possible to avoid unnecessary dust hazard. **Avoid** uncontrolled spills to watercourses and drains (elevated pH). Any large spillage into watercourses must be alerted to the agency responsible for environmental protection or other regulatory body.

Methods and materials for containment and cleaning up

Keep the material dry if possible. Pick up the product mechanically in a dry way. Use vacuum suction unit, or shovel into bags.

7 Handling and storage

Precautions for safe handling

Avoid contact with skin and eyes. Wear protective equipment. Keep dust levels to a minimum. Minimise dust generation. Enclose dust sources, use exhaust ventilation (dust collector at handling points). Handling systems should preferably be enclosed. When manually handling bags usual precautions should be paid to the risks outlined in the Council Directive

90/269/EEC.

Conditions for safe storage, including any incompatibilities

Store under dry conditions. Minimise contact with air and moisture. Bulk storage should be in purpose – designed silos. Keep away from acids, significant quantities of paper, straw, and nitro compounds. Keep out of reach of children. **DO NOT** use aluminium for transport or storage if there is a risk of contact with water.

8 Exposure controls/personal protection

Control parameters

REL TWA 5 mg/m3

PEL TWA 15 mg/m3 (total) 5 mg/m3 (resp)

PEL-TWA 15 mg/m³ (total dust), 5 mg/m³ (respirable fraction)

REL-TWA 5 mg/m³

Immediately Dangerous to Life or Health
IDLH
N.D.

Threshold Limit Values
5 mg/m3, as TWA. (inhalable fraction): 1 mg/m3; peak limitation category: I(2); pregnancy risk group: C.

Appropriate engineering controls

General safety and hygiene measure
Wear clean, dry personal protective equipment. Barrier cream can be used if necessary.

If heavily exposed daily, employees must shower, and if necessary use a barrier cream to protect exposed skin, particularly neck, face and wrists.

Environmental exposure controls
All ventilation systems should be filtered before discharge to atmosphere.

Individual protection measures

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors.

Eye/face protection
fitting goggles with side shields, or wide vision full goggles. **DO NOT** wear contact lenses when handling this product. It is also advisable to have individual pocket eyewash. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Hand protection
Use approved nitrile impregnated gloves having CE marks.

Skin protection
Clothing fully covering skin, full length trousers, long sleeved overalls, with close fittings at openings. Footwear resistant to caustics, and avoiding dust penetration.

Respiratory protection
Use appropriate respiratory protection against particles according to the risk level. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU) such as EN 149:2001.

9 Physical and chemical properties

Physical and chemical properties

Appearance/physical state/colour
Based on the available data, calcium dihydroxide is an odourless, colourless crystalline substance.

Melting point
In a standard test, the melting point for calcium dihydroxide (92.1 % purity) was determined to be > 450°C. Literature data for calcium carbonate also show the melting point to be greater than 450°C. In a Thermogravimetric analysis study, a sample of hydrated lime (calcium dihydroxide content of 91.3 %) was found to begin decomposition at 360 °C and to melt at 510 °C, whilst a sample with calcium dihydroxide of 60.0 % and calcium carbonate content of 35.9 %, respectively, showed decomposition at 356 °C and 571 °C with melting at approximately 490 °C and approximately 800 °C.

Boiling point
According to Annex VII, section 7.3, column 2 of Regulation No. 1907/2006, a boiling point study is not required for solids that either melt above 300 °C or decompose before boiling. The melting point of calcium dihydroxide is >450 °C and the melting point of grades of calcium dihydroxide containing calcium carbonate up to 35% is also expected to be >450 °C. Hence a boiling point study is not required.

Relative density
The relative density of calcium dihydroxide (hydrated lime; purity = 98.2%) measured in accordance with OECD TG 109 using the pycnometer method is 2.22.

The relative density of calcium carbonate, based on a weight of evidence using data from several peer reviewed handbooks, is 2.7. Thus it may be expected that grades of calcium dihydroxide with up to 35% calcium carbonate will have a relative density in the range of 2.2 - 2.7.

Particle size distribution (Granulometry)
Total Dustiness (airborne fraction): 143.50 mg/g (experimental results, DMT Report). Mass median aerodynamic diameter of airborne fraction: 12.62 µm (GSD: 4.61 µm) (distribution fitted to cascade impactor data). Fractional deposition in human respiratory tract (MPPD model, based on calculated MMAD): Head (ET): 50.7 %; Tracheobronchial (TB): 1.4 %; Pulmonary (PU): 4.0 %

Vapour pressure
According to Annex VII, section 7.5, column 2 of Regulation No. 1907/2006, a vapour pressure study is not required for solids that melt above 300 °C. Calcium dihydroxide is a solid with a melting point of > 450 °C and the melting point of grades of calcium dihydroxide containing calcium carbonate up to 35% is also expected to be >450 °C. Hence, a vapour pressure study is not required for this substance.

