

SAFETY INFORMATION

HYDRALIME ANNEX A

Prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2019 **Health and Safety Information**

1 IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Substance name Hydrated lime

Synonyms Slaked lime, Air slaked lime, Building lime, Fat lime, Chemical lime, Finishing lime, Mason's lime, Calcium dihydroxide, Calcium hydroxide, Calcium hydrate, Lime, Lime water.

Please note that this list may not be exhaustive.

Chemical name and formula Calcium dihydroxide - Ca(OH)₂

Trade name Hydralime

CAS 1305-62-0

EINECS 215-137-3

Molecular Weight 74,09 g/mol

REACH Registration number 01-2119475151-45-0053

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

Please check the identified uses in Table 1 of the Appendix of this SDS. Uses advised against: There are no uses advised against.

1.3 Details of the supplier of the safety data sheet

Tarmac Cement and Lime Ltd,
 T3 Trinity Park, Bickenhill Lane,
 Birmingham, B37 7ES

Technical helpdesk: 0345 812 6232

Email: info-cement@tarmac.com

1.4 Emergency telephone

Emergency telephone number available during office hours: **Tel 0345 812 6232 (08:30 - 16:00)**

Emergency telephone number available outside office hours: **999**

2 HAZARDS IDENTIFICATION

2.1 Classification of the substance

2.1.1 Classification according to Regulation (EC) 1272/2008

STOT Single Exp. 3, Route of exposure: Inhalation
 Skin Irritation 2
 Eye Damage 1

2.1.2 Classification according to Directive 67/548/EEC

Xi - irritant

2.2 Label elements

2.2.1 Labeling according to Regulation (EC) 1272/2008

Signal word: **Danger**

Hazard pictogram



Warning



Corrosive

Hazard statement

H315: Causes skin irritation.

H318: Causes serious eye damage.

H335: May cause respiratory irritation.

Precautionary statements

P102: Keep out of reach of children.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P305+P351+P310: IF IN EYES: Rinse cautiously with water for several minutes. Immediately call a POISON CENTRE or doctor/physician.

P302+P352: IF ON SKIN: Wash with plenty of soap and water.

P261: Avoid breathing dust/fume/gas/mist/vapours/spray.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P501: Dispose of contents/container to a hazardous waste collection point.

2.2.2 Labeling according to Directive 67/548/EEC

Indication of danger



IRRITANT Xi irritant

Risk phrases

R37: Irritating to respiratory system

R38: Irritating to skin

R41: Risk of serious damage to eyes

Safety phrases

S2: Keep out of the reach of children

S25: Avoid contact with eyes

S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S37: Wear suitable gloves

S39: Wear eye/face protection

2.3 Other hazards

The substance does not meet the criteria for PBT or vPvB substance. No other hazards identified.

3 COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Composition

Main constituent

Name: Calcium dihydroxide

CAS: 1305-62-0

EINECS: 215-137-3

Impurities

No impurities relevant for classification and labelling.

4 FIRST AID MEASURES

4.1 Description of first aid measures

General advice

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

Following inhalation

Move source of dust or move person to fresh air. Obtain medical attention immediately.

Following skin contact

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.

Following eye contact

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

After ingestion

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

4.2 Most important symptoms and effects, both acute and delayed

Calcium dihydroxide is not acutely toxic via the oral, dermal, or inhalation route. The substance is classified as irritating to skin and the respiratory tract, and entails a risk of serious damage to the eye. There is no concern for adverse systemic effects because local effects (pH-effect) are the major health hazard.

4.3 Indication of any immediate medical attention and special treatment needed

Follow the advice given in section 4.1

5 FIRE FIGHTING MEASURES

5.1 Extinguishing media

5.1.1 Suitable extinguishing media

Suitable extinguishing media: The product is not combustible. Use a dry powder, foam or CO2 fire extinguisher to extinguish the surrounding fire.

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

5.1.2 Unsuitable extinguishing media

Do not use water.

5.2 Special hazards arising from the substance or mixture

None

5.3 Advice for firefighters

Avoid generation of dust. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

6 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

6.1.2 For non-emergency personnel

Ensure adequate ventilation
Keep dust levels to a minimum.
Keep unprotected persons away.
Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8). Avoid inhalation of dust – ensure that sufficient ventilation or suitable respiratory protective equipment is used, wear suitable protective equipment (see section 8).

