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# **TREATABILITY WORK PLAN**

**for**

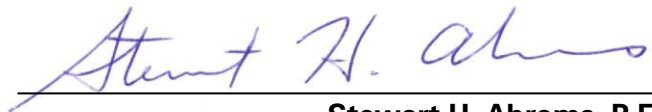
## **ABC BLOCK 25 & 26 LONG ISLAND CITY, NEW YORK NYSDEC BCP NO.: C241173 AND C241174**

***Prepared For:***

**Plaxall Realty Sub, LLC and Plastic Center Realty Sub, LLC  
5-46 46<sup>th</sup> Avenue  
Long Island City, NY 11101**

***Prepared By:***

**Langan Engineering, Environmental, Surveying  
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**Stewart H. Abrams, P.E.  
Principal/Vice President**

**August 30, 2017**

**Langan Project Nos. 170340202 and 170340203**

# **LANGAN**

## TABLE OF CONTENTS

TABLE OF CONTENTS.....	i
1.0 Introduction .....	1
2.0 Field Sample Collection .....	1
2.1 Groundwater Sampling .....	1
2.2 Soil Sampling .....	2
3.0 Laboratory Testing.....	2
3.1 Buffering Capacity Test .....	2
3.2 Microcosm Experiment .....	3
3.2.1 Experimental Setup.....	3
3.2.2 Impacts to Groundwater and Spiking with Contaminants.....	4
3.2.2 Analytical Program .....	5
4.0 Health and Safety Requirements .....	6
5.0 Data Analysis and Reporting.....	6

## FIGURES

Figure 1A	Block 25 Sampling Locations
Figure 1B	Block 26 Sampling Locations

## TABLES

Table 1	Microcosm Setup
Table 2	Analytical Program

## APPENDICES

Appendix A	Well Construction Details
Appendix B	Boring Logs
Appendix C	Safety Data Sheets

## **1.0 INTRODUCTION**

This treatability work plan was prepared by Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. (Langan) on behalf of Plaxall Realty Sub, LLC for the properties at 4-40 44<sup>th</sup> Drive and 5-25 46<sup>th</sup> Avenue in Long Island City, New York (ABC Block 25 and ABC Block 26, respectively). This work plan describes two microbially-mediated sulfate reduction treatability studies to support remedial alternative assessments for ABC Block 25 and ABC Block 26, which are two sites enrolled in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) (Site Nos. C241173 and C241174). This work plan for bench-scale testing was developed to evaluate the effectiveness of microbially-mediated sulfate reduction (hereafter referred to as "sulfate reduction") in addressing dissolved benzene, toluene, ethylbenzene and xylenes (BTEX) and other volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC) in soil and groundwater.

The treatability studies evaluate the efficacy of sulfate reduction on two different contaminant classes:

- 1) Residual/Weathered Petroleum Contamination (Block 25 and 26) - Both Block 25 and 26 have soil and groundwater impacts related to historical releases from bulk petroleum storage.
- 2) Mineral Spirits (Block 26) - The eastern portion of Block 26 is impacted with mineral spirits light non-aqueous phase liquid (LNAPL) related to the Paragon Paint and Varnish Corp BCP site, which is located up-gradient of and adjoins Block 26 to the east.

## **2.0 FIELD SAMPLE COLLECTION**

Soil and groundwater samples will be collected from areas known to be impacted by historical petroleum and mineral spirit releases. Samples will be used to evaluate bench scale treatability of the proposed microbially-mediated sulfate reduction remediation options. The following describes the sample collection methods.

### **2.1 Groundwater Sampling**

At least 5 liters of groundwater will be collected from monitoring wells MW-18D and MW-06D on Blocks 25 26, respectively (see Figures 1A and 1B for well location and Appendix A for well construction details). Groundwater field parameters (pH, oxidation-reduction potential [ORP], dissolved oxygen, specific conductivity and turbidity) will be collected during groundwater collection and groundwater will be pumped at a rate to minimize water table drawdown (less

than about 0.5 feet of drawdown). Groundwater will be collected in Labtainer™ bags with care to minimize head space.

## **2.2 Soil Sampling**

Site soil generally consists of the following units (in descending order): 1) a historic fill layer; 2) a meadow mat layer composed of gray to black clay and silt with fibrous organic matter and peat; and 3) glacial outwash deposits composed of fine- to medium-grained sand with lenses of clay and gravel. About 3 pounds of soil will be collected from beneath the meadow mat layer. No clay or peat will be collected in the soil samples. Samples will be collected as described below:

### *Block 25*

Soil will be collected from a boring that will be advanced near MW-18D (Figure 1A) from about 16 feet to 20 feet bgs. The LB-18 boring log is attached as a reference (Appendix B). The expected soil type is sand and/or silt.

### *Block 26*

Soil will be collected from a boring that will be advanced near MW-06D, from about 13 feet to 20 feet bgs. The LB-06D boring log is attached as a reference (Appendix B). The expected soil type is sand.

Soil will be logged and screened with a photo ionization detector (PID) for the presence of VOCs. Soil samples will be collected in glass or plastic containers with minimum head space. Gravel will be removed before packing the soil in the containers. Samples will be stored on ice after collection and will be refrigerated until commencement of the bench scale treatability studies.

## **3.0 LABORATORY TESTING**

Treatability testing will be performed at Langan's treatability facility at New Jersey Institute of Technology (Newark, NJ). Each bench-scale treatability study will have two components, a buffering capacity test and a microcosm test.

### **3.1 Buffering Capacity Test**

The soil and groundwater buffering capacity test will be performed to determine the buffer dosage required to maintain circum-neutral pH (7.0 standard units [S.U.]) in the microcosm test. A mixture of 25 grams (g) of soil and 50 milliliters (ml) of groundwater will be used to perform the buffering capacity test. Dilute sodium hydroxide or dilute hydrochloric acid will be added in small aliquots to the solution until the pH reaches 11 S.U. or 2 S.U., respectively. Additional buffer reagents may be tested depending upon the results of the initial tests. After each

addition of the alkali/acid, pH will be measured. The last pH measurement will be repeated after an hour to assess pH drift. Results of the buffering capacity test will be used to create a method for establishing circum-neutral pH conditions in the microcosms.

### **3.2 Microcosm Experiment**

#### **3.2.1 Experimental Setup**

Microcosm studies will be set up in serum bottles sealed with polytetrafluoroethylene (PTFE) coated septa and aluminum crimps. Each microcosm will be composed of site soil and groundwater in a ratio of approximately 1:3.

To test the effect of adding sulfate and the effect of adding bioaugmentation culture (enriched microbial culture) on the degradation of the target contaminants, four types of microcosms will be set up as treatments and controls as listed below and in Table 1.

- Live control;
- Killed control;
- Sulfate only treatment; and
- Sulfate + bioaugmentation culture treatment.

With the exception of the killed control, each treatment option and control microcosms will be set up as quadruplet microcosms (four bottles per treatment or control). The killed control will be set up as a triplicate microcosm. One of the four bottles (or three, in the case of the killed control) per treatment will be used to collect baseline (Day 0) data as described in Section 3.2.2.

The reagents for each control and treatment is detailed in Table 1 and summarized below:

- Buffer: Buffer will be chosen based on the results of the buffering capacity test. The buffer will be added in all treatment and control microcosms to maintain circum-neutral pH, which is suitable for microbial growth.
- Resazurin: A redox color indicator will be added to all control and treatment microcosms.
- Formaldehyde: A biocide will be added only to the killed control.
- Sodium sulfide: A reducing agent will be added only to the treatment microcosms to induce reducing conditions.
- Magnesium sulfate: A source of sulfate will be added only to the treatment microcosms.

- Diammonium phosphate: A source of nitrogen and phosphorous (nutrients) will be added only to the treatment microcosms.
- Yeast extract: An easily fermentable carbon source will be added only to the treatment microcosms to boost microbial growth.
- Bioaugmentation culture: Enriched microbial culture will be added only to one set of the treatment microcosms to speed up the degradation processes.
- Contaminants to be tested will be spiked in all treatment and control microcosms, as described in the following section.

### 3.2.2 Impacts to Groundwater and Spiking with Contaminants

Contaminants specific to each site may be spiked into the respective microcosm studies to ensure that contaminant loss can be tested under laboratory conditions. The VOCs in groundwater at the wells targeted for sampling are as follows:

#### *Block 25*

Groundwater for the treatability study will be collected from MW-18D, which is impacted with <30 micrograms per liter  $\mu\text{g/L}$  BTEX and 1,2,4- trimethylbenzene, as per September 2016 groundwater monitoring data.