Partition coefficient
According to Annex VII, section 7.8, column 2 of Regulation No. 1907/2006, a study of the n-octanol/water partition coefficient does not need to be performed for an inorganic substance.

Water solubility of calcium dihydroxide
The water solubility of calcium dihydroxide (purity = 92.1 %) was determined in a study performed according to EU Method A.6. In this study, a value of 1844.9 mg/L was obtained, and the pH of the solution was 12.4.

The water solubility of calcium carbonate, as determined in a study performed according to OECD TG 105, is 16.6 mg/L at 20 °C.

A water solubility study was performed using a method based on EU test method A.6. Two grades of hydrated lime were used, the first containing 91.3 % calcium dihydroxide, whilst the second contained 60.0 % calcium dihydroxide and 35.9 % calcium carbonate. The water solubility for the grade with high calcium dihydroxide content was 935 mg Ca/L (equivalent to 1725 mg Ca(OH)2/L) whilst for the high calcium carbonate content grade the water solubility was 910 mg Ca/L (equivalent to 1680 Ca(OH)2/L). For both grades the pH of the solution was 12.4.

Surface tension
The surface tension of calcium dihydroxide (hydrated lime; purity = 98.2%) was determined by the OECD harmonised ring method in accordance with OECD TG 115. The surface tension of a 1 g/l aqueous solution of the substance was found to be 72.0 mN/m. As the result is greater than 60 mN/m, calcium dihydroxide was not considered to be surface active.

No data are available for calcium carbonate. However, based on structure, surface activity is not expected. Therefore, grades of calcium dihydroxide containing up to 35%% calcium carbonate are also not expected to be surface active.

Flash point
According to Annex VII, section 7.9, column 2 of Regulation No. 1907/2006, a study of the flash point does not need to be performed for an inorganic substance.

Auto-flammability
Calcium dihydroxide purity = 92.1 %) showed no relative self-ignition temperature below 400 °C in a test performed according to EU Method A.16.
Calcium carbonate was found to be not auto flammable in a study performed using Method N.4 of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, 4th revised edition, 2003. On this basis it may be concluded that grades of calcium dihydroxide containing up to 35% calcium carbonate will not be auto flammable.

Flammability
Calcium dihydroxide is not flammable based on the results of a preliminary screening test performed according to EU Method A.10.
Similarly, calcium carbonate (purity = 92.1 %) is not flammable based on the results of a preliminary screening test performed according to Method N.1 of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, 4th revised edition, 2003. Therefore it may be concluded that grades of calcium dihydroxide containing up to 35% calcium carbonate will also be not flammable.

Explosiveness
According to the provisions of EU A.14 method, expert judgement considered calcium dihydroxide to be void of any chemical structures commonly associated with explosive properties.

The explosive properties of calcium carbonate have also been predicted negative based on the chemical structure and experience of handling and use. Therefore grades of calcium dihydroxide containing up to 35% calcium carbonate may also be predicted to have no explosive properties.

Oxidising properties
According to the provisions of EU A.17 method, expert judgement considered calcium dihydroxide as a non-oxidising substance.
The structure of calcium carbonate was assessed for chemical groups that would indicate oxidising properties and was found to contain no such groups. Therefore, the oxidising properties of calcium carbonate have been predicted negative based on the chemical structure and experience of handling and use. On this basis all grades of calcium dihydroxide may be considered to be non-oxidising, irrespective of the calcium carbonate content.

Stability in organic solvents and identity of relevant degradation products:
This study does not need to be conducted for inorganic substances (cf. section 7.15 Column 2 Annex IX of Regulation (EC) 1907/2006).

Dissociation constant
The dissociation constants in water of calcium dihydroxide could not be deternined using OECD TG 112 as the test item was an inorganic and the test methods were not applicable. Alternatively, the pH of a saturated solution of the test item was measured to be 12.4 which correlated with the value of 12.6 found in the literature for the pKa of calcium (II) ion.

