
SECTION 1: IDENTIFICATION OF THE MIXTURE AND OF THE COMPANY

1. Product identifier

Product name:	Calcium Acetylide
Chemical family:	Inorganic substance
Chemical formula:	CaC ₂
Synonyms:	Calcium Carbide; Acetylenogen; Calcium Dicarbide
Trade name :	Calcium Carbide
CAS number:	75-20-7
EINECS number:	200-848-3
Annex I index number:	006-004-00-9
REACH Registration number:	01-2119494719-18-0011

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

1.2.1 Relevant identified uses

- Use as intermediate in the production of acetylene and calcium cyanamide
- Use in metallurgy (blast furnace hot metal desulfuriser, foundry iron desulfuriser and steelmaking)

1.2.2 Uses advised against

- Fruit ripening
- Lamps (direct use)

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture according to Regulation (EC) No. 1272/2008 (CLP/GHS)

HEALTH EFFECTS

Water React. Flam. Gas 1: In contact with water releases flammable gases which may ignite spontaneously.

Eye Damage 1: Causes serious eye damage.

Skin Irrit. 2: Causes skin irritation.

STOT Single Exp. 3: May cause respiratory irritation.

2.2 Label elements

Labeling according to Regulation (EC) No. 1272/2008 (CLP/GHS)

SIGNAL WORD: DANGER

GHS07: exclamation mark

GHS05: corrosion

GHS02: flame



HAZARD STATEMENTS:

H260 – In contact with water releases flammable gases which may ignite spontaneously

H315 – Causes skin irritation

H318 – Causes serious eye damage

H335 – May cause respiratory irritation

PRECAUTIONARY STATEMENTS:

P231 + P232 – Protect from moisture, Handle under inert gas

P223 – Keep away from any possible contact with water, because of violent reaction and possible flash fire

P280 – Wear protective gloves/clothing/eye and face protection

P305+351+338 +P310 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTRE or doctor/physician.

P370 + P378 – In case of fire: Use sand or dry powder for extinction

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

P261 – Avoid breathing dust

P501 – Dispose of contents by returning to supplier or disposal in suitable Hazardous waste site. See 13.2 below

For more information on physicochemical, human health and environmental effects see sections 9 to 12 of this SDS.

This section contains only the information that is visible on the label of the product. ECHA suggests that, unless it cannot be avoided, a maximum of 6 precautionary (P) statements should be on the label. The full list of them can be found in Section 16 of the e-SDS.

2.3 Other hazards

The mixture does not meet the criteria for a PBT or vPvB.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

1. Main Ingredient

Ingredient	EC No	CAS No	Content	Classification (CLP)
Calcium Acetylide	200-848-3	75-20-7	65 – 90%	Water react. 1

2. Hazardous Impurities

Impurity	EC No	CAS No	Content	Classification (CLP)
Calcium Oxide	215-138-9	1305-78-8	9 – 25%	No harmonised classification. Skin Irrit.2 in REACH
Calcium Sulphide	243-873-5	20548-54-3	0.5 – 2.5%	Eye Irrit. 2, STOT-SE 3, Skin Irrit. 2, Aquatic Acute 1.
Calcium Cyanamide	205-861-8	156-62-7	0.1 – 2%	Acute Tox.4, STOT-SE 3, Eye Dam.1

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General advice: Consult a physician. Show this data sheet to the doctor in attendance. Move out of dangerous area.

Following inhalation: Remove person to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical attention. Pass on all available product information.

Following skin contact: Remove contaminated clothing immediately and wash affected skin with plenty of soap and water. In case of burns, immediately cool infected skin for as long as possible with cold water. Do not remove clothing adhering to skin. Get immediate medical attention. Pass on all available product information.

Following eye contact: Wash out with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek immediate medical attention.

Following ingestion: Never give anything by mouth to an unconscious person. Get immediate medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Calcium Carbide is not normally a serious health hazard provided that proper precautions are taken and personal hygiene is practiced. The following are the most common acute effects of exposure to the product:

Following inhalation: Irritation and inflammation of respiratory tract. Severe injury is possible in extreme cases. Acetylene may act as asphyxiant and cause headache, dizziness, drowsiness and mild gastric symptoms.

Following skin contact: Irritation, dry skin with tendency of cracking after repeated contact. Dermatitis has been observed occasionally. Possibly ulceration.

Following eye contact: Irritation on the eye and eyelid, conjunctivitis and possible corneal damage and permanent scarring.

Following ingestion: In extreme cases, ulceration of mouth, esophagus and stomach.

4.3 Indication of any immediate medical attention and special treatment needed

There is no specific antidote for Calcium Carbide. Apply first aid measures described in Section 4.1.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

5.1.1 Suitable extinguishing media

Extinguish with dry agent (class D). Be careful when using seemingly dry agents (e.g. sand) because they may contain small amounts of moisture.

