

## MATERIAL SAFETY DATA SHEET

Date of MSDS: 17.05.2005  
Last updated: 10.01.2011

# Chlorobenzene

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### SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1 Product identifier

Trade name: Chlorobenzene  
Chemical name: Chlorobenzene  
EC no. (EINECS): 203-628-5  
CAS no.: 108-90-7  
Index number: 602-033-00-1  
Registration number: 01-2119432722-45-0001

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

Chlorobenzene is used as a chemical intermediate and as a solvent. Detail information on identified uses are given in Exposure Scenarios attached to this MSDS.

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

**PCC Rokita SA**, ul. Sienkiewicza 4, 56-120 Brzeg Dolny  
**Chlorine Business Unit**  
Phone: (+4871) 794 22 57 or 794 29 29; Fax: (+4871) 794 21 35

Entity responsible for marketing the substance: PCC Rokita SA  
E-mail address of a person responsible for drafting this MSDS: [mariusz.dopierala@pcc.rokita.pl](mailto:mariusz.dopierala@pcc.rokita.pl)

#### 1.4. Emergency telephone number

Phone: (+48 71) 794 25 55, 794 24 41 (available 24h) or 794 26 90 (fax) to PCC Rokita SA or to the local Fire Fighting Services

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### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

##### Classification in accordance with EC/1272/2008

Flam. liq.3,	H226
Acute tox. 2,	H332
Skin irrit. 2,	H315
Aquatic Chronic 2	H411

##### Classification of the substance according to the Directive 67/548/EEC

Xn,	R 10
	R 20
N,	R 51
	R 53

Full description of R-phrases and H-phrases as above is provided under Section 16.

Detailed information on health effects and possible symptoms are provided under Section 11.

## 2.2. Label elements

### Hazard pictograms



Signal word      **WARNING**

### Risk Phrases

Flammable liquid and vapours

Irritating to skin

Harmful by inhalation

Toxic to aquatic organisms, causing long-term adverse effects

### Safety Phrases

Do not breathe dust/smoke/gas/vapours/spray

Avoid contact with eyes, skin or clothing

Avoid release to environment

Keep in a well-ventilated place

## 2.3. Other hazards

During combustion hydrogen chloride is formed.

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## SECTION 3: Composition / information on ingredients

### 3.1 Substances

**Substance name:** Chlorobenzene

**Content:** min. 99.9%

### Substance Identifiers

**Index number:** 602-033-00-1

**CAS number(s):** 108-90-7

**EC number:** 203-628-5

**Registration number** 01-2119432722-45-0001

### 3.2 Mixtures

Not applicable

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## SECTION 4: First aid measures

### 4.1. Description of first aid measures

#### First Aid

Make sure that the medical personnel knows the material it is dealing with and has all necessary protection measures available to it.

#### Inhalation

Remove exposed person to fresh air. If needed perform mouth-to-mouth resuscitation or use a resuscitation apparatus. Make sure airways are clear.

#### Skin contact

Remove contaminated clothing. Flush contaminated skin with plenty of water.

#### Eye contact

Flush eyes with plenty of water for at least 15 minutes, keeping eyelids open. Seek immediate attention of an ophthalmologist.

#### Ingestion

Do not give anything to drink and do not induce vomiting. If exposed person is unconscious put him/her in the recovery position. In every case seek immediate medical attention.

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

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

If exposed person is unconscious, clear airways and put him/her in the recovery position. Seek medical attention.

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## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

#### Suitable extinguishing media

Foam, carbon dioxide, dry chemical powder, water spray.

#### Unsuitable extinguishing media

Unknown.

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

Chlorobenzene is a flammable liquid whose vapours form with air explosive mixtures of low lower explosion limit. Fumes are heavier than air. Products of combustion are: hydrogen chloride, and under conditions of limited availability of oxide, carbon oxide and phosgene may be formed.

### 5.3. Advice for firefighters

Exposed firefighters must wear self-contained breathing apparatus and gas-tight protective clothing.

#### Additional information

Hydrogen chloride evolved during combustion of chlorobenzene should be absorbed in water spray.

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## SECTION 6: Accidental release measures

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

Do not breathe fumes. Ensure free supply of fresh air in closed rooms and use personal protection equipment. Avoid spilling.

### 6.2. Environmental precautions

Prevent entry into sources of drinking water, sewers and drains (risk of explosion), ground and surface water or soil.