#### *Block 26*

Groundwater for the treatability study will be collected from MW-06D. This well is impacted by the following contaminants as per September 2016 groundwater monitoring data:

- 1,2,4-trimethylbenzene, *m*- and *p*-xylene and naphthalene between 100 and 310  $\mu\text{g/L}$ ;
- 1,2,4,5-tetramethylbenzene, 1,3,5-trimethylbenzene, acetone, ethylbenzene, isopropylbenzene, n-propylbenzene, n-butylbenzene, sec-butyl benzene, *o*-xylene and phenol between 14 to 84  $\mu\text{g/L}$ ; and
- t-butylbenzene, benzene, 1,2,3-trichloropropane, 2,4-dimethylphenol and pentachlorophenol <10  $\mu\text{g/L}$

The decision to spike/not spike a select set of contaminants will be contingent upon the soil and aqueous concentrations (comparing Remedial Investigation (RI) sampling data and pre-setup sampling data [discussed below]), groundwater quality standards (relative to aqueous concentrations), physical properties and the potential to biodegrade.

### 3.2.2 Analytical Program

Analytical samples will be collected before setup of microcosms and on Day 0 (week 0). Microcosms will be incubated at room temperature over a period of at least 4 months. Subsequent samples will be collected on week 3, 7, 11 and 16 of the microcosm study, as listed in Table 2 and as described below. This projected schedule may be modified based on the evaluation of the results collected to date. Slower degradation rates may elongate the schedule of the treatability study, while faster degradation rates may expedite the schedule.

#### *Pre-Setup Samples*

Site soil and groundwater collected for the treatability study will be thoroughly mixed before baseline analytical sample collection. The decision to spike/not spike contaminants will be based on the analytical results from the pre-setup samples.

- A water sample will be collected for VOC analysis.
- A soil sample will be collected for VOC and SVOC analysis.

#### *Day 0 (Baseline) Samples*

Baseline samples will be collected from sacrificial controls and treatments as follows:

- Soil samples for VOC and SVOC analysis will be collected from composite soil from all sacrificial treatments and controls.
- Soil samples for gene analysis of total bacterial (EBAC) and sulfate reducers (SRBs) will be collected from the following microcosms:
  - i. Pooled live control and sulfate only treatment
  - ii. Sulfate + bioaugmentation treatment
- Aqueous phase samples for analysis of pH, ORP, nitrate, manganese, iron, sulfide, total organic carbon (TOC) and VOCs will be collected from the pooled aqueous phase of all sacrificial treatments and controls.
- Aqueous phase samples for analysis of sulfate will be collected from the following microcosms:
  - i. Pooled sulfate only and sulfate + bioaugmentation culture treatment
  - ii. Live control

### *Week 3, 7, and 11 Samples*

- Aqueous phase samples for the analysis of pH, ORP and VOCs will be collected from each treatment and control microcosm replicate.
- Composite aqueous phase samples (pooled from replicates) will be collected from treatments and controls for iron and sulfate analysis.

### *Week 16 Samples*

- Aqueous phase samples for analysis of pH, ORP, nitrate, manganese, iron, sulfate and VOCs will be collected from each treatment and control microcosm replicate.
- Composite aqueous phase samples (pooled from replicates) will be collected from treatments and controls for TOC and sulfide analysis.
- Composite soil samples (pooled from replicates) will be collected from each treatment and control microcosm for EBAC and SRB gene analysis and VOC and SVOC analysis.

Analysis of VOCs, SVOCs and TOC will be performed by Alpha Analytical of Westborough, MA (NYSDOH ELAP #11148). Analysis of bacterial genes will be performed by Microbial Insights Inc. of Knoxville, TN. A portable water quality meter will be used to measure pH and ORP. Analytical parameters, with the exception of VOCs, SVOCs and TOC, will be analyzed using Hach® kits and a handheld colorimeter at the treatability facility. The sampling plan described above may be modified based upon ongoing evaluation of data collected during previous sampling event(s).

## **4.0 HEALTH AND SAFETY REQUIREMENTS**

Field work will be performed consistent with site-specific health and safety plans contained in the NYSDEC-approved Remedial Investigation Work Plans for Blocks 25 and 26 (each dated August 5, 2016). Laboratory work will be performed using level D personal protective equipment (safety glasses, nitrile gloves, and lab coat). Laboratory work will be performed in a ventilated chemical hood. Safety data sheets for all chemicals that will be used during this study are provided in Appendix C.

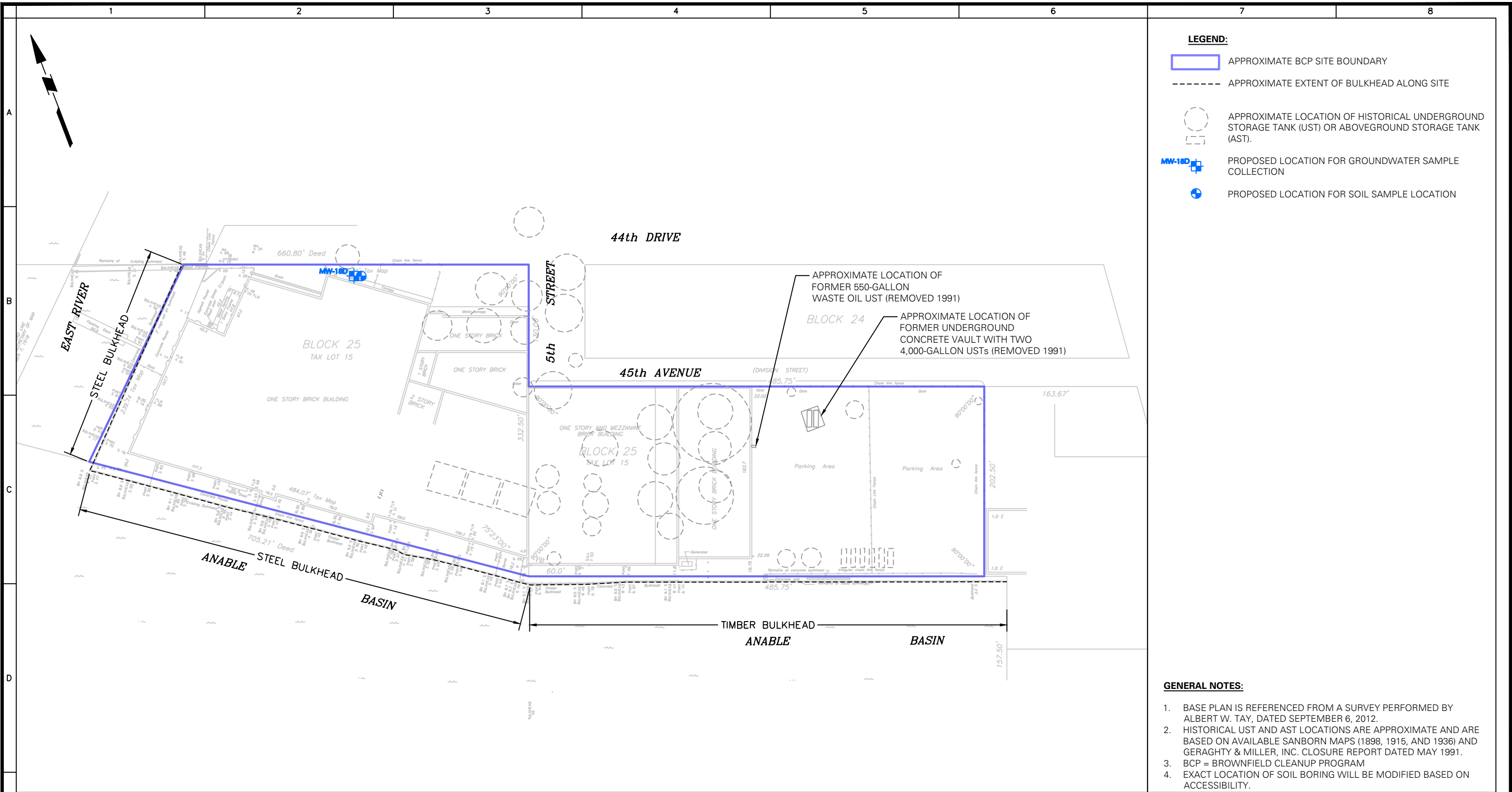
## **5.0 DATA ANALYSIS AND REPORTING**

Langan will prepare a report to document the methodology and results of the bench-scale treatability studies. The report will include tabulated laboratory data, summaries of field data, an

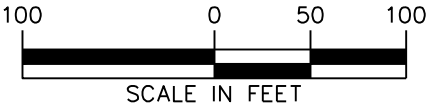


evaluation of the effectiveness of sulfate reduction to address site contamination, and recommendations for field implementation and pilot tests, if necessary.

## FIGURES



**WARNING:** IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.



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Langan International LLC  
Collectively known as Langan

Project

**ABC - BLOCK 25**

**BLOCK No. 25, LOT No. 15  
LONG ISLAND CITY**

**QUEENS**

**NEW YORK**

Figure Title

**TREATABILITY STUDY  
SAMPLE COLLECTION  
LOCATION MAP**

Project No.  
170340202

Date  
8/28/2017

Scale  
1"=100'

Drawn By  
MMK

Checked By  
JL

Submission Date

Figure No.