5.1.2 Unsuitable extinguishing media

Do not use water, foam or carbon dioxide to extinguish.

5.2 Special hazards arising from the substance or mixture

In contact with water or moisture, Calcium Carbide produces acetylene gas which may ignite spontaneously, forming explosive mixture with air in the range of 2.5 – 82% v/v.

Decomposition may also occur after contact with acids or acid fumes.

Finer fractions of Calcium Carbide have a larger surface area and are more reactive.

Heat from reaction of Calcium Carbide with moisture may decompose hydrated organic substances.

Advice for fire-fighters

The risk and damage are possibly elevated in confined spaces. Switch off electrical equipment when possible and remove or stop possible ignition sources and sources of static electricity. Where possible and safe, prevent further contact of the material with water and moisture and allow the fire to burn itself out. Wear self-contained breathing apparatus for fire-fighting if necessary. Beware of ignition from residues covered with extinguishing agent that may still contain moisture.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation and any kind of contact with the material. When possible, do not move through spilled material. Remove all possible sources of ignition. Evacuate personnel to safe areas, upwind of the spillage. Ensure adequate ventilation.

6.2 Environmental precautions

Prevent further spillage. If substance has entered a water course or sewer, inform the responsible authority.

6.3 Methods and materials for containment and cleaning up

For containment: Contain spillages by any means available. Prevent contact with moisture by means of bunds or any other means.

For cleaning up: If safe, recover material for reuse or transfer to a safe location in dry containers. Do not use water or clean with compressed air.

6.4 Reference to other sections

Emergency responders should comply with the requirements for personal protection of Sections 5 and 8.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

Handle under inert gas. Protect from moisture. Keep away from any possible contact with water, because of violent reaction and possible flash fire. Keep away from any unwanted contact with acids or acid fumes.

Avoid dust generation. Provide appropriate exhaust ventilation where dust is formed.

Advice on general occupational hygiene

Remove all possible sources of ignition (e.g. smoking). Do not eat, drink or smoke in areas near the material. Remove contaminated clothing before entering eating areas.

7.2 Conditions for safe storage, including any incompatibilities

Store in a dry place. Store in a well-ventilated place. Store in sealed metal containers, away from danger of flooding or wind driven rain. Avoid storage together with acids, strong oxidising, flammable, combustible and toxic materials and explosives.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

The following *sources* of information on Occupational Exposure Limits from Member States were used:

<http://osha.europa.eu/en/topics/ds/oel/index.stm/members.stm>

http://www.dguv.de/ifa/en/gestis/limit_values/index.jsp

<http://esis.jrc.ec.europa.eu/>

<http://www.gezondheidsraad.nl/en/>

There are no established occupational limits for CaC₂. There are limits for some of the impurities and these are presented here.

Area	Country	Current OELs (mg / m ³) – 8 hours	
		Calcium Oxide	Calcium Cyanamide
Europe	UK	2	0.5
	France	2	0.5
	Germany	5	1 (inhalable)
	Spain	5	0.5
	Holland	2	0.5
	Italy	2	0.5

8.1.1 PNECs and DNELs

Source: Calcium Carbide CSR

DNEL (acute and long-term local effects): 10mg/m³ based on the IOEL for Calcium Hydroxide (degradation product)

PNEC values are not available for Calcium Carbide, because it is unlikely to have direct effects on the environment. PNEC values were derived for the impurities Calcium Sulfide and Calcium Cyanamide, that are of known ecotoxicological activity.

Environmental protection target	Calcium Sulfide (mg/L)	Calcium Cyanamide (mg/L)
Freshwater	2.2·10 ⁻⁷	2.5·10 ⁻⁶
Marine water	2.2·10 ⁻⁸	2.5·10 ⁻⁷
Water, Intermittent releases	3	2.5·10 ⁻⁵
Sediment	1.8·10 ⁻¹¹	2.2·10 ⁻¹⁰
Soil	3.8·10 ⁻¹¹ (mg/kg)	4.7·10 ⁻¹⁰ (mg/kg)
Sewage Treatment Plant	N/A (short half-life)	0.003
Oral (secondary poisoning)	N/A	N/A

8.2 Exposure controls

8.2.1 Occupational Exposure Controls

Keep work areas well ventilated and free from dust.

8.2.2 Personal Protective Equipment

Respiratory Protection: Use Personal Protection Equipment in the form of respiratory protection equipment.

Eye Protection: Under normal conditions use safety eye goggles. Under emergency conditions use mask with respiratory equipment.

Hand and Skin Protection: Use Risk Management Measures to prevent dermal exposure (gloves, protective clothing, skin protection creams).

Ingestion: Exposure via ingestion is not expected, if occupational hygiene rules are followed.