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

Absorb spills with the use of solid absorber (e.g.: dry sand, diatomaceous earth). In the case of contamination of ground, collect contaminated soil to containers for treatment and/or disposal.

### 6.4. References to other sections

Risk control measures and product handling procedures are described under sections 7 and 8. Waste treatment methods under section 13.

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## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Avoid handling at higher temperature. Avoid contact with oxidizing substances. Protect against access by unauthorized persons. Follow work safety regulations in place.

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

Store in tightly closed containers in well-ventilated rooms, away from heat and sources of ignition, at max. temperature +30°C due to increased volatility at higher temperatures. Material of small packaging and containers – certified packaging, carbon steel is recommended. Protect against access by unauthorized persons.

### 7.3. Specific end use(s)

No information available.

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## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

TLV-TWA 23 mg/m<sup>3</sup>;  
TLV-STEL 70 mg/m<sup>3</sup>

Pursuant to the Regulation of the Minister of Labour and Social Policy of 29 November 2002 on maximum permissible concentrations and levels of factors harmful to health in the working environment (*Journal of Laws* (Dz. U.) No. 217, item 1833) as amended.

Dose descriptors per endpoint and endpoint-specific **DNELs** for workers

Endpoint	Route	Most relevant quantitative dose descriptor		Corrected dose descriptor		Overall AF applied	Endpoint-specific DNEL	
		Local	Systemic	Local	Systemic		Local	Systemic
Repeated dose toxicity Subchronic (no AF for duration extrapolation needed)	dermal	NA	NOAEL <sub>oral</sub> = 125 mg/kg bw/d	NA	NOAEL = 125 mg/kg bw/d	50 <sup>a</sup>	NA	2.5 mg/kg bw/d
Reproductive toxicity fertility impairment	inhalation	NA	NOAEC > 2106 mg/m <sup>3</sup>	NA	NOAEC > 1580 mg/m <sup>3</sup>	25 <sup>b</sup>	NA	63 mg/m <sup>3</sup>
Reproductive toxicity developmental tox	dermal	NA	NOAEC > 2761 mg/m <sup>3</sup>	NA	NOAEL > 787 mg/kg bw/d	30 <sup>c</sup>	NA	26 mg/kg bw/d
	inhalation	NA	NOAEC > 2761 mg/m <sup>3</sup>	NA	NOAEC > 2071 mg/m <sup>3</sup>	12.5 <sup>d</sup>	NA	166 mg/m <sup>3</sup>

## 8.2. Exposure controls

### Appropriate engineering controls

Ensure appropriate room ventilation

### Individual protection measures

Respiratory protection:

Required – gas half-mask with organic vapour filter or respiratory protective equipment if vapours are liberated.

Hand protection:

Required protective gloves resistant to chlorobenzene

Type of gloves – protective gloves in accordance with EN 374.

Protective glove material type – nitrile rubber on cotton liner, nitrile coated cotton or with equivalent resistance

Material durability – in accordance with glove manufacturer

Eye protection:

Required chemical splash safety goggles where eye contact can occur.

Skin protection:

Protective clothing, immediately change contaminated clothing.

Hygiene:

Wash hands and face after working with the substance, do not eat or drink in the workplace.

### Environmental exposure controls

Environmental exposure should be controlled in accordance with applicable local and Community legislature on environmental protection.

## SECTION 9: Physical and chemical properties

<b>Appearance:</b>	liquid
<b>Colour:</b>	colourless
<b>Odour:</b>	similar to benzene (almond-like)
<b>pH:</b>	neutral
<b>Temperature</b>	
<b>freezing point:</b>	- 46 C
<b>boiling point:</b>	132 C
<b>flash point:</b>	28 C
<b>self-ignition:</b>	590 C
<b>Flammability:</b>	flammable substance
<b>Explosive properties:</b>	lower limit – 1.3 % vol., upper limit – 11.0 % vol.
<b>Oxidizing properties:</b>	not applicable
<b>Vapour pressure:</b>	1.17 kPa at 20 C
<b>Relative density:</b>	1.107 g/cm <sup>3</sup> at 20 C
<b>Solubility</b>	
<b>in water:</b>	0.207g/L w 20 C
<b>in organic solvents:</b>	ethyl alcohol, benzene, ethyl ether, chloroform
<b>N-octanol/water partition coefficient</b>	log Pow 2.46 - 3.79
<b>Absolute viscosity:</b>	0.756 mPa s
<b>Vapour density:</b>	3.89 (Air)
<b>Evaporation rate:</b>	no data
<b>Decomposition temperature:</b>	no data

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## SECTION 10: Stability and reactivity

### 10.1 Reactivity

Under normal conditions the product is not reactive.

