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2.2 : Non-flammable, non-toxic gases

**Warning**



**Synonyms**

Protadur® E290  
 Secudur® C  
 R744  
 Corpadur® C

**SECTION 1. Identification of the substance/mixture and of the company/undertaking**

**1.1. Product identifier**

**Trade name** : Carbon dioxide  
**SDS no** : WAG-018A  
**Chemical description** : Carbon dioxide  
 CAS No :124-38-9  
 EC No :204-696-9  
 Index No :---  
**Registration-No.** : Listed in Annex IV / V REACH, exempted from registration.  
**Chemical formula** : CO<sub>2</sub>

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


**Relevant identified uses** : Purge gas, diluting gas, inerting gas.  
 Industrial and professional. Perform risk assessment prior to use.  
 Test gas/Calibration gas. Laboratory use. Purging.  
 Shield gas for welding processes.  
 Use for manufacture of electronic/photovoltaic components.  
 Contact supplier for more information on uses.

**1.3. Details of the supplier of the safety data sheet**

**Company identification** : Westfalen AG  
 Industrieweg 43  
 48155 MUENSTER Deutschland  
 Tel : 0049 2 51 6 95 0  
 Fax: 0049 2 51 6 95 1 94  
**E-Mail address (competent person)** : sdb@westfalen-ag.de

**1.4. Emergency telephone number**

**Emergency telephone number** : Tel. (+49) 5459/80625

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## SECTION 2. Hazards identification

### 2.1. Classification of the substance or mixture

#### Hazard Class and Category Code Regulation EC 1272/2008 (CLP)

- Physical hazards : Gases under pressure - Liquefied gas - Warning - (CLP : Press. Gas Liq.) - H280

### 2.2. Label elements

#### Labelling Regulation EC 1272/2008 (CLP)

- Hazard pictograms



- Hazard pictograms code : GHS04
- Signal word : Warning
- Hazard statements : H280 - Contains gas under pressure; may explode if heated.
- Precautionary statements
  - Storage : P403 - Store in a well-ventilated place.

### 2.3. Other hazards

- : Asphyxiant in high concentrations.  
Contact with liquid may cause cold burns/frostbite.

## SECTION 3. Composition/information on ingredients

### 3.1. Substance / 3.2. Mixture

Substance.

Substance name	Contents	CAS No EC No Index No Registration no	Classification(DSD)	Classification(CLP)
Carbon dioxide	: 100 %	124-38-9 204-696-9 ----- * 1		Press. Gas Liq. (H280)

Contains no other components or impurities which will influence the classification of the product.

\* 1: Listed in Annex IV / V REACH, exempted from registration.

\* 2: Registration deadline not expired.

\* 3: Registration not required: Substance manufactured or imported < 1t/y.

Full text of H-phrases see section 16.

Full text of H-statements see section 16.

## SECTION 4. First aid measures

### 4.1. Description of first aid measures

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
- Skin contact : In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.
- Eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion : Ingestion is not considered a potential route of exposure.

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

- : In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/ consciousness. Victim may not be aware of asphyxiation.  
Low concentrations of CO2 cause increased respiration and headache.


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#### SECTION 4. First aid measures (continued)

##### 4.3. Indication of any immediate medical attention and special treatment needed

: None.

#### SECTION 5. Firefighting measures

##### 5.1. Extinguishing media

- Suitable extinguishing media : Water spray or fog.
- Unsuitable extinguishing media : Do not use water jet to extinguish.

##### 5.2. Special hazards arising from the substance or mixture

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : None.

##### 5.3. Advice for fire fighters

- Specific methods : Move containers away from the fire area if this can be done without risk.  
Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.  
If possible, stop flow of product.  
Use water spray or fog to knock down fire fumes if possible.
- Special protective equipment for fire fighters : Use self-contained breathing apparatus.  
Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.  
Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.  
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

#### SECTION 6. Accidental release measures

##### 6.1. Personal precautions, protective equipment and emergency procedures

- : Try to stop release.  
Evacuate area.  
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.  
Ensure adequate air ventilation.  
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.  
Act in accordance with local emergency plan.  
Stay upwind.

##### 6.2. Environmental precautions


- : Try to stop release.

##### 6.3. Methods and material for containment and cleaning up

- : Ventilate area.

##### 6.4. Reference to other sections

- : See also sections 8 and 13.

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## SECTION 7. Handling and storage

### 7.1. Precautions for safe handling

#### Safe use of the product

- : Only experienced and properly instructed persons should handle gases under pressure. The substance must be handled in accordance with good industrial hygiene and safety procedures.
- Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
- Do not smoke while handling product.
- Ensure the complete gas system was (or is regularly) checked for leaks before use.
- Avoid suck back of water, acid and alkalis.
- Consider pressure relief device(s) in gas installations.
- Do not breathe gas.
- Avoid release of product into atmosphere.