For calcium carbonate, no experimental testing was considered possible according to OECD TG 112 for the following reasons:
1). The test material has been determined to be essentially insoluble in water. Therefore, determination of the dissociation constant(s) using a potentiometric titration, spectrophotometric and/or conductivity method would not be feasible.
2). The test material contains no significant chromophoric group(s) and thus, will absorb very little in the ultra-violet/ visible region of the spectrum. Therefore, determination of the dissociation constant(s) using a spectrophotometric method would not be practical.

Therefore, experimentally determined dissociation constants were taken from Albert and Serjeant, Ionisation Constants of Acids and Bases, A Laboratory Manual, 1971. The values presented below are those for carbonic acid, the free acid form of the test material:

pKa1 = 10.4 (functional group - carboxylic acid)
pKa2 = 6.4 (functional group - carboxylic acid)

Viscosity
Viscosity is a property of liquids. Since calcium dihydroxide is a solid at ambient temperature (ca. 20 °C) such a study does not need to be conducted for this substance (melting point: >450 °C, which is in accordance with section 1, Annex XI of Regulation (EC) 1907/2006 (REACH).

Calcium carbonate is a solid which remains solid at temperatures significantly above room temperature (melting point >825 °C). OECD Guideline no. 114 on the viscosity of liquids, indicates that the substances to be tested must be liquid at room temperature, and therefore a study of the viscosity of calcium carbonate is not required.

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10 Stability and reactivity

Reactivity

Phosphorus boiled with alkaline hydroxides yields mixed phosphines which may ignite spontaneously in air.

When chlorinated phenols are heated for analytical purposes with calcium hydroxide-potassium nitrate mixtures, chlorinated benzodioxins analogous to the extremely toxic tetrachlorodibenzodioxin may be formed.

The self-heating and decomposition of 1,3,5-trinitrohexahydro-1,3,5-triazine, calcium hydroxide and water was studied in a sealed capsule and in a larger scale furnace test. A rapid exothermic decomposition reaction can be initiated at 100 deg C or below, and may lead to spontaneous ignition and then deflagration or detonation.

Maleic anhydride, phosphorus, nitroethane, nitromethane, nitroparaffins, nitropropane [Note: Attacks some metals].

Calcium Hydroxide will dissolve in water and react with carbonate ions or CO2 in water to form calcium carbonate.

Decomposes on heating. This produces calcium oxide. The solution in water is a medium strong base. Reacts violently with acids. Attacks many metals in the presence of water. This produces flammable/explosive gas

Calcium hydroxide may react violently with acids, maleic anhydride, nitromethane, nitroethane, nitropropane, nitroparaffins and phosphorus.

Alkali and other alkaline earth compounds such as potassium, lithium, calcium, barium and magnesium compounds, as well as amines and other nitrogen compounds will cause explosive decomposition of maleic anhydride.

The nitroparaffins, in the presence of water, form salts with inorganic bases. The dry salts are explosive.

Violent reaction with maleic anhydride, nitroethane, nitromethane, nitroparaffins, nitropropane, phosphorus. Reaction with polychlorinated phenols + potassium nitrate forms extremely toxic products.

Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

No data available.

Conditions to avoid

Minimise exposure to air and moisture to avoid degradation. When heated above 580°C, calcium hydroxide decomposes to produce calcium oxide (CaO) and water (H2O): Ca(OH)2 → CaO + H2O

Incompatible materials

Reacts exothermically with acids to form salts. Reacts with aluminium and brass in the presence of moisture leading to the production of hydrogen.Ca(OH)2 + 2 Al + 6 H2O → Ca[Al(OH)4]2 + 3 H2

Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Calcium oxide.

Other decomposition products - The solution in water is a medium strong base. Reacts violently with acids. Attacks many metals in the presence of water. This produces flammable/explosive gas (hydrogen - see ICSC 0001).

In the event of fire: see section 5.

Additional remarks
Calcium hydroxide reacts with carbon dioxide to form Calcium carbonate, which is a common material in nature :
$Ca(OH)2 + CO2 \rightarrow CaCO3 + H2O$

11 Toxicological information

Toxicological (health) effects

Irritation / corrosion
Calcium dihydroxide is irritating to skin and to the respiratory system, and entails a risk of serious damage to the eye.

Sensitisation
Calcium dihydroxide: No studies are available. However, sensitisation by or intolerance to an abundantly available essential element such as calcium would be grossly implausible and can therefore safely be excluded for calcium dihydroxide.
Calcium carbonate: Not sensitising in a murine LLNA (Bradshaw, 2010).