6.1.3 For emergency responders

Keep dust levels to a minimum.
Ensure adequate ventilation.
Keep unprotected persons away.
Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8).
Avoid inhalation of dust – ensure that sufficient ventilation or suitable respiratory protective equipment is used, wear suitable protective equipment (see section 8).

6.2 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 (pH rising). Any large spillage into watercourses must be alerted to the Environment Agency or other regulatory body.

6.3 Methods and material for containment and cleaning up

In all cases avoid dust formation.
Keep the material dry if possible.
Pick up the product mechanically in a dry way.
Use vacuum suction unit, or shovel into bags.

6.4 Reference to other sections

For more information on exposure controls /personal protection or disposal considerations, please check sections 8 and 13 of this safety data sheet.

7 HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

Avoid contact with skin and eyes. Wear protective

equipment (refer to section 8 of this safety data sheet). Do not wear contact lenses when handling this product. It is also advisable to have individual pocket eyewash. 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 handling bags usual precautions should be paid to the risks outlined in the Council Directive 90/269/EEC.

7.1.2 Advice on general occupational hygiene

Avoid inhalation or ingestion and contact with skin and eyes. General occupational hygiene measures are required to ensure safe handling of the substance. These measures involve good personal and housekeeping practices (ie, regular cleaning with suitable cleaning devices), no drinking, eating and smoking at the workplace. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home.

7.2 Conditions for safe storage, including any incompatibilities

The substance should be stored under dry conditions. Any contact with air and moisture should be avoided. 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.

7.3 Specific end use(s)

Please check the identified uses in Table 1 of the Appendix of this SDS. For more information please see the relevant exposure scenario in the Appendix, and check section 2.1: Control of worker exposure.

8 EXPOSURE CONTROLS /PERSONAL PROTECTION

8.1 Control parameters

SCOEL recommendation (SCOEL/SUM/137 February 2008):
Occupational Exposure Limit (OEL), 8 h TWA: 1 mg/m³
respirable dust of calcium dihydroxide
Short-term exposure limit (STEL), 15 min: 4 mg/m³
respirable dust of calcium dihydroxide
PNEC aqua = 490 µg/l
PNEC soil/groundwater = 1080 mg/l

8.2 Exposure controls

To control potential exposures, generation of dust should be avoided. Further, appropriate protective equipment is recommended. Eye protection equipment (eg, goggles or visors) must be worn, unless potential contact with the eye can be excluded by the nature and type of application (ie, closed process). Additionally, face protection, protective

clothing and safety shoes are required to be worn as appropriate. Please check the relevant exposure scenario, given in the Appendix.

8.2.1 Appropriate engineering controls

If user operations generate dusts or fumes, use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits.

8.2.2 Individual protection measures, such as personal protective equipment

8.2.2.1 Eye/face protection

Do not wear contact lenses. For powders, tight fitting goggles with side shields, or wide vision full goggles. It is also advisable to have individual pocket eyewash.

8.2.2.2 Skin protection

Since calcium dihydroxide is classified as irritating to skin, dermal exposure has to be minimised as far as technically feasible. The use of protective gloves (nitrile), protective standard working clothes fully covering skin, full length trousers, long sleeved overalls, with close fittings at openings and shoes resistant to caustics and avoiding dust penetration are required to be worn.

8.2.2.3 Respiratory protection

Local ventilation to keep levels below established threshold values is recommended. A suitable particle filter mask is recommended, depending on the expected exposure levels - please check the relevant exposure scenario, given in the Appendix.

8.2.2.4 Thermal hazards

The substance does not represent a thermal hazard, thus special consideration is not required.

8.2.3 Environmental exposure controls

All ventilation systems should be filtered before discharge to atmosphere.

Avoid releasing to the environment.

Contain the spillage. Any large spillage into watercourses must be alerted to the Environment Agency or other regulatory body. For detailed explanations of the risk management measures that adequately control exposure of the environment to the substance please check the relevant exposure scenario, available via your supplier. For further detailed information, please check the Appendix of this SDS.