#### Safe handling of the gas receptacle

- : Refer to supplier's container handling instructions.
- Do not allow backfeed into the container.
- Protect cylinders from physical damage; do not drag, roll, slide or drop.
- When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
- Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.
- If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.
- Never attempt to repair or modify container valves or safety relief devices.
- Damaged valves should be reported immediately to the supplier.
- Keep container valve outlets clean and free from contaminants particularly oil and water.
- Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
- Close container valve after each use and when empty, even if still connected to equipment.
- Never attempt to transfer gases from one cylinder/container to another.
- Never use direct flame or electrical heating devices to raise the pressure of a container.
- Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.

### 7.2. Conditions for safe storage, including any incompatibilities

- : Keep container below 50°C in a well ventilated place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition.
- Observe all regulations and local requirements regarding storage of containers.
- Containers should not be stored in conditions likely to encourage corrosion. Keep away from combustible materials.

### 7.3. Specific end use(s)

- : None.


## SECTION 8. Exposure controls/personal protection

### 8.1. Control parameters

#### Occupational Exposure Limits

#### Carbon dioxide

- : VME - 8h France [mg/m<sup>3</sup>] : 9000
- : VME - 8h France [ppm] : 5000
- : AGW (8h) - Germany [mg/m<sup>3</sup>] TRGS 900 : 9100 01/06
- : AGW (8h) - Germany [ppm] TRGS 900 : 5000 01/06
- : Exceeding factor AGW - Germany TRGS 900 : 2 01/06
- : MAC TWA 8H (NL) [mg/m<sup>3</sup>] : 9000
- : KZGW/VLE-CH [mg/m<sup>3</sup>] : 9000

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## SECTION 8. Exposure controls/personal protection (continued)

: MAK/VME-CH [ppm] : 5000  
 : TWA (BE) OEL 8h [ppm] : 5000  
 : TWA (BE) OEL 8h [mg/m<sup>3</sup>] : 9131  
 : STEL (BE) OEL 15min [ppm] : 30000  
 : STEL (BE) OEL 15min [mg/m<sup>3</sup>] : 54784

**DNEL: Derived no effect level (Workers)**

: No data available.

**PNEC: Predicted no effect concentration**

: No data available.

### **8.2. Exposure controls**

**8.2.1. Appropriate engineering controls**

: Oxygen detectors should be used when asphyxiating gases may be released. Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Ensure exposure is below occupational exposure limits (where available). Provide adequate general and local exhaust ventilation.

**8.2.2. Individual protection measures, e.g. personal protective equipment**

: A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered: PPE compliant to the recommended EN/ISO standards should be selected.

• **Eye/face protection**

: Wear safety glasses with side shields. Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections. Standard EN 166 - Personal eye-protection.

• **Skin protection**

- **Hand protection**

: Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risk.

- **Other**

: Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

• **Respiratory protection**

: Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

• **Thermal hazards**

: None necessary.

**8.2.3. Environmental exposure controls**

: None necessary.

## SECTION 9. Physical and chemical properties

### **9.1. Information on basic physical and chemical properties**

**Appearance**

**Physical state at 20°C / 101.3kPa**

: Gas.

**Colour**

: Colourless.

**Odour**

: No odour warning properties.

**Odour threshold**

: Odour threshold is subjective and inadequate to warn of overexposure.

**pH value**

: Not applicable.

**Molar mass [g/mol]**

: 44

**Melting point [°C]**

: -78.5 (-57@5,2 bar)

**Boiling point [°C]**

: -56.6 (s)


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## SECTION 9. Physical and chemical properties (continued)

Critical temperature [°C]	: 30
Flash point [°C]	: Not applicable for gases and gas mixtures.
Evaporation rate (ether=1)	: Not applicable for gases and gas mixtures.
Flammability range [vol% in air]	: Non flammable.
Vapour pressure [20°C]	: 57.3 bar
Relative density, gas (air=1)	: 1.52
Relative density, liquid (water=1)	: 0.82
Solubility in water [mg/l]	: 2000 Completely soluble.
Partition coefficient n-octanol/water [log Kow]	: 0.83
Auto-ignition temperature [°C]	: Not applicable.
Viscosity at 20°C [mPa.s]	: Not applicable.
Explosive Properties	: Not applicable.
Oxidising Properties	: None.

### 9.2. Other information

Other data	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.
------------	--

## SECTION 10. Stability and reactivity

### 10.1. Reactivity

: No reactivity hazard other than the effects described in sub-sections below.

### 10.2. Chemical stability

: Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

: None.

### 10.4. Conditions to avoid

: None under recommended storage and handling conditions (see section 7).

### 10.5. Incompatible materials

: None.  
For additional information on compatibility refer to ISO 11114.

### 10.6. Hazardous decomposition products

: None.

## SECTION 11. Toxicological information


### 11.1. Information on toxicological effects

Acute toxicity	: In high concentrations cause rapid circulatory insufficiency. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness. Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. 5% CO <sub>2</sub> has been found to act synergistically to increase the toxicity of certain other gases (CO, NO <sub>2</sub> ). CO <sub>2</sub> has been shown to enhance the production of carboxy- or met-hemoglobin by these gases possibly due to carbon dioxide's stimulatory effects on the respiratory and circulatory systems.
Skin corrosion/irritation	: No known effects from this product.
Serious eye damage/irritation	: No known effects from this product.