**1A**

Sheet 1 of 2



## TABLES

**Table 1**  
**Setup of Microcosms**  
**Treatability Study Work Plan for ABC Blocks 25 and 26**

**BCP Site Nos. C241173 and C241174**  
**Langan Project Nos.: 170340202 and 170340202**  
**August 2017**

Types of Microcosms	Number of Microcosms <sup>1</sup>	Buffer <sup>2</sup>	Resazurin	Formaldehyde	Sodium Sulfide	Magnesium Sulfate	Diammonium Phosphate	Yeast Extract	Bioaugmentation culture
			1 mg/L	10 g/L	50 mg/L	1500 mg/L	100 mg/L	200 mg/L	-
Live Control	4	x	x						
Killed Control	3	x	x	x					
Sulfate only	4	x	x		x	x	x	x	
Sulfate +Bioaugmentation Culture	4	x	x		x	x	x	x	x
Characteristics of Amendments	Replicate microcosms	Buffer	Redox indicator	Biocide	Reducing agent	Sulfate source	Nutrient to provide phosphorous and nitrogen.	Nutrient to provide easily fermentable carbon source, nitrogen and vitamins.	Bioaugmentation culture with abundant sulfate reducers to boost sulfate reduction

**Notes:**

- Assumes that microcosm study will be set up in glass serum bottles with polytetrafluoroethylene septa/stopper
- mg/L - milligrams per liter
- During the setup, soil and water will be added to all microcosms in a ratio of approximately 1:3.
- Commercially available bioaugmentation culture will be used
- Target concentrations of reagents are shown in the table.
- Iron concentration at MW-18D and MW-06D is 31.5 mg/L and 9.6 mg/L as per the September 2016 groundwater monitoring data.
- Manganese concentration at MW-18D and MW-06D is 1.7 mg/L and 0.9 mg/L as per the September 2016 groundwater monitoring data.

<sup>1</sup> - Buffer reagent concentration will be determined after the buffer capacity test

<sup>2</sup> - Four microcosms will be set up for live control, sulfate only treatment and sulfate + bioaugmentation culture treatment. One microcosms from each of these treatments and controls will be sacrificed for day 0 sampling..

**Table 2**  
**Analytical Program**  
**Treatability Study Work Plan for ABC Blocks 25 and 26**

BCP Site Nos. C241173 and C241174  
Langan Project Nos.: 170340202 and 170340202  
August 2017

Sample ID	Number of Replicates	Aqueous Phase											Soil Phase			
		Groundwater Sampling	pH	ORP	Nitrate	Manganese	Iron	Sulfate	Sulfide	TOC	SVOCs <sup>1</sup>	VOCs <sup>2</sup>	EBAC	Sulfate Reducers	VOCs	SVOCs
		Water quality meter	pH/ORP meter		Hach NitraVer® Reagent	Hach (Manganese Reagent)	Hach (FerroVer® Iron)	Hach (SulfaVer® 4)	Hach (HS-WR)/ SM 4500S2F	EPA 9060	EPA 8270	EPA 8260C	Census™		EPA 8260C	EPA 8270
<b>Pre-Setup</b>	1	x <sup>3</sup>										x <sup>4</sup>			x <sup>4</sup>	x <sup>4</sup>
<b>Day 0/Week 0</b>																
Live Control	3															
Killed Control	3															
Sulfate only	3															
Sulfate + Bioaugmentation Culture	3															
Sacrificial Controls and Treatments <sup>6</sup>	3		x	x	x	x	x	x	x	x		x	x	x	x	x
<b>Week 3, 7 and 11</b>																
Live Control	3		x	x			x <sup>5</sup>	x <sup>5</sup>				x				
Killed Control	3		x	x			x <sup>5</sup>	x <sup>5</sup>				x				
Sulfate only	3		x	x			x <sup>5</sup>	x <sup>5</sup>				x				
Sulfate + Bioaugmentation Culture	3		x	x			x <sup>5</sup>	x <sup>5</sup>				x				
<b>Week 16</b>																
Live Control	3		x	x	x	x	x	x	x <sup>5</sup>	x <sup>5</sup>		x	x <sup>5</sup>	x <sup>5</sup>	x <sup>5</sup>	x <sup>5</sup>
Killed Control	3		x	x	x	x	x	x	x <sup>5</sup>	x <sup>5</sup>		x	x <sup>5</sup>	x <sup>5</sup>	x <sup>5</sup>	x <sup>5</sup>
Sulfate only	3		x	x	x	x	x	x	x <sup>5</sup>	x <sup>5</sup>		x	x <sup>5</sup>	x <sup>5</sup>	x <sup>5</sup>	x <sup>5</sup>
Sulfate + Bioaugmentation Culture	3		x	x	x	x	x	x	x <sup>5</sup>	x <sup>5</sup>		x	x <sup>5</sup>	x <sup>5</sup>	x <sup>5</sup>	x <sup>5</sup>

**Notes:**

- One day turn around time will be used for samples collected before setup
- Total and dissolved manganese and iron will be measured
- TOC samples may be eliminated based data collected to date.
- TOC: Total organic carbon
- VOCs: Volatile organic compounds
- ORP: oxidation reduction potential
- SVOCs - semivolatile organic compounds
- EBAC - total bacteria

<sup>1</sup> - SVOC samples will collected only from Block 26 study

<sup>2</sup> - Naphthalene will be analyzed as a part of VOC analysis only for Block 26 study

<sup>3</sup> Water quality parameters will be collected during well sampling. The water quality parameters include pH, oxidation-reduction potential, dissolved oxygen, specific conductivity and turbidity.

<sup>4</sup> Samples will be analyzed using 1-day Turn-Around-Time

<sup>5</sup> - Composite samples will be collected from the replicates

<sup>6</sup> - Baseline samples will be collected from sacrificial controls and treatments as follows.

A: Aqueous phase samples for analysis of sulfate will be collected from

- i. Pooled sulfate only and sulfate + bioaugmentation culture treatment
- ii. Live control

B: Aqueous phase samples for analysis of pH, ORP, nitrate, manganese, iron, sulfide and total organic carbon (TOC) and VOCs will be collected from the pooled aqueous phase of all sacrificial treatments and controls.

C: Soil samples for gene analysis of total bacterial (EBAC) and sulfate reducers (SRBs) will be collected from

- i. Pooled live control and sulfate only treatment
- ii. Sulfate + bioaugmentation treatment

D: Soil sample for analysis of VOCs and SVOCs will be collected from composite soil from all sacrificial treatments and controls.

## **APPENDIX A**

### **WELL CONSTRUCTION DETAILS**



## WELL CONSTRUCTION SUMMARY

### ABC Block 25 (BCP Site C241173)

### MW-18D

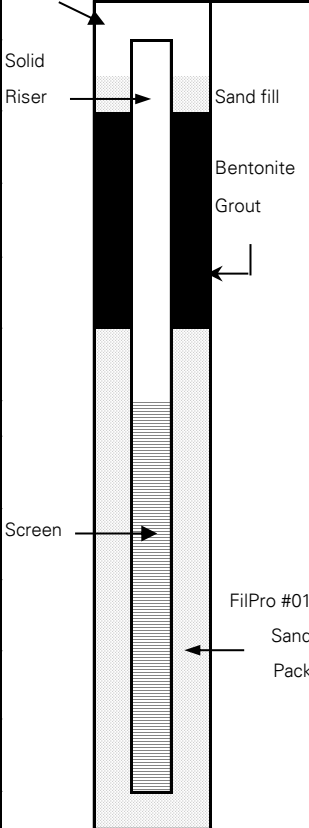
<b>PROJECT</b> Remedial Investigation	<b>PROJECT NO.</b> 170340202	
<b>LOCATION</b> Queens, New York	<b>ELEVATION AND DATUM</b> El. 7.15 feet NAVD88	
<b>DRILLING AGENCY</b> AARCO	<b>DATE STARTED</b> 9/14/2016	<b>DATE FINISHED</b> 9/14/2016
<b>DRILLING EQUIPMENT</b> Geoprobe 7822DT	<b>DRILLER</b> Greg Freese	
<b>SIZE AND TYPE OF BIT</b> 4-inch diameter hollow-stem auger	<b>INSPECTORS</b> Vinicius DePaula	

#### METHOD OF INSTALLATION

AARCO used a 10-inch diameter steel core barrel to remove the concrete slab cover. 4-1/4-inch diameter steel hollow-stem augers fitted with an expendable wooden plug were advanced to support a borehole opening for installation of the PVC well. The augers were advanced to about 23 feet below grade surface (bgs) and the well was installed in the open annulus and the wooden plug was pushed out of the bottom of the augers. The well was constructed of 7-feet of 0.01-slot screen set from 16 to 23 feet bgs and 3.68 feet of solid PVC riser set from 0.32 feet bgs to 4 feet bgs. FilPro #1 sand was used to backfill the annulus around the well between 15.5 to 23 feet bgs and the depth of the pack was measured during backfilling to ensure correct depth placement. Bentonite grout was backfilled between 4 to 15.5 feet bgs. The well was capped with a removable J-plug and finished within a bolt-down flush-mount manhole cover set in concrete.