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	White or off white (beige) fine powder
Odour	odourless
Odour threshold	not applicable
pH	12.4 (saturated solution at 20 °C)
Melting point	> 450 °C (study result, EU A.1 method)
Boiling point	not applicable (solid with a melting point > 450 °C)
Flash point	not applicable (solid with a melting point > 450 °C)
Evaporation rate	not applicable (solid with a melting point > 450 °C)
Flammability	non flammable (study result, EU A.10 method)
Explosive limits	non explosive (void of any chemical structures commonly associated with explosive properties)
Vapour pressure	not applicable (solid with a melting point > 450 °C)
Vapour density	not applicable
Relative density	2.24 (study result, EU A.3 method)
Solubility in water	1844.9 mg/L (study results, EU A.6 method)
Partition coefficient	not applicable (inorganic substance)
Auto ignition temperature	no relative self-ignition temperature below 400 °C (study result, EU A.16 method).
Decomposition temperature	When heated above 580°C, calcium dihydroxide decomposes to produce calcium oxide (CaO) and water (H ₂ O).
Viscosity	not applicable (solid with a melting point > 450 °C)
Oxidising properties	no oxidising properties (Based on the chemical structure, the substance does not contain a surplus of oxygen or any structural groups known to be correlated with a tendency to react exothermally with combustible material)

10 STABILITY AND REACTIVITY

10.1 Reactivity

In aqueous media Ca(OH)₂ dissociates under formation of calcium cations and hydroxyl anions (when below the solubility).

10.2 Chemical stability

Under normal conditions of use and storage, calcium dihydroxide is stable.

10.3 Possibility of hazardous reactions

Reacts exothermically with acids. When heated above 580 °C, calcium dihydroxide decomposes to produce calcium oxide (CaO) and water

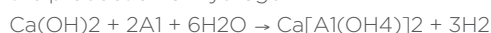
(H₂O): $\text{Ca(OH)}_2 \rightarrow \text{CaO} + \text{H}_2\text{O}$. Calcium oxide reacts with water and generates heat. This may cause risk to flammable material.

10.4 Conditions to avoid

Minimise exposure to air and moisture to avoid degradation.

10.5 Incompatible materials

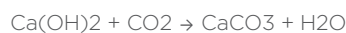
Reacts exothermically with acids to form salts. Reacts with aluminium and brass in the presence of moisture leading to the production of hydrogen.



10.6 Hazardous decomposition products

None.

Further information: Calcium dihydroxide reacts with carbon dioxide to form calcium carbonate, which is a common material in nature:



11 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Calcium dihydroxide is classified as irritating to skin and the respiratory tract and it entails a risk of serious damage to the eye. The occupational exposure limit for the prevention of local sensory irritation and decrease of lung function parameters as critical effects is OEL (8 h) = 1 mg/m³ respirable dust.