Repeated dose toxicity
Toxicity of calcium via the oral route is addressed by upper intake levels (UL) for adults determined by the Scientific Committee on Food (SCF), being UL = 2500 mg/d, corresponding to 36 mg/kg bw/d (70 kg person) for calcium.

Toxicity of calcium dihydroxide via the dermal route is not considered as relevant in view of the anticipated negligible absorption through skin.
Toxicity of calcium dihydroxide via inhalation (local effect, irritation of mucous membranes) is addressed by an IOELV of 1 mg/m^3 respirable fraction (8h-TWA) (Commission Directive (EU) 2017/164 of 31 January 2017).

Genetic toxicity
The results of in vitro gene mutation studies in bacteria, in vitro chromosome aberration studies in mammalian cells and in vitro gene mutation studies in mammalian cells performed using calcium dihydroxide or calcium carbonate were all negative. It is concluded that both calcium dihydroxide and calcium carbonate are not genotoxic and neither chemical nor mixtures of these chemicals warrants classification for mutagenicity under CLP.

Calcium (when administered orally in feed as Ca-lactate) is not carcinogenic: Neither toxicity nor carcinogenic activity was observed in rats at the highest dose tested.

Carcinogenicity
Neither calcium, calcium dihydroxide nor calcium carbonate are carcinogenic. Classification for carcinogenicity is not warranted.

Toxicity to reproduction
Calcium is an essential mineral nutrient for mammals including humans. Based on evaluation of a wealth of human medical and nutritional data (Anonymous, 2001 [FAO/WHO report]; Anonymous, 2006 [SCF opinion]), it is concluded that calcium, therefore also calcium dihydroxide and calcium carbonate, does not pose any hazard for reproduction and/or developmental toxicity. Classification for toxicity to reproduction is not warranted.

Exposure related observations in humans
Studies summarised in section 7.10.1 report individual cases or epidemiological data regarding human exposure to lime (or cement as surrogate for the alkaline effects of lime). Cain (2004), Torén (1996), Lahaye (1987), Wegman (1991), Vestbo (1991), Fell (2003), Yang (1996), and Eid (1969) form the basis of the SCOEL recommendation of occupational exposure limits (inhalation). Cain (2008) is provided as a supplementary reference to Cain (2004), confirming the nature of effects upon short-term exposure to CaO, which are described as sensory irritation and slightly increased secretion from the nasal mucosa. Meo (2003), and Al-Neaimi (2001) are provided as additional references describing typical symptoms of long-term over-exposure to cement dust, typically being reduced pulmonary function, pleural thickening and chronic bronchitis.

Villar (1990), Levine (1997), Koo (1999) are used as supportive data for the endpoint "developmental toxicity/teratogenicity" (section 7.8.2), demonstrating either a beneficial effect of lack of adverse effects of calcium in pregnancy, both to mothers and their offspring.

Belizán (1991) reports a protective effect of calcium against hypertensive disorders in pregnant women.

Baron (1999) reports that calcium supplementation is associated with a significant - though moderate - reduction of the risk of recurrent colorectal adenomas.

The references Johnston (1992), Lloyd (1993), Elders (1994), Reid (1993), Moser-Veillon (2001), Rosado (2005), Wastney (2000), Braun (2008), Minihane (1998), Sokoll (1992), Kalkwarf (1998), Peacock (2000), Dawson-Hughes (2002), and Bonjour (1997) are dealing with toxicokinetic parameters of calcium and are therefore reflected in section 7.1.1, together with SCF and FAO/WHO documents in a weight-of-evidence approach.

No relevant classical epidemiological data (section 7.10.2) have been identified.

Studies summarised in section 7.10.3 provide examples of human cases of eye irritation due to accidental exposure to calcium hydroxide (Schmidt, 2008), and skin corrosion due inadvertent exposure to wet cement over several hours (Rados, 2005). In the latter case, it is important to note that aqueous cement slurry has been found to result in substantially higher pH values (>13.5) than CaO or Ca(OH)2 alone. Therefore, the corrosive phenomena reported this case study should not be extrapolated to lime. Overall, the two human case studies summarised in this section demonstrate that exposure to hydrated lime or mixtures based upon lime may result in eye or skin irritation, particularly upon prolonged skin contact.

No sensitisation data in humans were retrieved (section 7.10.4).

Relevant exposure-related observation (section 7.10.5) other than those addressed in section 7.10.1 and 7.10.3 were not identified.