See section 2 of the individual exposure scenario in Annex I for a detailed description of the required exposure controls measures for workers.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

The table below contains the physicochemical properties of pure calcium carbide in absence of water.

Property	Value
Physical state at 20°C and 101.3 kPa	solid; form: crude irregular lumps, granules; odour: garlic like
Melting / freezing point	2300°C (measured. Test material is assumed to have highest purity)
Boiling point	not relevant (Melting point above 300°C)
Specific gravity	2.22 kg/l
Vapour pressure	0 mmHg at 25°C
Surface tension	not relevant (produces extremely flammable gas in contact with moisture)
Water solubility	not relevant (substance has a hydrolytic half-life less than 12 hours at pH 4, 7 & 9)
Partition coefficient n- octanol /water (log value)	not relevant (substance is inorganic)
Flash point	not relevant (inorganic)
Flammability	In contact with water or moisture it produces rapidly readily flammable gas
Explosive properties	In contact with water or moisture it produces rapidly readily flammable gas
Self-ignition temperature	In contact with water or moisture it produces rapidly readily flammable gas.
Oxidizing properties	not relevant (substance is incapable of reacting exothermically with combustible materials on the basis of its chemical structure)
Granulometry	Median value: between 0.2 and 0.5mm (sieve analysis) D10: 7.17µm (Laser diffraction of particles <100µm) D50: 48.11µm (Laser diffraction of particles <100µm)
Stability in organic solvents and identity of relevant degradation products	not relevant (substance has a hydrolytic half-life less than 12 hours)
Dissociation constant	not relevant (substance has a hydrolytic half-life less than 12 hours)
Viscosity	not relevant (solid)

9.2 Other information

Strong reducing agent when heated.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

If kept under recommended storage conditions, it is not subject to degradation at normal temperatures. Reactive on exposure to water, moisture and acids or acid fumes.

10.2 Chemical stability

If kept under recommended storage conditions, it is not subject to degradation at normal temperatures. Carbide decomposes under moisture/water to acetylene and lime. Acetylene is unstable at ambient temperatures. Acetylene is an extremely flammable gas.

10.3 Possibility of hazardous reactions

Carbide decomposes exothermally under moisture/water to acetylene and Ca(OH)_2 . Acetylene is known to ignite spontaneously.

10.4 Conditions to avoid

Moisture and presence of water. Avoid ignition sources (heat, flames, sparks, etc.).

10.5 Incompatible materials

Water, moisture, acids and acid fumes. Silver, copper and copper-rich alloys may form explosive metal acetylides.

10.6 Hazardous decomposition products

Acetylene is unstable at ambient temperatures. Acetylene is extremely flammable gas and may act as asphyxiant.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

The following table contains data on the toxicological properties of Calcium Carbide and its degradation products.

Toxicity endpoints	Description of effects
Toxicokinetics	Significant uptake of the substance is not anticipated via dermal route. After inhalation and oral intake, degradation will occur after contact with moisture and exposure to degradation products occurs. Significant absorption of inorganic calcium hydroxide will not occur. Acetylene is a gas at room temperature and as such, is likely to be excreted via the lungs.
Acute toxicity	LOCAL: The pH of 1% calcium carbide (w/w) in water was 12.48. The impurities and breakdown products do not lead to classification of calcium carbide for acute local toxicity. No impurities that are classified for acute toxicity are present at concentrations that would lead to classification of calcium carbide. SYSTEMIC: Classified as possible respiratory irritant (STOT-SE 3) based on human data for calcium di-hydroxide, as degradation product.
Irritation/corrosion	The pH of 1% calcium carbide (w/w) in water was 12.48. SKIN: Classified as skin irritant 2 based on experimental results for the read-across substance, calcium di-hydroxide, as degradation product. EYE: Classified as causing serious eye damage 1 based on experimental results for the read-across substance, calcium di-hydroxide, as degradation product. RESPIRATORY: Classified as possible respiratory irritant (STOT-SE 3) based on human data for calcium di-hydroxide, as degradation product.

Sensitization	SKIN: Not sensitising (Calcium Carbide, impurities and degradation products) RESPIRATORY: No data available (substance decomposes rapidly)
Repeated dose toxicity	Classification for repeated dose toxicity is not justified. None of the impurities and breakdown products of calcium carbide are classified for repeated dose toxicity, and there is no information to indicate that classification of any of the impurities and breakdown products is required.
Mutagenicity	Calcium carbide contains no impurities that are classified for genetic toxicity and the only impurity for which there is any evidence of genetic toxicity available in the public domain is present at concentrations below 0.1%. Classification for mutagenicity is not justified.
Carcinogenicity	Calcium carbide is not considered to be mutagenic and the only available information does not indicate a direct link between exposure to calcium carbide and incidence of cancer. Calcium carbide contains no impurities that are classified for carcinogenicity at concentrations over 0.1%. Classification for carcinogenicity is not justified.
Toxicity for reproduction	Calcium carbide contains no impurities that are classified for toxicity to reproduction, developmental toxicity or teratogenicity and there is no information available to suggest that classification is required. Due to the inorganic, irritant nature of calcium carbide, it is considered that there will be no uptake following exposure, therefore exposure of reproductive organs will not occur. Classification is not justified.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Calcium carbide is unlikely to have direct toxic effects on aquatic organisms. The only substances that are present in sufficient quantities to be of concern for aquatic toxicity are calcium sulfide and calcium cyanamide. Increase in pH may cause toxicity in both aquatic and terrestrial systems, but this will depend on the buffering capacity of the environment. Reaction of Calcium Carbide with water/moisture produces heat that can harm the organisms locally.