Toxicity endpoints	Outcome of the effects assessment
Absorption	The primary health effect of calcium dihydroxide is local irritation due to a pH shift. Therefore, absorption is not a relevant parameter for the effects assessment.
Acute toxicity	Calcium dihydroxide is not acutely toxic.
Oral	LD50 > 2000 mg/kg bw (OECD 425, rat)
Dermal	LD50 > 2500 mg/kg bw (OECD 402, rabbit)
Inhalation	No data available. Classification for acute toxicity is not warranted. For irritating effects to the respiratory tract see below.
Irritation/corrosion	<p><i>Eye irritation</i> Calcium dihydroxide entails a risk of serious damage to the eye (eye irritation studies (in vivo, rabbit).</p> <p><i>Skin irritation</i> Calcium dihydroxide is irritating to skin (in vivo, rabbit)</p> <p><i>Respiratory irritation</i> From human data it is concluded that Ca(OH)₂ is irritating to the respiratory tract. Based on experimental results, calcium dihydroxide requires classification as irritating to skin [R38, irritating to skin; Skin Irrit 2 (H315 - Causes skin irritation)] and as severely irritating to the eye [R41, Risk of serious damage to eye; Eye Damage 1 (H318 - Causes serious eye damage)]. As summarised and evaluated in the SCOEL recommendation (Anonymous, 2008), based on human data it is proposed to classify calcium dihydroxide as irritating to the respiratory system [R37, Irritating to respiratory system; STOT SE 3 (H335 - May cause respiratory irritation)].</p>
Sensitisation	No data available. Calcium dihydroxide is considered not to be a skin sensitiser, based on the nature of the effect (pH shift) and the essentiality of calcium for human nutrition. Classification for sensitisation is not warranted.
Repeated dose toxicity	<p>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.</p> <p>Toxicity of Ca(OH)₂ via the dermal route is not considered as relevant in view of the anticipated insignificant absorption through skin and due to local irritation as the primary health effect (pH shift). Toxicity of Ca(OH)₂ via inhalation (local effect, irritation of mucous membranes) is addressed by an 8-h TWA determined by the Scientific Committee on Occupational Exposure Limits (SCOEL) of 1 mg/m³ respirable dust. Therefore, classification of Ca(OH)₂ for toxicity upon prolonged exposure is not required.</p>
Mutagenicity	Bacterial reverse mutation assay (Ames test, OECD 471): Negative. Mammalian chromosome aberration test: Negative. In view of the omnipresence and essentiality of Ca and of the physiological non-relevance of any pH shift induced by lime in aqueous media, lime is obviously void of any genotoxic potential. Classification for genotoxicity is not warranted.
Carcinogenicity	Calcium (administered as Ca-lactate) is not carcinogenic (experimental result, rat). The pH effect of calcium dihydroxide does not give rise to a carcinogenic risk. Human epidemiological data support lack of any carcinogenic potential of calcium dihydroxide. Classification for carcinogenicity is not warranted.
Toxicity for reproduction	Calcium (administered as Ca-carbonate) is not toxic to reproduction (experimental result, mouse). The pH effect does not give rise to a reproductive risk. Human epidemiological data support lack of any potential for reproductive toxicity of calcium dihydroxide. Both in animal studies and human clinical studies on various calcium salts no reproductive or developmental effects whatsoever were detected. Also see the Scientific Committee on Food (Anonymous, 2006). Thus, calcium dihydroxide is not toxic for reproduction and/or development. Classification for reproductive toxicity according to regulation (EC) 1272/2008 is not required.

12 ECOLOGICAL INFORMATION

12.1 Toxicity

12.1.1 Acute/Prolonged toxicity to fish

LC50 (96h) for freshwater fish: 50.6 mg/l

LC50 (96h) for marine water fish: 457 mg/l

12.1.2 Acute/Prolonged toxicity to aquatic invertebrates

EC50 (48h) for freshwater invertebrates: 49.1 mg/l

LC50 (96h) for marine water invertebrates: 158 mg/l

12.1.3 Acute/Prolonged toxicity to aquatic plants

EC50 (72h) for freshwater algae: 184.57 mg/l

NOEC (72h) for freshwater algae: 48 mg/l

12.1.4 Toxicity to micro-organisms e.g. bacteria

At high concentration, through the rise of temperature and pH, calcium dihydroxide is used for disinfection of sewage sludges

12.1.5 Chronic toxicity to aquatic organisms

NOEC (14d) for marine water invertebrates: 32 mg/l

12.1.6 Toxicity to soil dwelling organisms

EC10/LC10 or NOEC for soil macroorganisms: 2000 mg/kg soil dw

EC10/LC10 or NOEC for soil microorganisms: 12000 mg/kg soil dw

12.1.7 Toxicity to terrestrial plants

NOEC (21d) for terrestrial plants: 1080 mg/kg

12.1.8 General effect

Acute pH-effect. Although this product is useful to correct water acidity, an excess of more than 1 g/l may be harmful to aquatic life. pH-value of > 12 will rapidly decrease as result of dilution and carbonation

12.2 Persistence and degradability

Not relevant for inorganic substances

12.3 Bioaccumulative potential

Not relevant for inorganic substances

12.4 Mobility in soil

Calcium dihydroxide, is sparingly soluble, and so present a low mobility in most ground conditions.

12.5 Results of PBT and vPvB assessment

Not relevant for inorganic substances

13 DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Disposal of calcium dihydroxide should be in accordance

with local and national legislation. Processing, use or contamination of this product may change the waste management options.