### 10.2 Chemical stability

Under normal conditions the product is stable.

### 10.3 Possibility of hazardous reactions

Under normal conditions the product is not reactive.

### 10.4 Conditions to avoid

Heating over 40 C

### 10.5 Incompatible materials

Do not use rubber as working material. Solvent for resins and oils.

### 10.6 Hazardous decomposition products

Product of thermal decomposition – hydrogen chloride, and in special cases (small amount of oxide) – phosgene and carbon oxide.

**Additional information** Flammable; volatile fumes. Gas may form explosive mixtures with air.

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## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

**Acute oral toxicity** LD<sub>50</sub> (rat): >2000 mg/kg,

<b>Toxicity by inhalation</b>	LC50 = 66 mg/L x (1.8h/4h) = 29.7 mg/L
<b>Skin corrosion/irritation</b>	Not available
<b>Skin contact</b>	May be absorbed through the skin. Irritating and degreasing effect.
<b>Eye contact</b>	Causes severe eye irritation and stinging.
<b>Ingestion</b>	Not available
<b>Respiratory or skin sensitisation</b>	Not available
<b>Mutagenicity</b>	Not determined
<b>Carcinogenicity</b>	Not determined
<b>Reproductive toxicity</b>	Not determined
<b>Aspiration hazard</b>	Harmful to respiratory tract
<b>Additional information</b>	Methods and results of performed toxicological tests are described in the Chemical Safety Report.

## SECTION 12: Ecological information

### 12.1. Toxicity

Toxic to aquatic organisms, may cause long-term changes in the environment. Adverse effect on growth of plants. Toxic to bacteria.

<b>Toxicity to fish</b>	Lepomis macrochirus, fresh water, LC50 (96 h) = 4.5 mg/L (static) LC50 (96 h) = 7.4 mg/L (flow-through)
	Danio rerio, Semi-static, 28 days NOEC = 4.8 mg/L
<b>Toxicity to daphnia and other invertebrates</b>	Daphnia magna, fresh water, EC50 (48 h) = 0.59 mg/L (static)
<b>Toxicity to algae</b>	Pseudokirchneriella subcapitata, static EC50 (96 h) = 12.5 mg/L NOEC (96 h) < 6.8 mg/L

### 12.2. Persistence and degradability

Not readily degradable

### 12.3. Bioaccumulative potential

Not bioaccumulative

### 12.4. Mobility in soil

The substance is heavier than water and may penetrate into ground waters.

### 12.5. Results of PBT and vPvB assessment

The substance is not classified as PBT and vPvB.

### 12.6. Other adverse effects

May cause increased demand for oxide.

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## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

#### Product disposal

##### Substance:

Do not flush to sewers. Prevent from entering into surface and underground water. Do not dump into any neutral waste dumping site. Recycling or disposal of waste product must be in compliance with all applicable regulations and be carried out in installations or devices which comply with the applicable requirements (licensed plants or manufacturer). In accordance with the Directive of the European Parliament and of the Council 2008/98/EC of 19 November 2008 on Wastes.

##### Packaging:

Empty packaging should be treated as a dangerous waste. Re-use is permitted after thorough decontamination or equivalent cleanup procedure. Recycling or disposal of such packaging must be in compliance with applicable regulations. In accordance with the Directive 94/62/EC of the European Parliament and of the Council of 20 December 1994 on Packaging and Packaging Wastes.

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## SECTION 14: Transport information

Transport classification ADR, other transport-related regulations have limited application.

### 14.1. UN Number

UN1134

### 14.2. UN proper shipping name

CHLOROBENZENE

### 14.3. Transport hazard class(es)

Class 3

### 14.4. Packing group

III

### 14.5. Environmental hazards

The product is hazardous to the environment

### 14.6. Special precautions for user

No specific regulations

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

Stowage and segregation:  
Category A.



Limited quantity:  
LQ7

Hazard identification number:  
30

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## SECTION 15: Regulatory information

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

The Material Safety Data Sheet in compliance with the Regulation (EC) no. 1907/2006 of the European Parliament and of the Council dated 18 December 2006 concerning the Registration, Authorization and Restriction of Chemicals (REACH).