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#### SECTION 11. Toxicological information (continued)

<b>Respiratory or skin sensitisation</b>	: No known effects from this product.
<b>Carcinogenicity</b>	: No known effects from this product.
<b>Germ cell mutagenicity</b>	: No known effects from this product.
<b>Reproductive toxicity</b>	: No known effects from this product.
<b>STOT-single exposure</b>	: No known effects from this product.
<b>STOT-repeated exposure</b>	: No known effects from this product.
<b>Aspiration hazard</b>	: Not applicable for gases and gas mixtures.

#### SECTION 12. Ecological information

##### 12.1. Toxicity

Assessment : No ecological damage caused by this product.

##### 12.2. Persistence and degradability

Assessment : No ecological damage caused by this product.

##### 12.3. Bioaccumulative potential

Assessment : No ecological damage caused by this product.

##### 12.4. Mobility in soil

Assessment : No ecological damage caused by this product.

##### 12.5. Results of PBT and vPvB assessment

: Not classified as PBT or vPvB.

##### 12.6. Other adverse effects

:  
WGK0 - In general not hazardous for aquatic environment.

**Effect on the ozone layer** : None.

**Global warming potential [CO<sub>2</sub>=1]** : 1

**Effect on global warming** : Contains greenhouse gas(es) not covered by Regulation (EC) 842/2006.  
When discharged in large quantities may contribute to the greenhouse effect.

#### SECTION 13. Disposal considerations


##### 13.1. Waste treatment methods

: Do not discharge into any place where its accumulation could be dangerous.  
May be vented to atmosphere in a well ventilated place.  
Discharge to atmosphere in large quantities should be avoided.

**List of hazardous waste codes (from Commission Decision 2001/118/EC)** : 16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.

##### 13.2. Additional information

: None.

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## SECTION 14. Transport information

### 14.1. UN number

UN number : 1013  
 Labelling ADR, IMDG, IATA



: 2.2 : Non-flammable, non-toxic gases

### 14.2. UN proper shipping name

Transport by road/rail (ADR/RID) : CARBON DIOXIDE  
 Transport by air (ICAO-TI / IATA-DGR) : CARBON DIOXIDE  
 Transport by sea (IMDG) : CARBON DIOXIDE

### 14.3. Transport hazard class(es)

Transport by road/rail (ADR/RID)  
 Class : 2  
 Classification code : 2 A  
 H.I. nr : 20  
 Tunnel Restriction : C/E Tank carriage: Passage forbidden through tunnels of category C, D and E; Other carriage: Passage forbidden through tunnels of category E

Transport by air (ICAO-TI / IATA-DGR)  
 Class / Division (Subsidiary risk(s)) : 2.2

Transport by sea (IMDG)  
 Class / Division (Subsidiary risk(s)) : 2.2  
 Emergency Schedule (EmS) - Fire : F-C  
 Emergency Schedule (EmS) - Spillage : S-V

### 14.4. Packing group

Transport by road/rail (ADR/RID) : Not applicable.  
 Transport by air (ICAO-TI / IATA-DGR) : Not applicable.  
 Transport by sea (IMDG) : Not applicable.

### 14.5. Environmental hazards

Transport by road/rail (ADR/RID) : None.  
 Transport by air (ICAO-TI / IATA-DGR) : None.  
 Transport by sea (IMDG) : None.


### 14.6. Special precautions for user

Packing Instruction(s)  
 Transport by road/rail (ADR/RID) : P200  
 Transport by air (ICAO-TI / IATA-DGR)  
 Passenger and Cargo Aircraft : Allowed.  
 Packing instruction - Passenger and Cargo Aircraft : 200  
 Cargo Aircraft only : Allowed.  
 Packing instruction - Cargo Aircraft only : 200

Transport by sea (IMDG) : P200

Special precautions for user : Avoid transport on vehicles where the load space is not separated from the driver's compartment.  
 Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.  
 Before transporting product containers:



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#### SECTION 14. Transport information (continued)

- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.
- Ensure there is adequate ventilation.

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

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not applicable.

#### SECTION 15. Regulatory information

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

###### EU legislation

Restrictions on use : None.  
 Seveso directive 96/82/EC : Not covered.

###### National legislation

National legislation : Ensure all national/local regulations are observed.

##### 15.2. Chemical safety assessment

: A CSA does not need to be carried out for this product.  
 Water-endangerment class Germany : WGK0 - In general not hazardous for aquatic environment.

#### SECTION 16. Other information

**Indication of changes** : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010. According to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

**Training advice** : The hazard of asphyxiation is often overlooked and must be stressed during operator training.

**Further information** : This Safety Data Sheet has been established in accordance with the applicable European Union legislation.

**List of full text of H-statements in section 3.** : H280 - Contains gas under pressure; may explode if heated.

**DISCLAIMER OF LIABILITY** : Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

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