12.2 Persistence and degradability

Calcium carbide reacts rapidly with water producing acetylene, which is a flammable gas, and calcium hydroxide. Calcium hydroxide will be neutralised in the environment and calcium is inorganic and ubiquitous in nature, therefore biodegradation data are not needed for this breakdown product. Acetylene has a high tendency to volatilise, which can be calculated from the vapour pressure divided by water solubility, therefore degradation data are not needed.

12.3 Bio accumulative potential

Commercially produced calcium carbide is considered to have no potential for bioaccumulation.

12.4 Mobility in soil

In view of the chemical and physical properties of calcium carbide and its hydrolysis products, commercially produced calcium carbide has no potential for adsorption.

12.5 Results of PBT and vPvB assessment

Calcium carbide does not have constituents with the potential to bio accumulate, and, therefore, does not have PBT or vPvB properties.

12.6 Other adverse effects

No data available.

For an overview of PNECs check section 8.1.2 and for more information on how the environmental classification was derived contact your supplier.



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SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Dispose of contents/container at authorised disposal sites in accordance with national/international regulation.

Disposal should only be undertaken under supervision of a competent person.

Contact a licensed professional waste disposal service to dispose of the material.

Do not allow calcium carbide or slurry to enter sewers or closed drains.

If the material comes in contact with water or moisture it reacts exothermally to produce acetylene and calcium hydroxide. Ignition or explosion hazard is present. Beware of residue covering wet calcium carbide, for possibility of eruption.

Advice and assistance for dealing with spillage and disposal of calcium carbide is available via the Emergency Telephone Number in Section 1.4.

SECTION 14: TRANSPORT INFORMATION

Land Transport (ADR-RID)



UN No: 1402

Proper shipping name: CALCIUM CARBIDE

Class: 4.3

Classification Code: W2

IBC and Drum Packaging Packing group: I

Bulk Packing group: II

Hazard label: 4.3

Inland Waterway Transport (ADN)



UN No: 1402

Proper shipping name: CALCIUM CARBIDE

Class: 4.3

Classification Code: W2

Packing group: I

Transport allowed only in packages.

Hazard label: 4.3

Marine Transport (IMDG Code)



UN No: 1402

Proper shipping name: CALCIUM CARBIDE

Class: 4.3

Classification Code: W2

Packing group: I
Hazard label: 4.3
Emergency Schedule: F-G, S-N
Stowage Category: B

Air Transport (ICAO - IATA)



UN No: 1402
Proper shipping name: CALCIUM CARBIDE
Class: 4.3
Classification Code: W2
Packing group: I
Hazard label: 4.3

SECTION 15: REGULATORY INFORMATION

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

15.1.1 Worldwide Chemical Inventories

EINECS (EU): 200-848-3

RTECS No: EV 94 00000

HazChem Code: 4W

15.1.2 Other regulatory information

Directive 2003/105/EC (SEVESO II)

Requires Safety Report (article 9) when quantities in the establishment >500tn and Notification (article 6) and Major Accident Prevention Policy (article 7) when quantities in the establishment >100tn.

German Water Hazard Class (Wassergefährdungsklassen)

Registration No: 791, WGK 1.

15.2. Chemical safety assessment

A Chemical Safety Assessment has been created for this substance, in the scope of REACH Regulation. Relevant information can be found in the submitted dossier's Chemical Safety Report and on the online database of registered substances at the ECHA Website:

<http://apps.echa.europa.eu/registered/registered-sub.aspx>

SECTION 16: OTHER INFORMATION

16.1 Indication of changes

The previous version of the Safety Data Sheet for Ferronickel (12/04/2006, rev 1) has been completely revised, according to Regulations 1907/2006, 1272/2008 and 453/2010.