The Material Safety Data Sheet in compliance with the Regulation of the European Parliament and of the Council (EC) 1272/2008 of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC and amending Regulation (EC) no. 1907/2006).

### 15.2. Chemical safety assessment

The substance was subject to the chemical safety assessment.

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## SECTION 16: Other information

### Classification in accordance with EC/1272/2008

Flam. liq. 3,	Flammable liquid, Cat.3
Acute tox. 4	Acute toxicity, Cat.4 by inhalation
Skin irrit. 2	Skin irritation, Cat.2
Aquatic Chronic 2	Aquatic chronic effect, Cat.2

### Hazard (H) Phrases

H226	Flammable liquid and vapour
H332,	Harmful if inhaled
H315,	Causes skin irritation
H411	Toxic to aquatic life with long lasting effects

### Classification of the substance according to the Directive 67/548/EEC

Xn	Harmful
N	Dangerous for the environment

### Risk (R) Phrases

R 10	Flammable
R 20	Harmful by inhalation
R 51	Toxic to aquatic organisms
R 53	May cause long-term adverse effects in the aquatic environment

**Required training** Contractors handling this substance should read this MSDS

**Recommended limits of application** The product is intended solely for the use of professionals

**Further information**                      Manufacturer

**Sources of key data**                      Latest knowledge and generally available research data

<b>Changes to the MSDS</b>	Updated on the basis of the Regulation of the European Parliament and of the Council (EC) no. 1272/2008 (CLP). Updated point 1.2. Updated point 8.1 – DNELS added. Exposure Scenarios attached at the end of the SDS
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**Additional information**                      Information presented in this MSDS refers to the technical product only and will not apply to any processed product.

**Version: 5**

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The information contained herein is accurate to our latest knowledge and describes the product from the point of view of health and environmental protection as well as safe handling. It must not, however, be interpreted as a guarantee of specific properties of the product.

## EXPOSURE ASSESSMENT

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

ES No.	Name of ES	Volume (t/a)	Identified uses				Life cycle stage		Sector of Use (SU)	Preparation Category (PC)	Process category (PROC)	Article category (AC)	Environmental Release Category (ERC)
			Manufacture	Formulation	Industrial Use	Consumer use	Service life (for articles)	Waste stage					
ES 1	Manufacture	XXX	X	--		--	--	SU 3,8	--	PROC 2,8b,9	--	ERC 1	
ES 2a	Industrial use as Intermediate (onsite)	XXX	--	--	X	--	--	SU 3,8,9	PC 19	PROC 1,2,3,4,8b,9	--	ERC 6a	
ES 2b	Industrial Use as Intermediate by DU (offsite)	3200	--	--	X	--	--	SU 3,8,9	PC 19	PROC 1,2,3,4,8b,9	--	ERC 6a	
ES 3a	Industrial Use as solvent by DU (onsite)	XXX	--	--	X	--	--	SU 3,8,9	PC 0 UCN: O15000, O15100	PROC 1,2,3,4,8b,9	--	ERC 4	
ES 3b	Industrial Use as solvent by DU (offsite)	1600	--	--	X	--	--	SU 3,8,9	PC 0 UCN: O15000, O15100	PROC 1,2,3,4,8b,9	--	ERC 4	
ES 4	Industrial and non-industrial use in chemical laboratories	<100	--	--	--	X	--	SU 3,22, 24	PC 21	PROC 15	--	(ERC 9a)	

- **ES 1: Manufacture of chlorobenzene**

- **Exposure scenario**

Description of process:

The fusion of benzene and chlorine to manufacture chlorobenzene takes place in closed systems. After the fusion process the chlorinated mixtures pass through various distilling steps. Non-converted educts are recycled back into the system. Manufacturing is automated and performed in closed systems or with local exhaust ventilation systems in place. In certain cases the transfer of bottled container can be located open-air. For quality control, sampling is performed.

Workers (on-site and non-dispersive) may be exposed to chlorobenzene via the dermal and respiratory route.

The processes involved in the manufacture of chlorobenzene can be categorized by the descriptor system as follows:

Sector of use: SU3 "Industrial Uses"  
SU8 "Manufacture of bulk, large scale chemicals (including petroleum products)"

Product category: Not applicable

Process category: PROC2 "Use in closed, continuous process with occasional controlled exposure (e.g. sampling)"  
PROC8b "Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities"  
PROC9 "Transfer of substance or preparation into small containers (dedicated filling line, including weighing)"

Article category: Not applicable

Environmental release category: ERC 1

### **Risk management measures**

- Risk management measures related to workers

Chlorobenzene is produced and processed in plants with a R45 substance (benzene) present and therefore, all the operations in which there is a potential for exposure are carried out with special care to minimise the risk to the workers.