#### METHOD OF WELL DEVELOPMENT

AARCO used a submersible whale pump fitted with tubing to surge and purge groundwater and sediment from the well. The well was developed until evacuated water was clear. Purge water was placed in a 55-gallon drum for disposal.

TYPE OF CASING Sch 40 PVC		DIAMETER 2-inch	TYPE OF BACKFILL MATERIAL FilPro #1 Sand				
TYPE OF SCREEN Sch 40 PVC		DIAMETER 2-inch	TYPE OF SEAL MATERIAL Cetco Powdered Bentonite Grout				
BOREHOLE DIAMETER 4-1/4 inch			TYPE OF FILTER MATERIAL FilPro #1 Sand				
TOP OF CASING	ELEVATION (ft) <sup>(3)</sup> 6.83	DEPTH (ft) 0.32	WELL DETAILS		SUMMARY SOIL CLASSIFICATION <sup>(1)</sup> , NOTES	DEPTH (FT) <sup>(2)</sup>	
TOP OF SEAL	ELEVATION (ft) <sup>(3)</sup> 3.15	DEPTH (ft) 4			Ground Surface	0.0	
TOP OF FILTER	ELEVATION (ft) <sup>(3)</sup> -8.35	DEPTH (ft) 15.5				0.32	
TOP OF SCREEN	ELEVATION (ft) <sup>(3)</sup> -8.85	DEPTH (ft) 16				4.0	
BOTTOM OF WELL	ELEVATION (ft) <sup>(3)</sup> -15.85	DEPTH (ft) 23				Approx. top of meadow mat	12.5
SCREEN LENGTH		LENGTH (ft) 7					
SLOT SIZE 0.02-inch							
GROUNDWATER ELEVATIONS							
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>				23.0	
					EOB		

## WELL CONSTRUCTION SUMMARY ABC Block 26 (BCP Site C241174) MW-6D

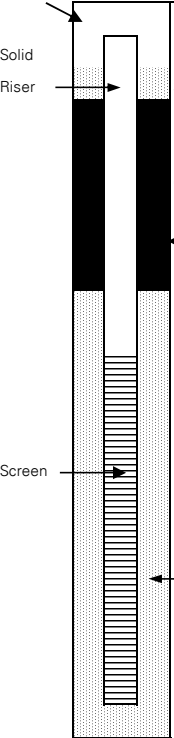
<b>PROJECT</b> Remedial Investigation	<b>PROJECT NO.</b> 170340203	
<b>LOCATION</b> Queens, New York	<b>ELEVATION AND DATUM</b> 9.00 ft NAVD88	
<b>DRILLING AGENCY</b> AARCO	<b>DATE STARTED</b> 8/8/2016	<b>DATE FINISHED</b> 8/9/2016
<b>DRILLING EQUIPMENT</b> Geoprobe 7822DT	<b>DRILLER</b> Adam Hutchinson	
<b>SIZE AND TYPE OF BIT</b> 4-inch diameter hollow-stem auger	<b>INSPECTORS</b> Luke McCartney	

### METHOD OF INSTALLATION

AARCO used a 6-inch diameter steel core barrel to remove the concrete slab cover. A 2-inch diameter steel macro-core sampler was used to recover soil samples, followed by advancement of 4-1/4-inch diameter steel hollow-stem augers fitted with an expendable wooden plug to support a borehole opening for installation of the PVC well. The augers were advanced to about 20 feet below grade surface (bgs) and the well was installed in the open annulus and the wooden plug was pushed out of the bottom of the augers. The well was constructed of 7-feet of 0.02-slot screen set from 13 to 20 feet bgs and 12.42 feet of solid PVC riser set from 0.58 feet bgs to 13 feet bgs. FilPro #2 sand was used to backfill the annulus around the well between 11.5 to 20 feet bgs and the depth of the pack was measured during backfilling to ensure correct depth placement. A bentonite grout slurry was backfilled between 2 to 11.5 feet bgs to seal the well annulus. Filpro #2 sand was backfilled between 1 to 2 feet bgs and the well was capped with a removable J-plug and finished within a bolt-down flush-mount manhole cover set in concrete.

### METHOD OF WELL DEVELOPMENT

AARCO used a submersible whale pump fitted with tubing to surge and purge groundwater and sediment from the well. The well was developed until evacuated water was clear. Purge water was placed in a 55-gallon drum for disposal.

TYPE OF CASING Sch 40 PVC		DIAMETER 2-inch	TYPE OF BACKFILL MATERIAL FilPro #2 Sand				
TYPE OF SCREEN Sch 40 PVC		DIAMETER 2-inch	TYPE OF SEAL MATERIAL Cetco Powdered Bentonite Grout				
BOREHOLE DIAMETER 4-1/4 inch			TYPE OF FILTER MATERIAL FilPro #2 Sand				
TOP OF CASING	ELEVATION (ft) <sup>(3)</sup> 8.42	DEPTH (ft) 0.58			SUMMARY SOIL CLASSIFICATION <sup>(1)</sup> , NOTES		DEPTH (FT) <sup>(2)</sup>
TOP OF SEAL	7.0	DEPTH (ft) 2			Ground Surface		0.0
TOP OF FILTER	-2.5	DEPTH (ft) 11.5					0.58
TOP OF SCREEN	-4.0	DEPTH (ft) 13					1.0
BOTTOM OF WELL	-11.0	DEPTH (ft) 20					2.0
SCREEN LENGTH		LENGTH (ft) 7					
SLOT SIZE 0.02-inch							
GROUNDWATER ELEVATIONS							
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
ELEVATION	DATE	DEPTH TO WATER (ft) <sup>(3)</sup>					
						EOB	

**LANGAN Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C.**

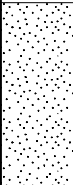

21 Penn Plaza, 360 West 31st Street, 8th Floor, New York, New York 10001

**APPENDIX B**  
**SOIL BORING LOGS**

Project ABC - Block 26				Project No. 170340203						
Location Long Island City, New York				Elevation and Datum 9.0 (NAVD88)						
Drilling Company AARCO				Date Started 8/8/16		Date Finished 8/8/16				
Drilling Equipment Geoprobe 6610DT				Completion Depth 20 ft		Rock Depth N/A				
Size and Type of Bit 2-inch Macrocore cutting shoe				Number of Samples 5		Undisturbed N/A				
Casing Diameter (in) N/A		Casing Depth (ft) N/A		Water Level (ft.) First 7		Completion N/A				
Casing Hammer N/A		Weight (lbs) N/A		Drop (in) N/A		Drilling Foreman Adam Hutchinson				
Sampler 2-inch diameter 4-feet steel Macrocore				Field Engineer Veronica Zuluaga/Luke McCartney						
Sampler Hammer N/A		Weight (lbs) N/A		Drop (in) N/A						
MATERIAL SYMBOL	Sample Description			Depth Scale	Sample Data				Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)	
					Number	Type	Recov. (in)	Penetr. resist BL/in		PID Reading (ppm)
	5" CONCRETE SLAB			0	R1	MACROCORE	33/48		0.0 0.0 0.0 0.0 0.0 0.0	MC-OPEN 0840 Collect C241174_LB06_0.5-1.5 C241174_SOMS01_080816 C241174_SOMSD01_080816
	Brown fine to medium SAND, some concrete, trace gravel and concrete (dry) [FILL]			1						
				2						
				3						
	Black, silty fine SAND, trace concrete (moist) [FILL]			4	R2	MACROCORE	18/48		568 391 146 1295	MC-OPEN Approximate water table at 7 ft 0900 Collect C241174_LB06_7-8 NAPL field test kit at 8 ft: Positive
				5						
				6						
				7						
	R3a (0-10"): Dark gray silty fine SAND, trace brick (moist) [FILL]			8	R3	MACROCORE	32/48		345 49 27.8 22.5	MC-CLOSED Petroleum-like odors NAPL field test kit at 10 ft: Not detected 0915 Organic decay-like odors
	R3b (10-19"): Brown to dark brown PEAT, fibrous (moist)			9						
	R3c (19-24"): Soft black, organic CLAY, organic fibers (moist)			10						
	R3d (24-32"): Gray clayey organic SILT, organic fibers (moist)			11						
	Brown to gray fine SAND (wet)			12	R4	MACROCORE	46/48		5.3 3.3 3.3 1.1	MC-CLOSED Organic decay-like odor
				13						
				14						
				15						
	R5a (0-31"): Gray fine SAND (wet)			16	R5	MACROCORE	41/48		2.9 1.3 1.8 1.6	NAPL field test kit at 15 ft: Not detected MC-CLOSED 1000 Collect C241174_LB06_17-18 Last 0.5ft washed out
				17						
				18						
				19						
	R5b (31-41"): Brown, silty fine SAND, some clay, trace subangular to angular pebbles [Till]			20					0.9 0.4 0.3	End of boring at 20' 2" monitoring well couplet set at LB-06 location, see monitoring well construction log for details
	End of boring at 20'									