16.2 Abbreviations used: on request via your supplier

BAF	Bioaccumulation factor
CAS	Chemical Abstract Services- Registry Numbers
DMEL	Derived Minimum Effect Level
DNEL	Derived No Effect Level
EINECS	European Inventory of Existing Commercial Chemical Substances
OEL	Occupational Exposure Limit
PBT	Persistent, Bio accumulative, Toxic
PNEC	Predicted no effect concentration
STEL	Short Term Exposure Level
TWA	Time-weighted average exposure
vPvB	very Persistent very Bio accumulative

16.3 Key literature references and sources of data

1. European Agency for safety and health at work -
<http://osha.europa.eu/en/topics/ds/oel/index.stm/members.stm>
2. IFA, GESTIS database – International limit values for chemical agents -
http://www.dquv.de/ifa/en/gestis/limit_values/index.jsp

16.4 Full labelling information according to CLP IF IN POWDER FORM

SIGNAL WORD: DANGER

GHS07: exclamation mark

GHS05: corrosion

GHS02: flame



HAZARD STATEMENTS:

H260 – In contact with water releases flammable gases which may ignite spontaneously

H315 – Causes skin irritation

H318 – Causes serious eye damage

H335 – May cause respiratory irritation

PRECAUTIONARY STATEMENTS:

Prevention

P223 - Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231 + P232 – Handle under inert gas. Protect from moisture

P280 – Wear protective gloves/protective clothing/eye protection/face protection

P264 – Wash skin thoroughly after handling

P261 – Avoid breathing dust

P271 – Use only outdoors or in a well-ventilated area

Response

P370 + P378 – In case of fire, use sand or dry powder for extinction

P335 + P334 – Brush off loose particles from skin.



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P305 + P351 + P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310 – Immediately call a POISON CENTER or doctor/physician

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

P321 – Specific treatment (see ... on label)

P332 + P313 – If skin irritation occurs: Get medical advice/attention

P362 – Take off contaminated clothing and wash before reuse

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

P312 – Call a POISON CENTER or doctor/physician if you feel unwell

Storage

P402 + P404 – Store in a dry place. Store in a closed container

P403 + P233 – Store in a well-ventilated place. Keep container tightly closed.

P405 – Store locked up

Disposal

P501 – Dispose of contents/container to contents/container in accordance to local; regional; national and international regulations

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.

16.5 Training advice for personnel

Calcium Carbide is a hazardous and very reactive substance that can produce a readily flammable/explosive gas after contact with water or moisture. Personnel handling and working with the material should be adequately trained in the necessary safety procedures to avoid unwanted contact of calcium carbide with water and moisture. They must be fully informed about the necessary procedures and safety measures that are described in this SDS. These must be followed every time the material is handled.

ANNEX I – EXPOSURE SCENARIOS FOR IDENTIFIED USES OF CALCIUM CARBIDE

ES 3: Use as an intermediate in the production of acetylene and calcium cyanamide

EXPOSURE ASSESSMENT

Description of activities and processes covered in the exposure scenario

This scenario covers the use of calcium carbide in the production of acetylene, based on information provided by members of the calcium carbide consortium.

Calcium carbide is used as a process material or intermediate in the production of acetylene and calcium cyanamide. Releases can be estimated using the REACH or standard TGD defaults, once the tonnage in this use is known.

Essentially, calcium carbide is transformed to other products during industrial use. However, exposure of soil and water (via raw material, process and product handling) to the impurities in commercial CaC_2 would be expected during this use. Emissions to the environment of calcium carbide and impurities in raw materials handling are considered here. Emissions of the impurities in waste from the processes are considered to be addressed in the assessments of the production of acetylene and calcium cyanamide.

Operational conditions related to frequency, duration and amount of use

A document (EIGA 2008) calculating emissions of acetylene to air from an acetylene production plant provides information on the amounts used per day at a typical site, and the number of days worked. These are included in Table 1.1.

Table 1.1 - Duration, frequency and amount

Information type	Data field	Explanation
Used amount of substance per day	10.08 tonnes	From EIGA (2008)
Duration of exposure per day at workplace [for one worker]	1-4 hours	Information from industry
Frequency of exposure at workplace [for one worker]	Once	Information from industry
Annual amount used per site	2520 tonnes	From EIGA (2008)
Emission days per site	250	From EIGA (2008)

Operational conditions and risk management measures related to product1 characteristics

Table 1.2 shows the product characteristics. Industrial use of calcium carbide as an intermediate in the production of acetylene and calcium cyanamide takes place in a closed, controlled process with occasional controlled exposure. Transfer of calcium carbide to vessels or large containers takes place at dedicated facilities.