Measures to prevent exposure comprise the use of adequate personal protection equipment (gloves, goggles and coverall), local exhaustive ventilation, wide use of automatic systems for sampling, information to workers on risk, etc. In addition, regular workplace measurements

are carried out to show that the DNELs derived are not exceeded. This ensures the safety of the worker in the production plant.

- Risk management measures related to environment

As Exposure Scenario 1 only reflects manufacturing stage within the life cycle of chlorobenzene, the following considerations were taken into account: All relevant production operations dealing with the active substance usually take place in closed systems. Environmental relevant activities are completely carried out indoor. Additionally risk reduction may be achieved by the attendance of local exhaust ventilation and adapted waste water treatment. Exposure of workers and/or environment during these processes is assumed to be rather low. Regarding environmental releases, dispersion of MCB is strongly restricted on industrial sites where processes are continuously monitored. Supposing a proper waste disposal according to national legislation and industrial STP capabilities, the production of the substance should not pose a risk for the environment.

## ○ ES 2: Industrial use of chlorobenzene as intermediate

Parameters influencing emissions on the use step always are multifaceted when considering different downstream use condition. Some companies performing an application of chlorobenzene that might have been similar to the production site. Regarding other chemical plants, different release factors must be taken into account. However, in the environmental risk assessment the proposed use as intermediate shall be covered by two different downstream users (DU). For ES 2a the chemical is used on the location where the substance has been manufactured (“onsite”). Since the chemical is used offsite by an „unknown DU“, ES 2b covers use operations that generally taking place within this phase. In both cases, it was assumed that the chemical is used as intermediate.

### ▪ Exposure scenario

Description of process:

Chlorobenzene is used as intermediate in continuous production processes. The reactants are supplied into the process via a pipeline bridge and are metered out into the reactor by means of an interim storage or a receiver tank.

The reaction is followed by several steps of purification, separation and desiccation. The end products are discharged to a tank farm. The whole operation is conducted in a closed and automated system with local exhaust ventilation systems in place.

Filling operations are carried out by using personal protective equipment. A closed connection between storage tank and tank container is established. Resulting offgas is transferred into an applicable offgas-treatment facility.

The processes involved in the application of chlorobenzene as intermediate can be categorized by the descriptor system as follows:

Sector of use:	SU3 "Industrial Uses" SU8 "Manufacture of bulk, large scale chemicals (including petroleum products)" SU9 "Manufacture of fine chemicals"
Product category:	PC19 "Intermediate"
Process category:	PROC1 "Use in closed process, no likelihood of exposure" PROC2 "Use in closed, continuous process with occasional controlled exposure (e.g. sampling)" PROC3 "Use in closed batch process (synthesis or formulation)" PROC4 "Use in batch and other process (synthesis) where opportunity for exposure arises" PROC8b "Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities"

PROC9 "Transfer of substance or preparation into small containers (dedicated filling line, including weighing)"

Article category: Not applicable

Environmental release category: ERC 6a

### **Risk management measures**

#### ○ Risk management measures related to workers

Measures to prevent exposure comprise the use of adequate personal protection equipment (gloves, goggles and coverall), local exhaustive ventilation, wide use of automatic systems for sampling, information to workers on risk, etc. Filling operations outdoor will be carried out by wearing additionally a full respiration mask with type ABEK filter.

#### ○ Risk management measures related to environment

Intermediates are applied for the synthesis of other substances. As proposed in the ERC-approach reactive intermediates are usually short-lived and are very seldom isolated. They do not remain in the product mixture. Emissions to waste water, waste air and/or waste are limited during the process.

For the use as intermediate, the environmental assessment was performed site-specifically by comparing two types of downstream users. Since ES 2a is only valid for industrial sites congruent to the production site (onsite use), whereas ES 2b (offsite use) reflects the „unknown user“.

Since production and industrial use were performed on the same location, similar abatement techniques were assumed. No RMM have been considered in case, that the chemical will be applied somewhere else

The database on release of chlorobenzene within ES 2a was strongly improved by available monitoring data. Representative measurements, cited in this risk assessment, were continuously carried out in the influent and effluent of a STP which is fed by a MCB processing plant.