Dispose of container and unused contents in accordance with applicable member state and local requirements.

The used packing is only meant for packing this product; it should not be reused for other purposes. After usage, empty the packing completely.

14 TRANSPORT INFORMATION

Calcium dihydroxide is not classified as hazardous for transport (ADR (Road), RID (Rail), IMDG / GGVSea (Sea)).

14.1 UN-Number

Not regulated

14.2 UN proper shipping name

Not regulated

14.3 Transport hazard class(es)

Not regulated

14.4 Packing group

Not regulated

14.5 Environmental hazards

None

14.6 Special precautions for user

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

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not regulated

15 REGULATORY INFORMATION

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

Authorisations: Not required

Restrictions on use: None

Other EU regulations: Calcium dihydroxide is not a SEVESO substance, not an ozone depleting substance and not a persistent organic pollutant.

National regulations: Water endangering class 1 (Germany)

15.2 Chemical safety assessment

A chemical safety assessment has been carried out for this substance.

16 OTHER INFORMATION

Data are based on our latest knowledge but do not constitute a guarantee for any specific product features and do not establish a legally valid contractual relationship.

16.1 Hazard Statements

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

16.2 Precautionary Statements

- P102:* Keep out of reach of children.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P305+P351: IF IN EYES: Rinse cautiously with water for several minutes
P310: Immediately call a POISON CENTER or doctor/physician.
P302+P352: IF ON SKIN: Wash with plenty of soap and water.
P261: Avoid breathing dust / fume / gas / mist / vapours / spray.
P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P501: Dispose of contents/container to hazardous waste collection point

16.3 Risk Phrases

- R37:* Irritating to respiratory system
R38: Irritating to skin
R41: Risk of serious damage to eyes

16.4 Safety Phrases

- S2:* Keep out of the reach of children
S25: Avoid contact with eyes
S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S37: Wear suitable gloves
S39: Wear eye/face protection

16.5 Abbreviations

- EC50:* median effective concentration
LC50: median lethal concentration
LD50: median lethal dose
NOEC: no observable effect concentration
OEL: occupational exposure limit
PBT: persistent, bioaccumulative, toxic chemical
PNEC: predicted no-effect concentration
STEL: short term exposure limit
TWA: time weighted average
VPvB: very persistent, very bioaccumulative material

16.6 Key Literature references:

- Anonymous, 2006: Tolerable upper intake levels for vitamins and minerals Scientific Committee on Food, European Food Safety Authority, ISBN: 92-9199-014-0 [SCF document]
Anonymous, 2008: Recommendation from the Scientific Committee on Occupational Exposure Limits for calcium oxide (CaO) and calcium dihydroxide (Ca(OH)₂), European Commission, DG Employment, Social Affairs and Equal

Opportunities, SCOEL/SUM/137 February 2008

APPENDIX 1 : EXPOSURE SCENARIOS

The current document includes relevant occupational and environmental exposure scenarios (ES) for the production and use of Hydralime (calcium dihydroxide) as required under the REACH Regulation (Regulation (EC) No 1907/2006). For the development of the ES the Regulation and the relevant REACH Guidance have been considered. For the description of the covered uses and processes, the "R.12 - Use descriptor system" guidance (Version: 2, March 2010, ECHA-2010-G-05-EN), for the description and implementation of risk management measures (RMM) the "R.13 - Risk management measures" guidance (Version: 1.1, May 2008), for the occupational exposure estimation the "R.14 - Occupational exposure estimation" guidance (Version: 2, May 2010, ECHA-2010-G-09-EN) and for the actual environmental exposure assessment the "R.16 - Environmental Exposure Assessment" (Version: 2, May 2010, ECHA-10-G-06-EN) was used.

Methodology used for environmental exposure assessment

The environmental exposure scenarios only address the assessment at the local scale, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, for industrial and professional uses as any effects that might occur is expected to place on a local scale.