Additional toxicological data
Results and discussion
Human sperm populations incubated in medium containing either CaCl2 or SrCl2 for 0, 6 and 22 hours showed the same occurrence of acrosome reactions. Significantly more motile spermatozoa were bound to more of the human zona pellucidae in the CaCl2 medium. In the HEPT experiments, an about 15-fold higher penetration of oocytes was observed in the calcium containing medium than in the strontium medium.

Conclusions:
The results demonstrate that while Sr-ions can substitute fully for Ca-ions in the capacitation and acrosome reaction of human spermatozoa, sperm-zona, and sperm-oolemma interaction seem to involve some more Ca-ion specific processes.

Information on the likely routes of exposure

Workers - Hazard via inhalation route
Systemic effects
Long term exposure

Hazard assessment conclusion:	no hazard identified

Acute/short term exposure

Hazard assessment conclusion:	no hazard identified

DNEL related information
Local effects
Long term exposure

Hazard assessment conclusion:	DNEL (Derived No Effect Level)
Value:	1 mg/m³
Most sensitive endpoint:	irritation (respiratory tract)

DNEL related information

DNEL derivation method:	ECHA REACH Guidance
Overall assessment factor (AF):	1
Dose descriptor:	other: IOELV

Acute/short term exposure

Hazard assessment conclusion:	DNEL (Derived No Effect Level)

Value: 4 mg/m³
Most sensitive endpoint: irritation (respiratory tract)

DNEL related information
DNEL derivation method: ECHA REACH Guidance
Overall assessment factor (AF): 1
Dose descriptor starting point: other: IOELV

Workers - Hazard via dermal route
Systemic effects
Long term exposure
Hazard assessment conclusion: no hazard identified
Acute/short term exposure
Hazard assessment conclusion: no hazard identified

DNEL related information
Local effects
Long term exposure
Hazard assessment conclusion: low hazard (no threshold derived)
Most sensitive endpoint: skin irritation/corrosion
Acute/short term exposure
Hazard assessment conclusion: low hazard (no threshold derived)
Most sensitive endpoint: skin irritation/corrosion

Workers - Hazard for the eyes
Local effects
Hazard assessment conclusion: medium hazard (no threshold derived)

Additional information - workers
No acute and long-term DNEL for workers exposed via inhalation are derived from animal studies, because indicative occupational exposure limit values (IOELV) for calcium dihydroxide and calcium oxide have been established by the European Commission (Commission Directive (EU) 2017/164 of 31 January 2017). These limits, based on the recommendations of the Scientific Committee on Occupation Exposure Limits (SCOEL) are STEL (15 min) = 4 mg/m³ respirable dust for short-term exposure to prevent local sensory irritation due to the irritation potential of the substance, and 8 -h TWA = 1 mg/m³ respirable dust for long term exposure to prevent local sensory irritation and decrease of lung function parameters as critical effects. No further assessment factors are applied to the IOELVs.

General Population - Hazard via inhalation route
Systemic effects
Long term exposure
Hazard assessment conclusion: no hazard identified
Acute/short term exposure
Hazard assessment conclusion: no hazard identified

DNEL related information
Local effects
Long term exposure
Hazard assessment conclusion: DNEL (Derived No Effect Level)
Value: 1 mg/m³
Most sensitive endpoint: irritation (respiratory tract)
DNEL related information
DNEL derivation method: ECHA REACH Guidance
Overall assessment factor (AF): 1
Dose descriptor: other: IOELV
Acute/short term exposure
Hazard assessment conclusion: DNEL (Derived No Effect Level)
Value: 4 mg/m³
Most sensitive endpoint: irritation (respiratory tract)
DNEL related information

DNEL derivation method: ECHA REACH Guidance
Overall assessment factor (AF): 1
Dose descriptor starting point: other: IOELV

General Population - Hazard via dermal route
Systemic effects
Long term exposure
Hazard assessment conclusion: no hazard identified
Acute/short term exposure
Hazard assessment conclusion: no hazard identified

DNEL related information
Local effects
Long term exposure
Hazard assessment conclusion: low hazard (no threshold derived)
Most sensitive endpoint: skin irritation/corrosion
Acute/short term exposure
Hazard assessment conclusion: low hazard (no threshold derived)
Most sensitive endpoint: skin irritation/corrosion

General Population - Hazard via oral route
Systemic effects
Long term exposure
Hazard assessment conclusion: no hazard identified
Acute/short term exposure
Hazard assessment conclusion: no hazard identified

DNEL related information
General Population - Hazard for the eyes
Local effects
Hazard assessment conclusion: medium hazard (no threshold derived)

Additional information - General Population
For the oral route, no DNELs are derived in view of the role of calcium as an essential mineral nutrient. An upper intake level (UL) has been derived by the Scientific Committee on Food as 2500 mg/d for calcium. This value is sufficiently protective both with respect to acute and long-term exposure.