○ **ES 3: Industrial use of chlorobenzene as solvent**

Following the approach of ES 2, this environmental risk assessment here also focuses two different downstream users (DU). For ES 3a the chemical is used on the location where the substance has had manufactured (“onsite”). In contrast, ES 3b appropriately represents the application conducted by an anonymous DU (“offsite”). However, both scenarios reflect the use of chlorobenzene as solvent.

▪ **Exposure scenario**

Description of process:

Chlorobenzene as a solvent is placed first into the reactor. Thereafter the reactants are pumped from IBCs into the process via fuelling ports. If necessary, the reaction is carried out by means of catalysers.

Subsequently chlorobenzene is repurified by distillation and restored to the process. The distillation bottoms are discharged outdoors into a sedimentation tank and delivered to the combustor. Discharged air is decontaminated by a recuperative thermal oxidizer (TAR).

The whole process including sampling is conducted in a closed and automated system with local exhaust ventilation systems in place.

Filling operations are carried out by using personal protective equipment. A closed connection between storage tank and tank container is established. Resulting offgas is transferred into an applicable offgas-treatment facility.

To prevent waste and to reduce the consumption of fresh raw material, chlorobenzene is recycled.

The processes involved in the industrial use of chlorobenzene as solvent can be categorized by the descriptor system as follows:

Sector of use: SU3 "Industrial Uses"  
SU8 "Manufacture of bulk, large scale chemicals (including petroleum products)"  
SU9 "Manufacture of fine chemicals"

Product category: PC 0 "Other products"  
UCN code: O15000, O15100 "Solvent"

Process category: PROC1 "Use in closed process, no likelihood of exposure"  
PROC2 "Use in closed, continuous process with occasional controlled exposure (e.g. sampling)"  
PROC3 "Use in closed batch process (synthesis or formulation)"  
PROC4 "Use in batch and other process (synthesis) where opportunity for exposure arises"



PROC8b "Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities"

PROC9 "Transfer of substance or preparation into small containers (dedicated filling line, including weighing)"

Article category: Not applicable

Environmental release category: ERC 4

### **Risk management measures**

- Risk management measures related to workers

Measures to prevent exposure comprise the use of adequate personal protection equipment (gloves, goggles and coverall), local exhaustive ventilation, wide use of automatic systems for sampling, information to workers on risk, etc. Filling operations outdoor will be carried out by wearing additionally a full respiration mask with type ABEK filter.

- Risk management measures related to environment

Solvents belong to processing aids. As proposed in the ERC-approach, the term „processing aid“ is described as a substance facilitating a process. The assessment for the relevant environmental compartments was arranged following a two-divided approach. For the calculations the “onsite approach” (ES 3a) and the downstream use, carried out somewhere else (“offsite”, ES 3b) have been compared. Since production and industrial use was performed on the same location, similar abatement techniques were assumed. For the case, the chemical will be applied by an unknown DU, no RMMs have been considered.

- **ES 4: Non-industrial use in chemical laboratories**

- **Exposure scenario**

Description of process:

Chlorobenzene is used in chemical laboratories mainly as a solvent. In general, chlorobenzene is handled in closed systems. In rare cases small amounts (< 1 L, <1 kg) might be directly handled.

The processes involved in the non-industrial use of chlorobenzene in chemical laboratories can be categorized by the descriptor system as follows:

Sector of use: SU22 "Professional Uses"  
SU 0-2 "Other activities related to manufacture and services"

Product category: PC 21 "Laboratory chemicals"

Process category: PROC15 "Use as a laboratory reagent; non-industrial setting"

Article category: Not applicable

Environmental release category: ERC 9a / not applicable

### **Risk management measures**

- Risk management measures related to workers

Measures to prevent exposure comprise the use of adequate personal protection equipment (gloves, goggles and coverall), local exhaustive ventilation, wide use of automatic systems for sampling, information to workers on risk, etc.

- Risk management measures related to environment

Exposure Scenario 4 focuses the use in chemical laboratories. All operations relevant for environmental emission were assumed to take place on the area of an "unknown" downstream user. Regarding the use of the active ingredient, exposure to environment occurs only rarely during these processes. All relevant operations regarding industrial use are assumed to take place in closed systems. Environmental relevant activities are completely carried out indoor. According to ERC9a possible releases to soil and water were classified as "not applicable". For the downstream use abatement techniques were assumed, resulting in emissions far below the calculated quantities given for ES3.