Table 1.2 - Characteristics of the substance or preparation

Information type	Data field	Explanation
Physical state	solid	
For solids: Categorisation of dust grades	Medium for acetylene production; high for	

¹ "Product" includes substances, preparations and articles



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Information type	Data field	Explanation
	calcium cyanamide production.	
Risk management measures related to the design of product	Calcium carbide granules are used for the acetylene production	

Table 1.3 - Operational conditions related to available dilution capacity and characteristics of exposed humans

Information type	Data field	Explanation
Respiration volume under conditions of use	10 m ³ /d	Default worker respiration rate for light activity
Room size and ventilation rate	m ³ ; exchange per hour	
Area of skin contact with the substance under conditions of use	480 cm ²	ECETOC TRA model default: PROC2 non-dispersive use, no direct handling, palms of both hands. PROC8b: wide-dispersive use, direct handling, palms of both hands.
Body weight	70 kg	Default for workers

Environmental surroundings characteristics

Standard environmental characteristics are appropriate for this scenario.

Other operational conditions of use

The REACH default environmental release estimates for industrial use of intermediates (ERC6A) are:

Release to air: 5 %

Release to wastewater: 2%

Releases to air

Releases to air during production are controlled by dust or particulate matter control devices such as fabric filter, with a dust emission limit of 50 mg/m³.

Release of calcium carbide dust to air during the production of acetylene occurs when calcium carbide is charged to the acetylene generation. However, this is only applicable to an open generator system and not a closed system (EIGA 2008). Calcium carbide dust emission to air (from a cyclone) at an open generator system acetylene production plant handling 2,520 t/year of calcium carbide has been estimated as 4 kg/yr (EIGA 2008), or 4/250 = 0.016 kg/d. This gives a release estimate of 0.00015% of calcium carbide dust to air.

Release to wastewater

Wastewater is generated from acetylene production process and will contain impurities from the calcium carbide used as well as by-products from the reaction. This is assumed to be dealt with in the CSR for acetylene production.

Release to soil

Releases to soil are assumed not to occur.

Risk management measures

Table 1.4 - Risk management measures for industrial site

Information type	Data field	Explanation
Containment and local exhaust ventilation		
Containment plus good work practice required		
Local exhaust ventilation required plus good work practise	No	
Personal protective equipment (PPE)		
Skin protection	Protective gloves and clothing are used	Information from production sites
Eye protection	Goggles are used	Information from production sites
Respiratory protection	Respirators are used	Information from production sites
Others	Skin protection creams	Information from production sites
Other risk management measures related to workers		
Risk management measures related to environmental emissions from industrial sites		
Onsite pre-treatment of wastewater	No measured data	
Resulting fraction of initially applied amount in wastewater released from site to the external sewage system	1.7×10^{-6} kg/kg	
Air emission abatement	Scrubbers, Fabric filters	Information from production sites
Resulting fraction of applied amount in waste gas released to environment	1.7×10^{-4} kg/kg	Value is fraction of tonnage produced, expressed as calcium carbide, in the form of dust.
Onsite waste treatment	No measured data.	
Fraction of initially applied amount sent to external waste treatment. This is the sum of direct losses from processes to waste, and the residues from onsite wastewater and waste gas treatment.	1.7×10^{-4} kg/kg	
Municipal or other type of external wastewater treatment	Yes	Generic environmental surrounding characteristics considered covers both on-site wastewater and municipal or external wastewater treatment
Effluent (of the wastewater treatment plant) discharge rate	10 000 m ³ /day discharged to wastewater treatment plant	Standard size wastewater treatment plant for highly industrial sites.



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Information type	Data field	Explanation
Recovery of sludge for agriculture or horticulture	Yes	The spreading of sludge is assumed in accordance with the default models, but is not believed to occur at every location.

Waste related measures

Wastes are recycled into the processes.

Exposure estimation

Workers exposure

Acute/Short term exposure

Workers at industrial sites are routinely involved with the same tasks; therefore it is more appropriate to consider long-term exposure.

Long-term exposure

Exposures as measured for the production scenario may also be relevant. Therefore personal protective equipment as described in Section 8 of the SDS will also be needed if the limits are exceeded locally.

Duration of exposure (in the areas with the greatest dust) per personnel at most sites is reported to be for 1-4 hours per shift

Oral exposure

Eating and drinking at the workplace is forbidden across sites. Hence, workers' exposure via ingestion of Calcium Carbide is not expected.

Dermal exposure

Risk management measures used to prevent dermal exposures at most sites include gloves, protective clothing and goggles. In appropriate use of PPE can result in skin irritation and burns.

Inhalation exposure

Exposure of workers via inhalation is prevented by air exhaustion and use of respirators.

Table 1.5 - Long-term exposure concentrations to workers

Routes of exposure	Estimated Exposure Concentrations		Measured exposure concentrations		Explanation / source of measured data
	Value	Unit	Value	Unit	
Dermal exposure ^a	0.14	mg/kg/day	-	-	ECETOC TRA model prediction for PROC 2 (acetylene and calcium cyanamide)
Inhalation exposure	0.05	mg/m ³	-	-	ECETOC TRA model prediction for PROC 2 (acetylene)
	0.1	mg/m ³	-	-	ECETOC TRA model prediction for PROC 2 (calcium cyanamide)

Notes: ^a Calculated assuming a default bodyweight of 70 kg for workers and a default respiratory volume of 10 m³, light activity, for an 8 hour work shift.