1) Industrial uses (local scale)

The exposure and risk assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions in the industrial stages mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH⁻ discharges. The exposure assessment for the aquatic environment only deals with the possible pH changes in STP effluent and surface water related to the OH⁻ discharges at the local scale and is performed by assessing the resulting pH impact: the surface water pH should not increase above 9 (In general, most aquatic organisms can tolerate pH values in the range of 6-9). Risk management measures related to the environment aim to avoid discharging calcium dihydroxide solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. Discharges should be carried out such that pH changes in receiving surface waters are minimised. The effluent pH is normally measured and can be neutralised easily, as often required by national laws.

2) Professional uses (local scale)

The exposure and risk assessment is only relevant for the aquatic and terrestrial environment. The aquatic effect and risk assessment is determined by the pH effect. Nevertheless, the classical risk characterisation ratio (RCR), based on PEC (predicted environmental concentration) and PNEC (predicted no effect concentration) is calculated. The professional uses on a local scale refer to applications on agricultural or urban soil. The environmental exposure is assessed based on data and a modelling tool. The modelling FOCUS/ Exposit tool is used to assess terrestrial and aquatic exposure (typically conceived for biocidal applications). Details and scaling approach indications are reported in the specific scenarios.

Methodology used for occupational exposure assessment

By definition an exposure scenario (ES) has to describe under which operational conditions (OC) and risk management measure (RMMs) the substance can be handled safely. This is demonstrated if the estimated exposure level is below the respective derived no-effect level (DNEL), which is expressed in the risk characterisation ratio (RCR). For workers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the scientific committee on occupational exposure limits (SCOEL) being 1 mg/m³ and 4 mg/m³, respectively. In cases where neither measured data nor analogous data are available, human exposure is assessed with the aid of a modelling tool. At the first tier screening level, the MEASE tool (<http://www.ebrc.de/mease.html>) is used to assess inhalation exposure according to the ECHA guidance (R.14). Since the SCOEL recommendation refers to respirable dust while the exposure estimates in MEASE reflect the inhalable fraction, an additional safety margin is inherently included in the exposure scenarios below when MEASE has been used to derive exposure estimates.

Methodology used for consumer exposure assessment

By definition an ES has to describe under which conditions the substances, preparation or articles can be handled safely. In cases where neither measured data nor analogous data are available, exposure is assessed with the aid of a modelling tool.

For consumers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the Scientific Committee on Occupational Exposure Limits (SCOEL), being 1 mg/m³ and 4 mg/m³, respectively.

For inhalation exposure to powders the data are derived from van Hemmen (van Hemmen, 1992):

Agricultural pesticide exposure data bases for risk assessment. Rev Environ Contam Toxicol. 126: 1- 85.), has been used to calculate the inhalation exposure. The inhalation exposure for consumers is estimated at 15 µg/hr

or 0.25 µg/min. For larger tasks the inhalation exposure is expected to be higher. A factor of 10 is suggested when the product amount exceeds 2.5 kg, resulting in the inhalation exposure of 150 µg/hr. To convert these values in mg/m³ a default value of 1.25 m³/hr for the breathing volume under light working conditions will be assumed (van Hemmen, 1992) giving 12 µg/m³ for small tasks and 120 µg/m³ for larger tasks.

When the preparation or substance is applied in granular form or as tablets, reduced exposure to dust was assumed. To take this into account if data about particle size distribution and attrition of the granule are lacking, the model for powder formulations is used, assuming a reduction in dust formation by 10 % according to Becks and Falks (Manual for the authorisation of pesticides. Plant products. Chapter 4 Human toxicology; risk operator, worker and bystander, version 1.0., 2006).

For dermal exposure and exposure to the eye a qualitative approach has been followed, as no DNEL could be derived for this route due to the irritating properties of calcium oxide. Oral exposure was not assessed as this is not a foreseeable route of exposure regarding the uses addressed. Since the SCOEL recommendation refers to respirable dust while the exposure estimates by the model from van Hemmen reflect the inhalable fraction, an additional safety margin is inherently included in the exposure scenarios below, i.e. the exposure estimates are very conservative. The exposure assessment of calcium dihydroxide professional and industrial and consumer use is performed and organized based on several scenarios. An overview of the scenarios and the coverage of substance life cycle (where appropriate) is presented in Table 1.

