TATA STEEL

TATA

Dec 2022

Calcium Oxide - CaO

Safety Data Sheet

1. Identification of the Substance and company

1.1 Product

Other names:	Lime, Burnt lime, Fluxing lime, Quick lime, Calcined limestone	**REACH Reg No.:**	UK-01-6025516321-8-0004
EINECS no.:	215-138-9	**CAS no.:**	1305-78-8

1.2 Relevant identified Uses

Calcium oxide or quick lime produced for the UK steel industry. Please check the identified uses in Table 1 of the Appendix of this SDS.

1.3 Details of the Supplier of the Safety Datasheet

Manufacturer/ Supplier:	Tata Steel Shapfell Limestone Quarries, Shap, Cumbria, CA10 3QG, UK
Telephone:	+44 (0) 1931 717130
Normal Hours:	Split cells to add more than one company contact
Email:	reach@tatasteeleurope.com

1.4 Emergency telephone number

Emergency:	+44 (0) 1931 717130

2. Hazards Identification

2.1 Classification

Hazard Classification: CLP regulations (EC)1272/2008			
Name	**Hazard Class**	**Hazard Category**	**Hazard Statement (code)**
Calcium oxide	STOT Single Exp. 3 (Route of exposure: Inhalation)	STOT SE 3	H335: May cause respiratory irritation
	Skin Irritation 2	Skin Irrit. 2	H315: Causes skin irritation
	Eye Damage 1	Eye Dam. 1	H318: Causes serious eye damage

2.2 Label according to CLP regulations (EC)1272/2008

GHS07: 

GHS05: 

Signal word – **Danger**

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

Substance	CAS-Nr.	Einecs No.	Registration No.	Classification (CLP Regs)	Range (%) by weight
Calcium oxide	1305-78-8	215-138-9	01-2119475325-36-0062	H335, H315, H318	>90

No impurities present relevant for classification. Full text of hazard statements above can be found in section 16.

4. First aid measures

4.1 Description of First Aid Measures

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

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.

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

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

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

Calcium oxide 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 4.1.

5. Fire fighting measures

5.1 Extinguishing media

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

Do not use water. Avoid humidification.

5.2 Special Hazards arising

Calcium oxide reacts with water and generates heat. This may cause risk to flammable material.

5.3 Advice for Firefighters

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

6. Accidental release measures

6.1 Personal precautions

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 are used, wear suitable protective equipment (see section 8), avoid humidification.

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), avoid humidification.

6.2 Environmental precautions

Contain any spillage. Keep the material dry, if possible. Cover the area if possible to avoid unnecessary dust hazard. Avoid uncontrolled spills to watercourses and drains (pH increase). Any large spillages into watercourses must be reported to the Environment Agency or other relevant regulatory body.

6.3 Methods for cleaning up

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

7. Handling and Storage

7.1 Precautions for safe handling

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 provide individual pocket eyewash units. 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.

Avoid inhalation or ingestion and contact with skin and eyes. General good occupational hygiene measures are required to ensure safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no drinking, eating or smoking at the workplace. Shower and change clothes at end of each 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 the product away from acids, significant quantities of paper, straw, and nitro compounds. Keep out of reach of children. Do not use aluminium containers for transport or storage if there is a risk of contact with water.

7.3 Specific end use

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

8. Exposure controls and personal protection

8.1 Control parameters (Occupational Exposure Limits (OELs))

Current OELs

Country in EU with OEL for the relevant substance	Calcium oxide (lime)	
	8-hTWA (mg/m^3)	**STEL** (mg/m^3)
European Scientific Committee on Occupational Exposure Limits (SCOEL)	1.0	4.0
United Kingdom	2.0	-

DNEL – inhalation (8-h) = 1.0 mg/m^3 (respirable dust)	PNEC aqua = 370 µg/l
DNEL – inhalation (short-term) = 4.0 mg/m^3 (respirable dust)	PNEC soil / groundwater = 816 µg/l
TWA – Time-weighted average measured over an 8-h period	Resp - Respirable fraction of dust
STEL – Short-term exposure limit value – 15-minute duration	

8.2 Control Measures

To control potential inhalation exposures, generation of dust should be avoided. Further, appropriate protective equipment is recommended. Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eyes can be excluded

by the nature and type of application (i.e. 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/available via your supplier.