No acute and long-term DNEL for exposure of general population via inhalation are derived from animal studies, because indicative occupational exposure limit values (IOELV) for calcium dihydroxide and calcium oxide have been established by the European Commission (Commission Directive (EU) 2017/164 of 31 January 2017). These limits, based on the recommendations of the Scientific Committee on Occupation Exposure Limits (SCOEL) are STEL (15 min) = 4 mg/m³ respirable dust for short-term exposure to prevent local sensory irritation due to the irritation potential of the substance, and 8 -h TWA = 1 mg/m³ respirable dust for long term exposure to prevent local sensory irritation and decrease of lung function parameters as critical effects. These indicative exposure limits are considered as sufficiently protective also for the general population and are therefore proposed to be adopted. No further assessment factors are applied to the IOELVs.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation
Sore throat. Cough. Burning sensation.

Skin
Redness. Roughness. Pain. Dry skin. Skin burns. Blisters.

Eyes
Redness. Pain. Severe deep burns.

Ingestion
Burning sensation. Abdominal pain. Abdominal cramps. Vomiting.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short-term exposure effects
The substance is corrosive to the eyes and skin. The substance is irritating to the respiratory tract. Medical observation is indicated.

Long-term exposure effects
Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged inhalation of dust particles may cause effects on the lungs.

Numerical measures of toxicity (such as acute toxicity estimates)

Acute oral toxicity:
LD_{50} (rat) > 2000 mg/kg bw for calcium dihydroxide (Arcelin, 2007)
LD_{50} (rat) > 2000 mg/kg bw for calcium carbonate (Bradshaw, 2008)

Acute inhalation toxicity
4-h LC_{50} (rat) >6.04 mg/L air for calcium dihydroxide, based on read-across to Flue dust, Portland cement (EC 270-659-9)(TNO, 2010)
4-h LC_{50} (rat) >3 mg/L air (highest technically achievable concentration) for calcium carbonate (Schuler, 2010)

Acute dermal toxicity
LD_{50} (rabbit) > 2500 mg/kg bw for calcium dihydroxide (Kietzmann, 1994)
LD_{50} (rat) > 2000 mg/kg bw for calcium carbonate (Bradshaw, 2010)

Interactive effects

No additional data available.

Where specific chemical data are not available

No additional data available.

Mixtures

No additional data available.

Mixture versus ingredient information

No additional data available.

Other information

None.

12 Ecological information

Toxicity

Hazard for aquatic organisms

Freshwater

Hazard assessment conclusion:	PNEC aqua (freshwater)
PNEC value:	0.49 mg/L
Assessment factor:	100
Extrapolation method:	assessment factor
PNEC freshwater (intermittent releases):	0.49 mg/L

Marine water

Hazard assessment conclusion:	PNEC aqua (marine water)
PNEC value:	0.32 mg/L
Assessment factor:	100
Extrapolation method:	assessment factor

STP

Hazard assessment conclusion:	PNEC STP
PNEC value:	3 mg/L
Assessment factor:	100
Extrapolation method:	assessment factor

Sediment (freshwater)

Hazard assessment conclusion: insufficient hazard data available (further information necessary)

Sediment (marine water)

Hazard assessment conclusion: insufficient hazard data available (further information necessary)

Hazard for air

Air

Hazard assessment conclusion: no hazard identified

Hazard for terrestrial organisms

Soil

Hazard assessment conclusion: PNEC soil
PNEC value: 1 080 mg/kg soil dw
Assessment factor: 1
Extrapolation method: assessment factor

Hazard for predators

Secondary poisoning
Hazard assessment conclusion: no potential for bioaccumulation

Additional information

Conclusion on classification
96-h LC50 for fish (Oncorhynchus mykiss) = 50.6 mg/L.
48-h EC50 for invertebrates (daphnia magna) = 49.1 mg/L.
14d-NOEC for marine invertebrates (Crangon septemspinosa) = 32 mg/L
72-h ErC50 for algae (Pseudokirchneriella subcapitata) = 184.57 mg/L, NOEC = 48 mg/L.
On the basis of the acute toxicity data, classification for acute aquatic toxicity is not required. Chronic data are available for both invertebrates and algae. These values are above the classification limits for chronic toxicity, hence classification is not required.