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Table 1.6 - Summary of long-term exposure concentration to workers

Routes of exposure	Concentrations	Justification
Dermal local exposure (in mg/cm ²)	0.02	ECETOC TRA model prediction for PROC 2 (acetylene and calcium cyanamide)
Dermal systemic exposure ^a (in mg/kg bw/d)	0.14	ECETOC TRA model prediction for PROC 2 (acetylene and calcium cyanamide)
Inhalation exposure ^a (in mg/m ³)/8h workday ²	0.007	ECETOC TRA model prediction for PROC 2 (acetylene)
Inhalation exposure ^a (in mg/m ³)/8h workday ³	0.14	ECETOC TRA model prediction for PROC 2 (calcium cyanamide)

Notes: ^a Calculated assuming a default bodyweight of 70 kg for workers and a default respiratory volume of 10 m³, light activity, for an 8 hour work shift.

Consumer exposure

None expected.

Indirect exposure of humans via the environment (oral)

Neither of the two impurities being considered accumulates in the food chain, so the assessment of secondary poisoning is not considered further.

Environmental exposure

Predicted Environmental Calculations (PECs) have been determined using EUSES 2.1.1. The EUSES program implements the environmental exposure models described in REACH Technical Guidance Chapter R16. Default model parameters have been used.

Local tonnage – 10.08 tonnes per day

Number of days – 250 days.

Environmental releases

Emissions to air as dust are 0.016 kg/day, as calcium carbide from a representative plant. As discussed in Section 7 of the Calcium Carbide CSR for the environment the assessment is considering the two impurities calcium cyanamide (as cyanamide) and calcium sulphide. The maximum content of calcium cyanamide in calcium cyanamide is 5% by weight (see Section 3), hence the emission is 0.8 g/day. For calcium sulphide, the maximum content is 1.3% by weight (see Section 3Error! Reference source not found.), hence the emission is 0.21 g/day.

No measured values for released amounts are available, so the calculated values are used in the exposure estimation. These are summarised in Error! Reference source not found..

² air concentration at the workplace

³ air concentration at the workplace

Table 1.7 - Summary of the releases to the environment

Compartments	Release from point source (kg/d) (local exposure estimation)	Justification
Aquatic (without STP)		Not addressed here, but in acetylene CSR.
Aquatic (after STP)		Not addressed here, but in acetylene CSR.
Air (direct + STP)	8E-04 cyanamide 2.1E-04 calcium sulfide	As dust, direct.
Soil (direct releases only)		Not addressed here, but in acetylene CSR.

Exposure concentrations in the environment

The only relevant emissions are to air, therefore only concentrations in air and in soil through deposition have been calculated. The results are summarised in Table 1.8.

Table 1.8 - Summary of exposure concentrations from acetylene production - cyanamide

LOCAL CONCENTRATIONS AND DEPOSITIONS	Value	Unit
AIR		
Concentration in air during emission episode	9.45E-08	[mg.m-3]
Annual average concentration in air, 100 m from point source	6.47E-08	[mg.m-3]
Total deposition flux during emission episode	1.71E-07	[mg.m-2.d-1]
Annual average total deposition flux	1.17E-07	[mg.m-2.d-1]
SOIL, GROUNDWATER		
Concentration in agric. soil averaged over 30 days	1.12E-08	[mg.kgwwt-1]
Concentration in agric. soil averaged over 180 days	1.12E-08	[mg.kgwwt-1]
Concentration in grassland averaged over 180 days	1.80E-08	[mg.kgwwt-1]
Fraction of steady-state (agricultural soil)	1	[-]
Fraction of steady-state (grassland soil)	1	[-]
LOCAL PECS [ACETYLENE PRODUCTION]		
AIR		
Annual average local PEC in air (total)	6.47E-08	[mg.m-3]
SOIL, GROUNDWATER		
Local PEC in agric. soil (total) averaged over 30 days	1.12E-08	[mg.kgwwt-1]
Local PEC in agric. soil (total) averaged over 180 days	1.12E-08	[mg.kgwwt-1]
Local PEC in grassland (total) averaged over 180 days	1.80E-08	[mg.kgwwt-1]
Local PEC in pore water of agricultural soil	6.00E-08	[mg.l-1]
Local PEC in pore water of grassland	9.63E-08	[mg.l-1]
Local PEC in groundwater under agricultural soil	6.00E-08	[mg.l-1]

The exposure concentrations from acetylene production for calcium sulphide are summarised in **Error! Reference source not found. 1.9**. The only relevant emissions are to air, therefore only concentrations in air and in soil through deposition have been calculated.