Project				Project No.			
ABC - Block 25				170340202			
Location				Elevation and Datum			
Long Island City, New York				7.15 (NAVD 88)			
Drilling Company				Date Started		Date Finished	
AARCO				9/14/16		9/14/16	
Drilling Equipment				Completion Depth		Rock Depth	
Geoprobe 7822 DT				23 ft		N/A	
Size and Type of Bit				Number of Samples	Disturbed	Undisturbed	Core
2-inch Macrocore cutting shoe					4	N/A	N/A
Casing Diameter (in)			Casing Depth (ft)	Water Level (ft.)	First	Completion	24 HR.
N/A			N/A		8	N/A	N/A
Casing Hammer		Weight (lbs)		Drop (in)		Drilling Foreman	
N/A		N/A		N/A		Greg Freese	
Sampler				Field Engineer			
2in diameter 4ft steel Macrocore				Vinicius DePaula			
Sampler Hammer		Weight (lbs)		Drop (in)			
N/A		N/A		N/A			

MATERIAL SYMBOL	Sample Description	Depth Scale	Sample Data					Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Number	Type	Recov. (in)	Penetr. resist. BL/6in	PID Reading (ppm)	
	3" CONCRETE SLAB	0						
	Loose, dark brown, fine to medium SAND, some brick and gravel, trace concrete (dry) [FILL]	1					1.1	
		2	R1	Macrocore	6/48			MC-OPEN 1020 Collect C241173_LB18_1-2
		3						
		4						
	R2a (0-9") Hard, dark brown CLAY, trace concrete and sand (dry) [FILL]	5						
		6	R2	Macrocore	12/48			MC-OPEN Petroleum-like odors NAPL field test kit at 7-8 ft: Not Detected 1025 Collect C241173_LB18_7-8
		7					484.4	
	R2b (9-12") Loose, dark brown, fine to medium SAND, trace gravel (dry)	8					841.8	
		9						
		10	R3	Macrocore	20/48			MC-CLOSED Petroleum-like odor NAPL field test kit at 10-11 ft: Slightly Positive
		11					767.1	
	Dense, dark brown, silty SAND, trace rock fragments (wet)	12					625.8	
		13					210.4	
	R4a (0-30") Hard, dark brownish-gray CLAY, trace seashell fragments (moist)	14					29.2	
		15	R4	Macrocore	36/48			623.1
		16					44.6	Petroleum-like odors
	R4b (30-36") Brown, fine to medium silty SAND (moist)	17					33.2	
	R5a (0-12") Soft, dark brown, silty SAND (wet)	18					14.4	
		19					11.4	
	R5b (12-36") Hard, dark gray, sandy SILT, trace mica (wet)	20					8.5	
		21	R5	Macrocore	36/48			66.2
		22					154.6	NAPL field test kit at 16-17 ft: Slightly Positive
		23					181.8	
	Gray fine to medium SAND, trace mica (wet)	24					29.0	Petroleum-like odors
		25					19.6	NAPL field test kit at 18-19 ft: Not Detected
		26	R6	Macrocore	48/48			1.2
		27					0.6	Refusal at 19', offset for last run

Project ABC - Block 25			Project No. 170340202					
Location Long Island City, New York			Elevation and Datum 7.15 (NAVD 88)					
MATERIAL SYMBOL	Sample Description	Depth Scale	Sample Data					Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	
		20	R6	Macrocore	48/48		0.6	1300 Collect C241173_LB18_21-22
		21					0.5	
		22					0.6	
		23					0.5	
	End of boring at 23'	23						End of boring at 23' Borehole backfilled with clean sand and capped with concrete
		24						
		25						
		26						
		27						
		28						
		29						
		30						
		31						
		32						
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	45							

## **APPENDIX C**

### **SAFETY DATA SHEETS**

## SAFETY DATA SHEET

Version 4.10  
Revision Date 12/01/2015  
Print Date 05/16/2017

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**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : 1,2,4-Trimethylbenzene

Product Number : T73601

Brand : Aldrich

Index-No. : 601-043-00-3

CAS-No. : 95-63-6

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

**1.4 Emergency telephone number**

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

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**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 3), H226  
Acute toxicity, Inhalation (Category 4), H332  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 2), H401  
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word : Danger

Hazard statement(s)

H226 : Flammable liquid and vapour.  
H304 : May be fatal if swallowed and enters airways.  
H315 : Causes skin irritation.  
H319 : Causes serious eye irritation.  
H332 : Harmful if inhaled.  
H335 : May cause respiratory irritation.



H411	Toxic to aquatic life with long lasting effects.
Precautionary statement(s)	
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>9</sub> H <sub>12</sub>
Molecular weight	: 120.19 g/mol
CAS-No.	: 95-63-6
EC-No.	: 202-436-9
Index-No.	: 601-043-00-3

#### Hazardous components

Component	Classification	Concentration
<b>1,2,4-Trimethylbenzene</b>		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 2; H226, H304, H315, H319, H332, H335, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

---

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

Carbon oxides

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

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

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): Flammable liquids

## 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## 8.1 Control parameters

### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,2,4-Trimethylbenzene	95-63-6	TWA	25.000000 ppm 125.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	hemimellitene is a mixture of the 1,2,3-isomer with up to 10% of related aromatics such as the 1,2,4-isomer.		
		TWA	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Asthma		

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 30 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

a) Appearance	Form: liquid, clear Colour: colourless
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	-43.69 °C (-46.64 °F)
f) Initial boiling point and boiling range	168.0 - 169.0 °C (334.4 - 336.2 °F)
g) Flash point	48.0 °C (118.4 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 6.4 %(V) Lower explosion limit: 0.9 %(V)
k) Vapour pressure	2.3 hPa (1.7 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	0.88 g/cm <sup>3</sup>
n) Water solubility	0.057 g/l at 25 °C (77 °F) - slightly soluble
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	515.0 °C (959.0 °F)
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

**9.2 Other safety information**

No data available

---

**10. STABILITY AND REACTIVITY****10.1 Reactivity**

No data available

**10.2 Chemical stability**

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - male - 6,000 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

in vitro assay

S. typhimurium

Result: negative

Mutagenicity (micronucleus test)

Rat - male and female - Bone marrow

Result: negative

#### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

#### Reproductive toxicity

No data available

No data available

#### Specific target organ toxicity - single exposure

No data available

#### Specific target organ toxicity - repeated exposure

No data available

#### Aspiration hazard

No data available

#### Additional Information

RTECS: DC3325000

prolonged or repeated exposure can cause: , narcosis, Bronchitis, Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish                      flow-through test LC50 - Pimephales promelas (fathead minnow) - 7.72 mg/l - 96.0 h

Toxicity to daphnia and other aquatic invertebrates              static test EC50 - Daphnia magna (Water flea) - 3.6 mg/l - 48 h (OECD Test Guideline 202)

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Toxic to aquatic life with long lasting effects.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 3295              Class: 3                      Packing group: III

Proper shipping name: Hydrocarbons, liquid, n.o.s.

Reportable Quantity (RQ):

Poison Inhalation Hazard: No

### IMDG

UN number: 3295              Class: 3                      Packing group: III                      EMS-No: F-E, S-D

Proper shipping name: HYDROCARBONS, LIQUID, N.O.S.

### IATA

UN number: 3295              Class: 3                      Packing group: III

Proper shipping name: Hydrocarbons, liquid, n.o.s.

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,2,4-Trimethylbenzene	95-63-6	2007-07-01

#### **SARA 311/312 Hazards**

Fire Hazard, Acute Health Hazard

#### **Massachusetts Right To Know Components**

	CAS-No.	Revision Date
1,2,4-Trimethylbenzene	95-63-6	2007-07-01

#### **Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
1,2,4-Trimethylbenzene	95-63-6	2007-07-01

#### **New Jersey Right To Know Components**

	CAS-No.	Revision Date
1,2,4-Trimethylbenzene	95-63-6	2007-07-01

#### **California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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## **16. OTHER INFORMATION**

### **Full text of H-Statements referred to under sections 2 and 3.**

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H401	Toxic to aquatic life.