8.2.1 Engineering controls

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

8.2.2 Individual protection measures (PPE)

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

Skin protection: Since calcium oxide is classified as irritating to skin, dermal exposure must 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 caustic substances and avoiding dust penetration are required to be worn.

Respiratory protection: Local ventilation is recommended to keep airborne concentrations below established threshold limit values. A suitable particle filter mask is recommended, depending on the expected exposure levels - please check the relevant exposure scenario, given in the Appendix/available via your supplier.

8.2.3 Environmental exposure controls

All ventilation systems should be equipped with air filtration to clean extracted air prior to its discharge to atmosphere. Avoid releasing the product to the environment. Contain any spillage. Any large spillages into watercourses must be reported to the appropriate regulatory authority responsible for environmental protection or any other relevant regulatory body. For detailed explanations of the risk management measures to provide adequate control of the 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

Property	Value used
Physical State at 20°C/ 1 013 hPa	Solid, lump, powder
Form	White or off-white (beige) solid material of varying sizes: lump, granular or fine powder
Odour	Odourless
pH	12.3 (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)
Relative density	3.31 (study result, EU A.3 method)
Vapour pressure	Not applicable (solid with a melting point > 450 °C)
Water solubility	1 337.6 mg/l (study results, EU A.6 method)
Partition coefficient (K_{ow}[4])	Not applicable, inorganic substance
Flash point	Not applicable (solid with a melting point > 450 °C)
Flammability	Not applicable (solid with a melting point > 450 °C)
Explosive properties	Non-explosive (void of any chemical structures commonly associated with explosive properties)
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 exothermically with combustible material)
Viscosity	Not applicable

10. Stability and reactivity

10.1 Reactivity

Calcium oxide reacts exothermically with water to form calcium dihydroxide.

10.2 Chemical stability
Under normal conditions of use and storage (dry conditions), calcium oxide is stable.

10.3 Possibility of hazardous reactions
Calcium oxide reacts exothermically with acids to form calcium salts.

10.4 Conditions to avoid
Minimise exposure of the product to air and moisture to avoid degradation.

10.5 Incompatible materials
Calcium oxide reacts exothermically with water to form calcium dihydroxide:
$CaO + H_2O \rightarrow Ca(OH)_2 + 1155$ kJ/kg CaO
Calcium oxide reacts exothermically with acids to form calcium salts.
Calcium oxide reacts with aluminium and brass in the presence of moisture leading to the production of hydrogen:
$CaO + 2\ Al + 7\ H_2O \rightarrow Ca(Al\ (OH)_4)_2 + 3\ H_2$

10.6 Hazardous decomposition products None.

Further information: calcium oxide absorbs moisture and carbon dioxide from air to form calcium carbonate, which is a common material in nature. It is also known that calcium carbonate may release carbon dioxide during thermal decomposition.

11. Toxicological information

Calcium oxide is classified as irritating to skin and the respiratory tract and it presents 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.

Acute toxicity
Calcium oxide is not acutely toxic.
Oral: LD_{50} > 2 000 mg/kg bw (OECD 425, rat).
Dermal: LD_{50} > 2 500 mg/kg bw (calcium dihydroxide, OECD 402, rabbit).
These results are also applicable to calcium oxide by read-across, since in contact with moisture calcium hydroxide is formed.

Inhalation: no data available.

Classification for acute toxicity is not warranted.
For irritating effects to the respiratory tract see below.

Irritation / Corrosion
Calcium oxide presents a risk of serious damage to the eye (eye irritation studies (in vivo, rabbit). Calcium oxide is irritating to skin (in vivo, rabbit). From human data it is concluded that calcium oxide is irritating to the respiratory tract. Based on experimental results, calcium oxide requires classification as irritating to skin [Skin Irrit. 2 (H315 – Causes skin irritation)] and as severely irritating to the eye [Eye Dam. 1 (H318 - Causes serious eye damage)]. As summarised and evaluated in the SCOEL recommendation (Anonymous, 2008), based on human data calcium oxide is classified as irritating to the respiratory system [STOT SE 3 (H335 – May cause respiratory irritation)].