Table 1: Overview of exposure scenarios for Hydralime and coverage of substance life cycle

ES number	1	
ES title	Professional and Consumer use (DIY – do it yourself) as a building and construction material	
Identified uses	Manufacture	
	Formulation	
	End use	
Consumer	X	
Resulting life cycle stage	Service life (for articles)	
	Linked to identified use	1
	Sector of use category (SU)	21
	Chemical product category (PC)	9a, 9b
	Process category (PROC)	
	Article category (AC)	
	Environmental release category (ERC)	8

ES number 1: Professional and Consumer use (DIY – do it yourself) as a building and construction material

Exposure Scenario Format addressing uses carried out by professional builders and consumers

1. Title				
Free short title	Professional and Consumer use as a building and construction material.			
Systematic title based on use descriptor	SU21, PC9a, PC9b, ERC8c, ERC8d, ERC8e, ERC8f			
Processes, tasks activities covered	Handling (mixing and filling) of powder formulations. Application of liquid, pasty lime preparations.			
Assessment method	Human health:	A qualitative assessment has been performed for oral and dermal exposure as well as exposure to the eye. Inhalation exposure to dust has been assessed by the Dutch model (van Hemmen, 1992)		
	Environment:	A qualitative justification assessment is provided.		
2. Operational conditions and risk management measures				
RMM	No product integrated risk management measures are in place.			
PC/ERC	Description of activity referring to article categories (AC) and environmental release categories (ERC)			
PC 9a, 9b	Mixing and loading of powder containing lime substances. Application of mortar, lime plaster, putty or slurry to the walls or ceiling. Post-application exposure.			
ERC 8c, 8d, 8e, 8f	Wide dispersive indoor use resulting in inclusion into or onto a matrix. Wide dispersive outdoor use of processing aids in open systems. Wide dispersive outdoor use of reactive substances in open systems. Wide dispersive outdoor use resulting in inclusion into or onto a matrix.			
2.1 Control of worker exposure				
Product characteristic				
Description of the preparation	Concentration of the substance in the preparation	Physical state of the preparation	Dustiness (if relevant)	Packaging design
Lime substance	100%	Solid, powder	High, medium and low, depending on the kind of lime substance	25 kg bags
Plaster, Mortar	20-40%	Solid, powder	-	-
Plaster, Mortar	20-40%	Pasty	-	-
Putty, Filler	30-55%	Pasty, highly viscous, thick liquid	-	In tubs or buckets
Pre-mixed lime wash paint	~30%	Solid, powder	High - Low	-
Lime wash paint/milk of lime preparation	~30%	Milk of lime preparation	-	-

Amounts used				
Description of the preparation	Amount used per event			
Filler, putty	250 g - 1 kg powder (2:1 powder water).			
Plaster/lime wash paint	- 25 kg depending on the size of the room, wall to be treated.			
Floor/wall equalizer	- 25 kg depending on the size of the room, wall to be equalized.			
Mortar/Render	- 25 kg or greater depending on size of masonry wall to be mortared/rendered.			
Frequency and duration of use/exposure				
Description of task	Duration of exposure per event	Frequency of events		
Mixing and loading of lime containing powder	1.33 min	2/year		
Application of lime plaster, putty or slurry to the walls or ceiling	Several minutes - hours	2/year		
Application of cement:lime:sand mortar or render to walls	Several minutes to hours	2/year to 100/yr		
Human factors not influenced by risk management				
Description of task	Population exposed	Breathing rate	Exposed body part	Corresponding skin area [cm ²]
Handling of powder	Adult	1.25 m ³ /hr	Half of both hands	430
Application of liquid, pasty lime preparations	Adult	NR	Hands and forearms	1900
Other given operational conditions affecting consumers exposure				
Description of task	Indoor/outdoor	Room volume	Air exchange rate	
Handling of powder	Indoor	1 m ³ (personal space, small area around the user)	0.6 hr-1 (unspecified room)	
Application of liquid, pasty lime preparations	Indoor	NR	NR	
Application of mortar or render	Outdoor	NR	NR	
Conditions and measures related to information and behavioural advice to consumers				
In order to avoid health damage DIYers should comply with the same strict protective measures which apply to professional workplaces. See section 8:				
<ul style="list-style-type: none"> • Change wet clothing, shoes and gloves immediately. • Protect uncovered areas of skin (arms, legs, face): there are various effective skin protection products which should be used in accordance with a skin protection plan (skin protection, cleansing and care). Cleanse the skin thoroughly after the work and apply a care product 				
Conditions and measures related to personal protection and hygiene				
In order to avoid health damage DIYers should comply with the same strict protective measures which apply to professional workplaces. See section 8:				
<ul style="list-style-type: none"> • When preparing or mixing building materials, during demolition or caulking and, above all, during overhead work, wear protective goggles as well as face masks during dusty work • Choose work gloves carefully. Leather gloves become wet and can facilitate burns. When working in a wet environment, cotton gloves with plastic covering (nitrile) are better. Wear gauntlet gloves during overhead work because they can considerably reduce the amount of humidity which permeates the working clothes. 				