### **HMIS Rating**

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	0

### **NFPA Rating**

Health hazard:	2
Fire Hazard:	2
Reactivity Hazard:	0

### **Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 4.10

Revision Date: 12/01/2015

Print Date: 05/16/2017



## SAFETY DATA SHEET

Version 3.12  
Revision Date 05/27/2016  
Print Date 05/16/2017

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**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : 1,2,3-Trichloropropane

Product Number : 110124

Brand : Aldrich

Index-No. : 602-062-00-X

CAS-No. : 96-18-4

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

**1.4 Emergency telephone number**

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

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**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 4), H227

Acute toxicity, Oral (Category 3), H301

Acute toxicity, Inhalation (Category 3), H331

Acute toxicity, Dermal (Category 3), H311

Eye irritation (Category 2A), H319

Germ cell mutagenicity (Category 2), H341

Carcinogenicity (Category 1B), H350

Reproductive toxicity (Category 1B), H360

Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372

Specific target organ toxicity - repeated exposure, Oral (Category 2), H373

Specific target organ toxicity - repeated exposure, Dermal (Category 2), H373

Acute aquatic toxicity (Category 2), H401

Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word

Danger

Hazard statement(s)  
H227

Combustible liquid.

H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H319	Causes serious eye irritation.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H373	May cause damage to organs through prolonged or repeated exposure if swallowed.
H373	May cause damage to organs through prolonged or repeated exposure in contact with skin.
H411	Toxic to aquatic life with long lasting effects.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>3</sub> H <sub>5</sub> Cl <sub>3</sub>
Molecular weight	: 147.43 g/mol
CAS-No.	: 96-18-4
EC-No.	: 202-486-1
Index-No.	: 602-062-00-X

#### Hazardous components

Component	Classification	Concentration
<b>1,2,3-Trichloropropane</b> Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Flam. Liq. 4; Acute Tox. 3; Eye Irrit. 2A; Muta. 2; Carc. 1B;	<= 100 %

	Repr. 1B; STOT RE 1; STOT RE 2; Aquatic Acute 2; Aquatic Chronic 2; H227, H301 + H311 + H331, H319, H341, H350, H360, H372, H373, H373, H411	
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For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

## 6. ACCIDENTAL RELEASE MEASURES

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

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.  
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.  
For precautions see section 2.2.

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

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.  
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,2,3-Trichloropropane	96-18-4	TWA	10.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Eye irritation Liver damage Kidney damage Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	10.000000 ppm 60.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A Potential for dermal absorption		
		TWA	50.000000 ppm 300.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	0.005 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Cancer 2015 Adoption Suspected human carcinogen		
		PEL	10 ppm 60 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

### 8.2 Exposure controls

#### Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

#### Personal protective equipment

##### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Full contact**

Material: butyl-rubber

Minimum layer thickness: 0.3 mm

Break through time: 480 min

Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

**Splash contact**

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 38 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

- |   |   |
|---|---|
| a) Appearance                                   | Form: liquid, clear<br>Colour: colourless                           |
| b) Odour  | pungent   |
| c) Odour Threshold                              | No data available   |
| d) pH   | No data available   |
| e) Melting point/freezing point                 | -14.0 °C (6.8 °F) - lit.  |
| f) Initial boiling point and boiling range      | No data available   |
| g) Flash point                                  | 74 °C (165 °F) - closed cup   |
| h) Evaporation rate                             | No data available   |
| i) Flammability (solid, gas)                    | No data available   |
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 12.6 %(V)<br>Lower explosion limit: 3.2 %(V) |
| k) Vapour pressure                              | 6.65 hPa (4.99 mmHg) at 32.84 °C (91.11 °F)                         |
| l) Vapour density                               | No data available   |

m) Relative density	1.387 g/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	1.88 g/l at 20 °C (68 °F) - slightly soluble
o) Partition coefficient: n-octanol/water	log Pow: 2.63 at 25 °C (77 °F)
p) Auto-ignition temperature	304 °C (579 °F)
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents, Strong bases, Strong acids, Aluminum, Tin/tin oxides, Zinc, Magnesium

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - male and female - 152 mg/kg

LC50 Inhalation - Rat - male and female - 4 h - > 4,800 mg/m<sup>3</sup>

(OECD Test Guideline 403)

LD50 Dermal - Rabbit - 523 mg/kg

(OECD Test Guideline 402)

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation - 24 h

(OECD Test Guideline 404)

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Irritating to eyes.

(OECD Test Guideline 405)

#### Respiratory or skin sensitisation

Maximisation Test - Guinea pig

Result: Does not cause skin sensitisation.  
(OECD Test Guideline 406)

### **Germ cell mutagenicity**

In vitro tests showed mutagenic effects

Ames test

S. typhimurium

Result: positive

Mouse - male

Result: positive

### **Carcinogenicity**

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification. Possible human carcinogen

IARC: 2A - Group 2A: Probably carcinogenic to humans (1,2,3-Trichloropropane)

NTP: Reasonably anticipated to be a human carcinogen (1,2,3-Trichloropropane)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### **Reproductive toxicity**

Presumed human reproductive toxicant

#### **Specific target organ toxicity - single exposure**

No data available

#### **Specific target organ toxicity - repeated exposure**

No data available

#### **Aspiration hazard**

No data available

#### **Additional Information**

RTECS: TZ9275000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Pancreas. -

---

## **12. ECOLOGICAL INFORMATION**

### **12.1 Toxicity**

Toxicity to fish flow-through test LC50 - Pimephales promelas (fathead minnow) - 66.5 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates EC50 - Ceriodaphnia dubia (water flea) - 4.1 mg/l - 48 h

Toxicity to algae Growth inhibition EC50 - Pseudokirchneriella subcapitata (algae) - 101 mg/l - 72 h  
(OECD Test Guideline 201)

### **12.2 Persistence and degradability**

Biodegradability aerobic - Exposure time 28 d  
Result: 0 % - Not readily biodegradable.  
(OECD Test Guideline 301C)

### **12.3 Bioaccumulative potential**

Bioaccumulation Cyprinus carpio (Carp) - 42 d

Bioconcentration factor (BCF): 5.3 - 13  
(OECD Test Guideline 305)

#### 12.4 Mobility in soil

No data available

#### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

#### 12.6 Other adverse effects

Toxic to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

---

### 13. DISPOSAL CONSIDERATIONS

#### 13.1 Waste treatment methods

##### Product

This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

##### Contaminated packaging

Dispose of as unused product.

---

### 14. TRANSPORT INFORMATION

#### DOT (US)

UN number: 2810      Class: 6.1      Packing group: III  
Proper shipping name: Toxic, liquids, organic, n.o.s. (1,2,3-Trichloropropane)  
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

#### IMDG

UN number: 2810      Class: 6.1      Packing group: III      EMS-No: F-A, S-A  
Proper shipping name: TOXIC LIQUID, ORGANIC, N.O.S. (1,2,3-Trichloropropane)  
Marine pollutant: yes

#### IATA

UN number: 2810      Class: 6.1      Packing group: III  
Proper shipping name: Toxic liquid, organic, n.o.s. (1,2,3-Trichloropropane)

---

### 15. REGULATORY INFORMATION

#### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

#### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,2,3-Trichloropropane	96-18-4	2007-07-01

#### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,2,3-Trichloropropane	96-18-4	2007-07-01

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,2,3-Trichloropropane	96-18-4	2007-07-01

#### New Jersey Right To Know Components

	CAS-No.	Revision Date
1,2,3-Trichloropropane	96-18-4	2007-07-01



**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.  
1,2,3-Trichloropropane

CAS-No.  
96-18-4

Revision Date  
2007-09-28

---

**16. OTHER INFORMATION****Full text of H-Statements referred to under sections 2 and 3.**

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H227	Combustible liquid.
H301	Toxic if swallowed.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H311	Toxic in contact with skin.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.

**HMIS Rating**

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	0

**NFPA Rating**

Health hazard:	2
Fire Hazard:	2
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 3.12

Revision Date: 05/27/2016

Print Date: 05/16/2017

## SAFETY DATA SHEET

Version 4.5  
Revision Date 07/01/2014  
Print Date 05/16/2017

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : 1,2,4,5-Tetramethylbenzene

Product Number : T19607  
Brand : Aldrich

CAS-No. : 95-93-2

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

Identified uses : Laboratory chemicals, Manufacture of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

## 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable solids (Category 1), H228

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)  
H228 : Flammable solid.

Precautionary statement(s)  
P210 : Keep away from heat/sparks/open flames/hot surfaces. - No smoking.  
P240 : Ground/bond container and receiving equipment.  
P241 : Use explosion-proof electrical/ ventilating/ lighting/ equipment.  
P280 : Wear protective gloves/ protective clothing/ eye protection/ face protection.  
P370 + P378 : In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

---

3. COMPOSITION/INFORMATION ON INGREDIENTS

## 3.1 Substances

Aldrich - T19607

Synonyms : Durene  
1,2,4,5-Tetramethylbenzene

Formula : C<sub>10</sub>H<sub>14</sub>  
Molecular Weight : 134.22 g/mol  
CAS-No. : 95-93-2  
EC-No. : 202-465-7

No ingredients are hazardous according to OSHA criteria.  
No components need to be disclosed according to the applicable regulations.  
For the full text of the H-Statements mentioned in this Section, see Section 16.