Respiratory / Skin sensitisation
No data available. Calcium oxide is considered not to be a skin sensitiser, based on the nature of the effect (pH shift) and the essential requirement of calcium for human nutrition. Classification for sensitisation is not warranted.

Germ cell mutagenicity
Bacterial reverse mutation assay (Ames test, OECD 471): Negative. In view of the omnipresence and essentiality of calcium and of the physiological non-relevance of any pH shift induced by calcium oxide in aqueous media, calcium oxide is obviously void of any genotoxic potential. Classification for genotoxicity is not warranted.

Carcinogenicity
Calcium (administered as calcium lactate) is not carcinogenic (experimental result: rat). The pH effect of calcium oxide does not give rise to a carcinogenic risk. Human epidemiological data support lack of any carcinogenic potential of calcium oxide. Classification for carcinogenicity is not warranted.

Reproductive toxicity
Calcium (administered as calcium 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 oxide. Both in animal studies and human clinical studies on various calcium salts, no reproductive or developmental effects were detected. Also, see the Scientific Committee on Food (Section 16.6). Thus, calcium oxide is not toxic for reproduction and/or development. Classification for reproductive toxicity according to regulation (EC) 1272/2008 is not required.

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 = 2 500 mg/d, corresponding to 36 mg/kg bw/d (70 kg person) for calcium. Toxicity of calcium oxide 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 calcium oxide via inhalation (local effect, irritation of mucous membranes) is addressed by an 8-h TWA exposure limit of 1 mg/m³ respirable dust (see Section 8.1) determined by the Scientific Committee on Occupational Exposure Limits (SCOEL). Therefore, classification of calcium oxide for toxicity upon prolonged exposure is not required.

12. Ecological information

12.1 Toxicity

12.1.1 Acute/Prolonged toxicity to fish
LC_{50} (96-h) for freshwater fish: 50.6 mg/l (calcium dihydroxide).
LC_{50} (96-h) for marine water fish: 457 mg/l (calcium dihydroxide).

12.1.2 Acute/Prolonged toxicity to aquatic invertebrates
EC_{50} (48-h) for freshwater invertebrates: 49.1 mg/l (calcium dihydroxide).
LC_{50} (96-h) for marine water invertebrates: 158 mg/l (calcium dihydroxide).

12.1.3 Acute/Prolonged toxicity to aquatic plants
EC_{50} (72-h) for freshwater algae: 184.57 mg/l (calcium dihydroxide). NOEC (72-h) for freshwater algae: 48 mg/l (calcium dihydroxide).

12.1.4 Toxicity to micro-organisms e.g. bacteria
At high concentration, through the rise of temperature and pH, calcium oxide is used for disinfection of sewage sludges.

12.1.5 Chronic toxicity to aquatic organisms
NOEC (14-d) for marine water invertebrates: 32 mg/l (calcium dihydroxide).

12.1.6 Toxicity to soil dwelling organisms
EC_{10}/LC_{10} or NOEC for soil macro organisms: 2 000 mg/kg soil dw (calcium dihydroxide).
EC_{10}/LC_{10} or NOEC for soil micro organisms: 12 000 mg/kg soil dw (calcium dihydroxide).

12.1.7 Toxicity to terrestrial plants
NOEC (21-d) for terrestrial plants: 1 080 mg/kg (calcium dihydroxide).

12.1.8 General effect
Acute pH-effect. Although this product is useful for correction of 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.

12.1.9 Further information
The results by read-across are also applicable to calcium oxide, calcium hydroxide is formed on contact with .moisture.

12.2 Persistence and Degradability
Not relevant for inorganic substances.

12.3 Bio accumulative potential
Not relevant for inorganic substances.

12.4 Mobility in soil
Calcium oxide reacts with water and/or carbon dioxide to form respectively calcium dihydroxide and/or calcium carbonate, which are sparingly soluble, and present a low mobility in most soils.