2.2 Control of environmental exposure

Product characteristics

Not relevant for exposure assessment

Amounts used

Not relevant for exposure assessment

Frequency and duration of use

Not relevant for exposure assessment

Environment factors not influenced by risk management

Default river flow and dilution

Other given operational conditions affecting environmental exposure

Indoor: Direct discharge to the wastewater is avoided.

Conditions and measures related to municipal sewage treatment plant

Default size of municipal sewage system/treatment plant and sludge treatment technique

Conditions and measures related to external treatment of waste for disposal

Not relevant for exposure assessment

Conditions and measures related to external recovery of waste

Not relevant for exposure assessment

3. Exposure estimation and reference to its source

The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and is given in parentheses below. For inhalation exposure, the RCR is based on the acute DNEL for lime substances of 4 mg/m³ (as respirable dust) and the respective inhalation exposure estimate (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction is a sub-fraction of the inhalable fraction according to EN 481. Since limes are classified as irritating to skin and eyes a qualitative assessment has been performed for dermal exposure and exposure to the eye.

Human exposure

Handling of powder

Route of exposure	Exposure estimate	Method used, comments
Oral	-	<i>Qualitative assessment-</i> Oral exposure does not occur as part of the intended product use
Dermal	Small task: 0.1 µg/cm ² (-) Large task: 1 µg/cm ² (-)	<i>Qualitative assessment-</i> If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from loading of lime substances or direct contact to the lime cannot be excluded if no protective gloves are worn during application. This may occasionally result in mild irritation easily avoided by prompt rinsing with water. <i>Qualitative assessment-</i> The constant rate model of ConsExpo has been used.
Eye	Dust	<i>Qualitative assessment-</i> If risk reduction measures are taken into account no human exposure is expected. Dust from loading of the lime substances cannot be excluded if no protective goggles are used. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable.
Inhalation	Small task: 12 µg/m ³ (0.003) Large task: 120 µg/m ³ (0.03)	Qualitative assessment: Dust formation while pouring the powder is addressed by using the Dutch model (van Hemmen, 1992).

Application of liquid, pasty lime preparations		
Handling of powder		
Route of exposure	Exposure estimate	Method used, comments
Oral	-	<i>Qualitative assessment:</i> Oral exposure does not occur as part of the intended product use
Dermal	Splashes	<i>Qualitative assessment-</i> If risk reduction measures are taken into account no human exposure is expected. However, splashes on the skin cannot be excluded if no protective gloves are worn during the application. Splashes may occasionally result in mild irritation easily avoided by immediate rinsing of the hands with water.
Eye	Splashes	<i>Qualitative assessment-</i> If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or Pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable.
Inhalation	-	<i>Qualitative assessment-</i> Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Post-application exposure		
No relevant exposure will be assumed as the aqueous lime preparation will quickly convert to calcium carbonate with carbon dioxide from the atmosphere.		
Environmental exposure		
Referring to the OC/RMMs related to the environment to avoid discharging lime solutions directly into municipal wastewater, the pH of the influent of a municipal wastewater treatment plant is circum-neutral and therefore, there is no exposure to the biological activity. The influent of a municipal wastewater treatment plant is often neutralised anyway and lime may even be used beneficially for pH control of acid wastewater streams that are treated in biological WWTPs. Since the pH of the influent of the municipal treatment plant is circum neutral, the pH impact is negligible on the receiving environmental compartments, such as surface water, sediment and terrestrial compartment.		

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