---

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

no data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

Carbon oxides

### 5.3 Advice for firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

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

Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas.  
For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed

containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

#### **6.4 Reference to other sections**

For disposal see section 13.

---

### **7. HANDLING AND STORAGE**

#### **7.1 Precautions for safe handling**

Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

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

Keep container tightly closed in a dry and well-ventilated place.

#### **7.3 Specific end use(s)**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

### **8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

#### **8.1 Control parameters**

##### **Components with workplace control parameters**

Contains no substances with occupational exposure limit values.

#### **8.2 Exposure controls**

##### **Appropriate engineering controls**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

##### **Personal protective equipment**

###### **Eye/face protection**

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

###### **Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

###### **Body Protection**

Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

- |   |  |
|---|--|
| a) Appearance                                   | Form: crystalline<br>Colour: colourless                            |
| b) Odour  | no data available  |
| c) Odour Threshold                              | no data available  |
| d) pH   | no data available  |
| e) Melting point/freezing point                 | Melting point/range: 76 - 80 °C (169 - 176 °F) - lit.              |
| f) Initial boiling point and boiling range      | no data available  |
| g) Flash point                                  | 74 °C (165 °F) - closed cup  |
| h) Evaporation rate                             | no data available  |
| i) Flammability (solid, gas)                    | The substance or mixture is a flammable solid with the category 1. |
| j) Upper/lower flammability or explosive limits | no data available  |
| k) Vapour pressure                              | no data available  |
| l) Vapour density                               | no data available  |
| m) Relative density                             | 0.838 g/mL at 25 °C (77 °F)  |
| n) Water solubility                             | 0.00348 g/l at 25 °C (77 °F)                                       |
| o) Partition coefficient: n-octanol/water       | log Pow: 4.17  |
| p) Auto-ignition temperature                    | no data available  |
| q) Decomposition temperature                    | no data available  |
| r) Viscosity                                    | no data available  |
| s) Explosive properties                         | no data available  |
| t) Oxidizing properties                         | no data available  |

**9.2 Other safety information**

no data available

---

**10. STABILITY AND REACTIVITY****10.1 Reactivity**

no data available

**10.2 Chemical stability**

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

no data available

### 10.4 Conditions to avoid

Heat, flames and sparks. Extremes of temperature and direct sunlight.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Other decomposition products - no data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - rat - 6,989 mg/kg

Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Lungs, Thorax, or Respiration:Dyspnea. Blood: Hemorrhage.

Inhalation: no data available

Dermal: no data available

#### Skin corrosion/irritation

no data available

#### Serious eye damage/eye irritation

no data available

#### Respiratory or skin sensitisation

no data available

#### Germ cell mutagenicity

no data available

#### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

#### Reproductive toxicity

no data available

no data available

#### Specific target organ toxicity - single exposure

no data available

#### Specific target organ toxicity - repeated exposure

no data available

#### Aspiration hazard

no data available

#### Additional Information

RTECS: DC0500000

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

### 12.2 Persistence and degradability

Biodegradability Result: - Not biodegradable.

### 12.3 Bioaccumulative potential

no data available

### 12.4 Mobility in soil

no data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

no data available

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1325 Class: 4.1 Packing group: II  
Proper shipping name: Flammable solids, organic, n.o.s. (1,2,4,5-Tetramethylbenzene)  
Reportable Quantity (RQ):  
Marine pollutant: No  
Poison Inhalation Hazard: No

### IMDG

UN number: 1325 Class: 4.1 Packing group: II EMS-No: F-A, S-G  
Proper shipping name: FLAMMABLE SOLID, ORGANIC, N.O.S. (1,2,4,5-Tetramethylbenzene)  
Marine pollutant: No

### IATA

UN number: 1325 Class: 4.1 Packing group: II  
Proper shipping name: Flammable solid, organic, n.o.s. (1,2,4,5-Tetramethylbenzene)

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

### SARA 311/312 Hazards

Fire Hazard

### Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

### Pennsylvania Right To Know Components

CAS-No.

Revision Date

1,2,4,5-Tetramethylbenzene

95-93-2

### New Jersey Right To Know Components

1,2,4,5-Tetramethylbenzene

CAS-No.  
95-93-2

Revision Date

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

H228 Flammable solid.

### HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	3

### NFPA Rating

Health hazard:	0
Fire Hazard:	3
Reactivity Hazard:	3

### Further information

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### Preparation Information

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 4.5

Revision Date: 07/01/2014

Print Date: 05/16/2017



## SAFETY DATA SHEET

Version 5.9  
Revision Date 08/10/2016  
Print Date 05/16/2017

---

**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Benzene

Product Number : 401765  
Brand : Sigma-Aldrich  
Index-No. : 601-020-00-8

CAS-No. : 71-43-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

**1.4 Emergency telephone number**

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

---

**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 2), H225  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Germ cell mutagenicity (Category 1B), H340  
Carcinogenicity (Category 1A), H350  
Specific target organ toxicity - repeated exposure (Category 1), H372  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 3), H402  
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word : Danger

Hazard statement(s)

H225 : Highly flammable liquid and vapour.  
H304 : May be fatal if swallowed and enters airways.  
H315 : Causes skin irritation.  
H319 : Causes serious eye irritation.  
H340 : May cause genetic defects.

H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure.
H412	Harmful to aquatic life with long lasting effects.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>6</sub> H <sub>6</sub>
Molecular weight	: 78.11 g/mol
CAS-No.	: 71-43-2
EC-No.	: 200-753-7
Index-No.	: 601-020-00-8
Registration number	: 01-2119447106-44-XXXX

#### Hazardous components

Component	Classification	Concentration
<b>Benzene</b>		
	Flam. Liq. 2; Skin Irrit. 2; Eye Irrit. 2A; Muta. 1B; Carc. 1A; STOT RE 1; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H225, H304, H315, H319, H340, H350, H372, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

---

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

Flash back possible over considerable distance., Container explosion may occur under fire conditions.

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

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

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

## 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## 8.1 Control parameters

### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Benzene	71-43-2	TWA	0.5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Leukemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen Danger of cutaneous absorption		
		STEL	2.5 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Leukemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen Danger of cutaneous absorption		
		TWA	10 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		CEIL	25 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		Peak	50 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		See 1910.1028. See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028 The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.		
		TWA	0.1 ppm	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		ST	1 ppm	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benzene	71-43-2	S-	0.0300	In urine	ACGIH - Biological

		Phenylmercapturic acid	mg/g		Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		t,t-Muconic acid	0.5000 mg/g	In urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |               |   |
|---------------|---|
| a) Appearance | Form: liquid<br>Colour: clear, colourless |
| b) Odour      | No data available                         |

c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: 5.5 °C (41.9 °F) - lit.
f) Initial boiling point and boiling range	80 °C (176 °F) - lit.
g) Flash point	-11.0 °C (12.2 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 8 %(V) Lower explosion limit: 1.3 %(V)
k) Vapour pressure	221.3 hPa (166.0 mmHg) at 37.7 °C (99.9 °F) 99.5 hPa (74.6 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	0.874 g/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	ca.1.88 g/l at 23.5 °C (74.3 °F) - soluble
o) Partition coefficient: n-octanol/water	log Pow: 2.13 at 25 °C (77 °F)
p) Auto-ignition temperature	562.0 °C (1,043.6 °F)
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

acids, Bases, Halogens, Strong oxidizing agents, Metallic salts

### 10.6 Hazardous decomposition products

Other decomposition products - No data available

Hazardous decomposition products formed under fire conditions. - Carbon oxides

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - male - > 5,960 mg/kg  
(OECD Test Guideline 401)

LC50 Inhalation - Rat - female - 4 h - 43.7 mg/l  
(OECD Test Guideline 403)

LD50 Dermal - Rabbit - 8,263 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Skin irritation - 4 h  
(OECD Test Guideline 404)

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Eye irritation

#### Respiratory or skin sensitisation

Maximisation Test - Guinea pig

Result: Does not cause skin sensitisation.

#### Germ cell mutagenicity

Laboratory experiments have shown mutagenic effects.

In vivo tests showed mutagenic effects

Chinese hamster lung cells

Result: positive

OECD Test Guideline 475

Mouse - male

Result: positive

#### Carcinogenicity

Carcinogenicity - Human - male - Inhalation

Tumorigenic: Carcinogenic by RTECS criteria. Leukaemia Blood: Thrombocytopenia.

Carcinogenicity - Rat - Oral

Tumorigenic: Carcinogenic by RTECS criteria. Endocrine: Tumors. Leukaemia

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Human carcinogen.