12.5 Results of PBT and vPvB assessment
Not relevant for inorganic substances.

12.6 Other adverse effects
No other adverse effects are identified.

13. Disposal considerations
Disposal of calcium oxide should be carried out in accordance with local and national legislation. Processing, use or contamination of this product may restrict waste management options. Dispose of containers and unused contents in accordance with applicable member state and local requirements. The used packaging is only meant for packaging this product: it should not be reused for other purposes. After use, empty the packaging completely.

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

14.1 UN-Number
UN 1910

14.2 UN proper shipping name
Calcium oxide

14.3 Transport hazard class(es)
Class 8
Calcium oxide is listed in IMDG (Amendment 34-08).

14.4 Packing group
Group III (Air transport (ICAO/IATA))

14.5 Environmental hazards
None

14.6 Special precautions for user
Avoid any release of dust during transportation, by using air-tight tanks for powders and covered trucks for pebbles.

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 to the substance

Authorisations:	Not required
Restrictions on use:	None
Other EU regulations:	Calcium oxide is not a SEVESO substance, not an ozone-depleting substance or a persistent organic pollutant.

15.2 Chemical Safety Assessment
A chemical safety assessment has been carried out for this substance and full details of this can be found in the formal chemical safety report (CSR) document held by each registrant. Details, which were seen to add value, have been included in the relevant sections of this SDS. Also see the Annex of this SDS for the relevant exposure scenarios written for this substance.

16. Other Information

Revision
This safety data sheet has been produced / revised in line with Annex II of the REACH Regulations (2010). Information in this safety data sheet was collected and used where necessary from the work done to produce a REACH Registration dossier and chemical safety report for ferrous sulphate.

This revision is the current version dated **December 2022** – Changes: *Updated UK REACH Registration number plus minor edits in section 1.3.*

Previous Versions:
November 2021 – Changes: Updated telephone numbers
June 2021 – Changes*:* Updated email address
May 2015 - Changes: deletion of references to Dangerous Substances Directive to comply with June 2015 requirements CLP
December – 2010
November – 1999 (as Corus)
July – 1995 (as Corus)

Abbreviations / Acronyms of significance

EC_{50}:	median effective concentration
LC_{50}:	median lethal concentration
LD_{50}:	median lethal dose
NOEC:	no observable effect concentration
OEL:	occupational exposure limit
PBT:	persistent, bio-accumulative, toxic chemical
PNEC:	predicted no-effect concentration
STEL:	short-term exposure limit
TWA:	time weighted average
vPvB:	very persistent, very bio-accumulative chemical

Hazard and Precautionary Statements according to CLP Regulations (EC)1272/2008):

H315:	Causes skin irritation
H318:	Causes serious eye damage
H335:	May cause respiratory irritation
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 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 in accordance with local/regional/national/international regulation (UK)

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 (SCOEL) for calcium oxide (CaO) and calcium dihydroxide (Ca(OH)2), European Commission, DG Employment, Social Affairs and Equal Opportunities, SCOEL/SUM/137 February 2008.
Health and Safety Executive, 2005: EH40 - Workplace Exposure Limits (amended 2007). Health and Safety Executive, UK.

The European Lime Association (EULA) and the member registrant in accordance with Annex 2 of Regulation 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010 have constructed this SDS. 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.

Disclaimer

The information, specifications, procedures, and recommendations herein are presented in good faith and are believed to be accurate and reliable at the date of issue. Where information is taken from supplied items it is the responsibility of the supplier to ensure the accuracy of the data. The individual authors of this safety sheet are deemed to be appropriately competent. This safety data sheet was constructed under the requirements of the REACH regulations ((EC) No 1907/2006) using the guidance provided as to the format and information necessary. Occupational exposure limits (OEL) used in this safety data sheet will be EU OELs and where these limits do not exist appropriate member state OELs will be the reference limit. No liability can be accepted with regard to the handling, processing or use of the product concerned which, in all cases, shall be in accordance with appropriate regulations and or legislation. Tata Steel Europe gives no warranty or representation as to the accuracy of the information or for the guidance being for, or suitable for, a specific purpose. All implied warranties and conditions are excluded, to the maximum extent permitted by law. Use of this document by any third

party is at your own risk. Save to the extent that liability cannot be excluded by law, Tata Steel Europe is in no way responsible or liable for any damage or loss whatsoever arising from the use of or reliance on the information and guidance contained in this document.