Table 1.9 - Summary of exposure concentrations from acetylene production – calcium sulphide

LOCAL CONCENTRATIONS AND DEPOSITIONS	Value	Unit
AIR		
Concentration in air during emission episode	4.73E-08	[mg.m-3]
Annual average concentration in air, 100 m from point source	3.24E-08	[mg.m-3]
Total deposition flux during emission episode	1.69E-06	[mg.m-2.d-1]
Annual average total deposition flux	1.16E-06	[mg.m-2.d-1]
SOIL, GROUNDWATER		
Concentration in agric. soil averaged over 30 days	4.86E-09	[mg.kgwwt-1]
Concentration in agric. soil averaged over 180 days	4.86E-09	[mg.kgwwt-1]
Concentration in grassland averaged over 180 days	9.62E-09	[mg.kgwwt-1]
Fraction of steady-state (agricultural soil)	1	[-]
Fraction of steady-state (grassland soil)	1	[-]
LOCAL PECS [ACETYLENE PRODUCTION]		
AIR		
Annual average local PEC in air (total)	3.24E-08	[mg.m-3]
SOIL, GROUNDWATER		
Local PEC in agric. soil (total) averaged over 30 days	4.86E-09	[mg.kgwwt-1]
Local PEC in agric. soil (total) averaged over 180 days	4.86E-09	[mg.kgwwt-1]
Local PEC in grassland (total) averaged over 180 days	9.62E-09	[mg.kgwwt-1]
Local PEC in pore water of agricultural soil	2.80E-08	[mg.l-1]
Local PEC in pore water of grassland	5.55E-08	[mg.l-1]
Local PEC in groundwater under agricultural soil	2.80E-08	[mg.l-1]

Exposure concentration relevant for the food chain (Secondary poisoning)

Neither of the two impurities being considered accumulates in the food chain, so the assessment of secondary poisoning is not considered further.

EXPOSURE CONSIDERATION

Human health

Workers

As discussed above, exposure via ingestion is unlikely to occur. Inhalation exposure to dust from commercially produced calcium carbide occurs at levels that do not exceed the WEL for calcium dihydroxide, so no additional use of PPE is required, and the level of exposure is acceptable. Dermal exposure also occurs. The lead health effects are skin irritation and severe eye irritation. Risk management measures used to prevent dermal exposures at most production sites include gloves, protective clothing, goggles and skin protection creams (used during crushing operations). Appropriate use of PPE is sufficient to prevent skin irritation and burns.

Consumers

There is no exposure of consumers from use as an intermediate.

Environment

The EUSES 2.1.1 software has been used to calculate Risk Characterisation Ratios (RCRs) for cyanamide, which are summarised in Table 1.10 below.

The only relevant emissions are to air, therefore only concentrations in air and in soil through deposition have been calculated.

Table 1.10 - Summary of risk characterisation ratios (RCRs) from acetylene production – cyanamide

COMPARTMENT	RCR
WATER	
RCR for the local fresh-water compartment	0
Intermittent release	No
RCR for the local marine compartment	0
SEDIMENT	
RCR for the local fresh-water sediment compartment	0
Extra factor 10 applied to PEC/PNEC	No
RCR for the local marine sediment compartment	0
Extra factor 10 applied to PEC/PNEC	No
SOIL	
RCR for the local soil compartment	2.40E-05
Extra factor 10 applied to PEC/PNEC	No
STP	
RCR for the sewage treatment plant	0

The RCRs for calcium sulphide calculated using EUSES 2.1.1 are given in Table 1.11 below. The only relevant emissions are to air, therefore only concentrations in air and in soil through deposition have been calculated.

Table 1.11 - Summary of risk characterisation ratios (RCRs) from acetylene production – calcium sulphide

COMPARTMENT	RCR
WATER	
RCR for the local fresh-water compartment	0
Intermittent release	No
RCR for the local marine compartment	0
SEDIMENT	
RCR for the local fresh-water sediment compartment	0
Extra factor 10 applied to PEC/PNEC	No
RCR for the local marine sediment compartment	0
Extra factor 10 applied to PEC/PNEC	No
SOIL	



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RCR for the local soil compartment	<<1.27E-04
Extra factor 10 applied to PEC/PNEC	No
STP	
RCR for the sewage treatment plant	

ES 4: Use of calcium carbide in metallurgy

The REACH default release estimates for industrial use of reactive processing aids (ERC6B) are:

Release to air: 0.1 %

Release to wastewater: 5%

These values are unrealistically high, and they may be ignored on the basis of a site visit to an iron foundry. This shows that at the worst there may be occasional losses of carbide from transfer lines, but there is no carbide/oxide dust in the area. The entire facility is free from use of water. Losses will therefore be even lower than those estimated for production of calcium carbide.

Exposures have been assessed as minimal, and less than those from production, based on site visits, and therefore do not need to be quantified.