Persistence and degradability

Biodegradation in water: screening tests

Biodegradation studies are not required for inorganic substances.

Biodegradation in water and sediment: simulation tests

Simulation tests for biodegradation in water and sediment are not relevant for inorganic substances.

Biodegradation in soil

Biodegradation tests in soil are not relevant for inorganic substances.

Bioaccumulative potential

Bioaccumulation is not relevant for calcium dihydroxide. In the aquatic environment and in soil, exposure to calcium dihydroxide actually comes down to exposure to calcium and hydroxyl ions. There will be no intake of calcium dihydroxide as such from water or soil, nor will calcium dihydroxide prevail under its original form in the organisms. Moreover, both the intake of the essential element calcium and the internal pH (hydroxyl ions) of an organism are actively regulated (homeostasis).

Similarly, calcium carbonate dissociates into the calcium Ca2+and carbonate CO32-ions at environmental pH. These are essential to all living organisms (flora and fauna) and their intracellular and extra-cellular concentrations are actively regulated. Bioaccumulation is thus not expected or relevant.

Mobility in soil

Determining a Kd-value for calcium dihydroxide is not relevant, since this molecule reacts with water to release calcium ions and hydroxyl ions. Reliable Kd-values for calcium range from 5.3 L/kg to 49.1 L/kg and are added as supportive information. The Kd-concept is not relevant for hydroxyl ions, since the behaviour of these ions depends on the pH buffer capacity of the tested medium.

Other adverse effects

Stability

This endpoint is specifically needed for organic substances and less relevant for inorganic substances. When mixing calcium (di)hydroxide with water, the substance will be completely dissociated into its ions as the water solubility is

relatively high compared to the environmental background concentration of calcium and due to dilution effects. Depending on the properties of the test medium, calcium (di)hydroxide will be strongly neutralised in the initial period after application, by formation of calcium carbonate.

In the environment, calcium carbonate will dissociate into calcium and carbonate ions. These ions are naturally ubiquitous in the environment; calcium will be assimilated by species present in the water and is necessary to maintain a good chemical balance in soils, water and plants and carbonate will become part of the carbon cycle.
Data from Allan DJ (1995) indicate that most natural waters contain various bicarbonate and carbonate compounds, originating from dissolution of sedimentary rocks. Streamwater usually contains bicarbonates and carbonates and carbonic acid readily dissolves CaCO3 rocks, forming Ca(HCO3)2. The resulting streamwater is a solution of CO2, H2CO3, HCO3- and CO3^2- ions forming an effective buffer system that resists change in pH. The relative proportions of CO2, H2CO3, HCO3- and CO3^2- are pH dependent. At a pH below 4.5, only CO2 and H2CO3 are present and almost no HCO3- or CO3^2- is found. At higher pH values dissociation of H2CO3 occurs, HCO3-and CO3^2- are present and CO2 and H2CO3 are no longer detectable. At intermediate pH values, HCO3- predominates. Above a pH of about 8.3, HCO3- also declines with formation of CO3^2-. The dissociation dynamics are influenced by both temperature and ionic concentrations. Therefore, the chemistry of carbonate in water is clearly understood.

13 Disposal considerations

Disposal methods

Waste disposal recommendations
Dispose of waste and container in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle/reuse. Remove for physico-chemical/biological treatment. **DO NOT** discharge into drains or the environment. Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Ecology - waste materials
Avoid release to the environment.

Packaging material
Recycle or dispose of as unused product to hazardous waste point.

14 Transport information

UN Number

Land transport (ADR/RID)

UN number:	None
Shipping	
Class:	Not classified as hazardous for transport
Classification code:	None
Packaging group:	None
Labels:	None

Inland waterway transport (ADN(R))

UN number:	None
Shipping	
Class:	Not classified as hazardous for inland waterway transport.
Classification code:	None
Packaging group:	None
Labels:	None

Marine transport (IMDG)

UN number:	None
Proper shipping name and description:	not applicable, not listed as hazardous material
Chemical name:	Calcium (di)hydroxide
Class:	Not classified as hazardous for transport

Packaging group: None
EmS code: None
Labels: None

Air transport ICAO/IATA

UN number: None
Proper shipping name and description: not applicable, not listed as hazardous material
Chemical name: Calcium (di)hydroxide
Class: Not classified as hazardous for transport
Packaging group: None
Labels: None

Additional transport information

Avoid any release of dust during transportation, by using tight tanks.

UN Proper Shipping Name

Not regulated for transport

Transport hazard class(es)

Not regulated for transport

Packing group, if applicable

Not regulated for transport

Environmental hazards

Not regulated for transport

Special precautions for user

None except those in sections 4 to 8.

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

Not applicable.

15 Regulatory information

Safety, health and environmental regulations specific for the product in question

SA NATIONAL LEGISLATION

Hazardous Substances Act 15 of 1973 and Regulations.
Occupational Health and Safety Act 85 of 1993 and Regulations.

SA NATIONAL STANDARDS

SANS 10228 : 2006 : Identification and Classification of Dangerous Goods for Transport by Road and Rail.
SANS 10231 : 2018 : Transport of dangerous goods - Operational requirements for road vehicles.
SANS 10234 : 2008 : Globally Harmonized System of classification and labelling of chemicals (GHS).
SANS 11014 : 2010 : Safety Data Sheets for chemical Products.

REACH Regulation (EC) No 1907/2006

This product contains only components that have been either pre-registered, registered, are exempt from registration, are regarded as registered or are not subject to registration according to Regulation (EC) No. 1907/2006 (REACH)., The aforementioned indications of the REACH registration status are provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. It is the buyer´s/user´s responsibility to ensure that his/her understanding of the regulatory status of this product is correct.

Seveso III: Directive 2012/18/EU

Listed in Regulation: Not applicable

FIFRA Requirements

Residues of calcium hydroxide are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to

raw agricultural commodities after harvest. Use: solid diluent, carrier.

As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their continued use. Under this pesticide reregistration program, EPA examines newer health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether the use of the pesticide does not pose unreasonable risk in accordance to newer saftey standards, such as those described in the Food Quality Protection Act of 1996. Pesticides for which EPA had not issued Registration Standards prior to the effective date of FIFRA '88 were divided into three lists based upon their potential for human exposure and other factors, with List B containing pesticides of greater concern than those on List C, and with List C containing pesticides of greater concern than those on List D. Calcium hydroxide is found on List D. Case No: 4066; Pesticide type: Fungicide, Herbicide, Antimicrobial; Case Status: None of the active ingredients in the case are being supported for reregistration by their registrants. All are unsupported, or some are unsupported and some are cancelled. Cases described as "unsupported" generally are being processed for cancellation.; Active ingredient (AI): Calcium hydroxide; AI Status: The active ingredient is no longer contained in any registered pesticide products ... "cancelled."

FDA Requirements

Substance added directly to human food affirmed as generally recognized as safe (GRAS).

Calcium hydroxide used as a general purpose food additive in animal drugs, feeds, and related products is generally recognized as safe when used in accordance with good manufacturing or feeding practice.

Drug products containing certain active ingredients offered over-the-counter (OTC) for certain uses. A number of active ingredients have been present in OTC drug products for various uses, as described below. However, based on evidence currently available, there are inadequate data to establish general recognition of the safety and effectiveness of these ingredients for the specified uses: Calcium hydroxide is included in antidiarrheal drug products.

Chemical safety assessment

Type of CSR: Joint CSR (joint uses)
CSR contains: Part B section 1 to 8

16 Other information

Other information

Full text of H & P - Statements referred to under section 2

Hazard statements

H315	Causes skin irritation.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

Precautionary statements

P261	Avoid breathing dust.
P264	Wash thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P304+P340	IF INHALED: Remove victim to fresh air and Keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332+P313	If skin irritation occurs: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P310	Immediately call a POISON CENTER or doctor/physician.
P321	Specific treatment (see P352 on this label).
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents and container in accordance with local, regional, national, international regulations.

Labelling REGULATION (EC) No 1272/2008

Signal Word

Danger

Pictograms Hazard to Human

GHS05 Corrosive hazard

GHS07 Health hazard

Pictogram Hazard during Transport

None

Training advice

Provide adequate information, instruction and training for operators.

Information sources

1. ECHA - European Chemicals Agency
   https://www.echa.europa.eu/web/guest/registration-dossier/-/registered-dossier/16187/1
2. National Center for Biotechnology Information. PubChem Database. Calcium dihydroxide, CID=6093208, https://pubchem.ncbi.nlm.nih.gov/compound/6093208 (accessed on Apr. 29, 2019)

Compiled by Aquatrade Water Treatment Chemicals (Pty) Ltd, R. van Rooyen, SHEQ Co-ordinator and E. Le Sar, Director.

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Revision History

Revision	Date	Change
1.0	2019/04/29	Preparation of the safety data sheet according to SANS 11014:2010