IARC: 1 - Group 1: Carcinogenic to humans (Benzene)

NTP: Known to be human carcinogen (Benzene)

OSHA: OSHA specifically regulated carcinogen (Benzene)

#### Reproductive toxicity

Reproductive toxicity - Mouse - Intraperitoneal

Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - Rat - Inhalation

Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Developmental Toxicity - Mouse - Inhalation

Effects on Embryo or Fetus: Cytological changes (including somatic cell genetic material). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

May be fatal if swallowed and enters airways.

**Additional Information**

Repeated dose                      Rat - male and female - Oral - NOAEL : 100 mg/kg - OECD Test Guideline 408  
toxicity  
RTECS: CY1400000

Nausea, Dizziness, Headache, narcosis, Inhalation of high concentrations of benzene may have an initial stimulatory effect on the central nervous system characterized by exhilaration, nervous excitation and/or giddiness, depression, drowsiness, or fatigue. The victim may experience tightness in the chest, breathlessness, and loss of consciousness. Tremors, convulsions, and death due to respiratory paralysis or circulatory collapse can occur in a few minutes to several hours following severe exposures. Aspiration of small amounts of liquid immediately causes pulmonary edema and hemorrhage of pulmonary tissue. Direct skin contact may cause erythema. Repeated or prolonged skin contact may result in drying, scaling dermatitis, or development of secondary skin infections. The chief target organ is the hematopoietic system. Bleeding from the nose, gums, or mucous membranes and the development of purpuric spots, pancytopenia, leukopenia, thrombocytopenia, aplastic anemia, and leukemia may occur as the condition progresses. The bone marrow may appear normal, aplastic or hyperplastic, and may not correlate with peripheral blood-forming tissues. The onset of effects of prolonged benzene exposure may be delayed for many months or years after the actual exposure has ceased., Blood disorders

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 15.00 - 32.00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Ceriodaphnia dubia (water flea) - 17.2 mg/l - 48 h
Toxicity to algae	Growth inhibition EC50 - Pseudokirchneriella subcapitata (green algae) - 100 mg/l - 72 h (OECD Test Guideline 201)

**12.2 Persistence and degradability**

Biodegradability	aerobic - Exposure time 28 d Result: 96 % - Readily biodegradable (OECD Test Guideline 301F)
------------------	--

**12.3 Bioaccumulative potential**

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d - 0.05 mg/l
	Bioconcentration factor (BCF): 10

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Harmful to aquatic life with long lasting effects.



---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1114      Class: 3      Packing group: II  
Proper shipping name: Benzene  
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 1114      Class: 3      Packing group: II      EMS-No: F-E, S-D  
Proper shipping name: BENZENE

### IATA

UN number: 1114      Class: 3      Packing group: II  
Proper shipping name: Benzene

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benzene	71-43-2	2007-07-01

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzene	71-43-2	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzene	71-43-2	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Benzene	71-43-2	2007-07-01

### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.

	CAS-No.	Revision Date
Benzene	71-43-2	2009-02-01

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

	CAS-No.	Revision Date
Benzene	71-43-2	2009-02-01

---

## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H340	May cause genetic defects.
H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure.

### HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

### NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

### Further information

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### Preparation Information

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.9

Revision Date: 08/10/2016

Print Date: 05/16/2017

## SAFETY DATA SHEET

Version 5.12  
Revision Date 04/20/2017  
Print Date 05/16/2017

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : Ethylbenzene

Product Number : 296848  
Brand : Sigma-Aldrich  
Index-No. : 601-023-00-4

CAS-No. : 100-41-4

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

#### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

##### GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225  
Acute toxicity, Inhalation (Category 4), H332  
Carcinogenicity (Category 2), H351  
Specific target organ toxicity - repeated exposure (Category 2), H373  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

#### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.  
H304 May be fatal if swallowed and enters airways.  
H332 Harmful if inhaled.  
H351 Suspected of causing cancer.  
H373 May cause damage to organs through prolonged or repeated exposure.  
H401 Toxic to aquatic life.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>8</sub> H <sub>10</sub>
Molecular weight	: 106.17 g/mol
CAS-No.	: 100-41-4
EC-No.	: 202-849-4
Index-No.	: 601-023-00-4

#### Hazardous components

Component	Classification	Concentration
<b>Ethylbenzene</b>		
	Flam. Liq. 2; Acute Tox. 4; Carc. 2; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H225, H304, H332, H351, H373, H401	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

---

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**

No data available

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**

Use water spray to cool unopened containers.

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

**6.2 Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**

Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

hygroscopic

**7.3 Specific end use(s)**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Ethylbenzene	100-41-4	TWA	20.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Cochlear impair Kidney damage (nephropathy) Upper Respiratory Tract irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		STEL	125.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	125.000000 ppm 545.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Cochlear impair Kidney damage (nephropathy) Upper Respiratory Tract irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		TWA	100 ppm 435 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	125 ppm 545 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

		TWA	100 ppm 435 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	125 ppm 545 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	5 ppm 22 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	30 ppm 130 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Ethylbenzene	100-41-4	Sum of mandelic acid and phenyl glyoxylic acid	0.7g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Ethylbenzene		In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
		Not critical			
		Sum of mandelic acid and phenyl glyoxylic acid	0.15g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

a) Appearance	Form: liquid Colour: colourless
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: -95 °C (-139 °F) - lit.
f) Initial boiling point and boiling range	136 °C (277 °F) - lit.
g) Flash point	15.0 °C (59.0 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 6.7 %(V) Lower explosion limit: 1 %(V)
k) Vapour pressure	13.3 hPa (10.0 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	0.867 g/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	0.2 g/l at 25 °C (77 °F) - slightly soluble
o) Partition coefficient: n-octanol/water	log Pow: 3.6 at 20 °C (68 °F)
p) Auto-ignition temperature	432.0 °C (809.6 °F)
q) Decomposition temperature	No data available
r) Viscosity	0.773 mm <sup>2</sup> /s at 20 °C (68 °F) -
s) Explosive properties	No data available
t) Oxidizing properties	No data available

**9.2 Other safety information**

Surface tension	71.2 mN/m at 23 °C (73 °F)
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**10. STABILITY AND REACTIVITY****10.1 Reactivity**

No data available



## **10.2 Chemical stability**

Stable under recommended storage conditions.

## **10.3 Possibility of hazardous reactions**

Vapours may form explosive mixture with air.

## **10.4 Conditions to avoid**

Heat, flames and sparks.

## **10.5 Incompatible materials**

Strong oxidizing agents

## **10.6 Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

# **11. TOXICOLOGICAL INFORMATION**

## **11.1 Information on toxicological effects**

### **Acute toxicity**

LD50 Oral - Rat - male and female - 3,500 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 15,433 mg/kg

No data available

### **Skin corrosion/irritation**

Skin - Rabbit

Result: Moderate skin irritation - 24 h

### **Serious eye damage/eye irritation**

Eyes - Rabbit

Result: Mild eye irritation

### **Respiratory or skin sensitisation**

No data available

### **Germ cell mutagenicity**

Hamster

ovary

Result: negative

Mouse - male and female

Result: negative

### **Carcinogenicity**

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Ethylbenzene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### **Reproductive toxicity**

No data available

### **Specific target organ toxicity - single exposure**

No data available

### **Specific target organ toxicity - repeated exposure**

No data available

### **Aspiration hazard**

May be fatal if swallowed and enters airways.

## Additional Information

Repeated dose toxicity      Rat - male and female - NOAEL : 75 mg/kg - OECD Test Guideline 407

RTECS: DA0700000

Central nervous system depression, Nausea, Headache, Vomiting, Ataxia., Tremors

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish      LC50 - Oncorhynchus mykiss (rainbow trout) - 4.2 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates      static test EC50 - Daphnia magna (Water flea) - 1.8 - 2.4 mg/l - 48 h

Toxicity to algae      static test EC50 - Skeletonema costatum (marine diatom) - 4.9 mg/l - 72 h

### 12.2 Persistence and degradability

Biodegradability      aerobic - Exposure time 28 d  
Result: 70 - 80 % - Readily biodegradable.

### 12.3 Bioaccumulative potential

Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Harmful to aquatic life with long lasting effects.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1175      Class: 3      Packing group: II  
Proper shipping name: Ethylbenzene  
Reportable Quantity (RQ): 1000 lbs  
Poison Inhalation Hazard: No

### IMDG

UN number: 1175      Class: 3      Packing group: II      EMS-No: F-E, S-D  
Proper shipping name: ETHYLBENZENE

### IATA

UN number: 1175      Class: 3      Packing group: II  
Proper shipping name: Ethylbenzene

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

### SARA 311/312 Hazards

Fire Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-09-28

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## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.

### HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

### NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.12

Revision Date: 04/20/2017

Print Date: 05/16/2017

## SAFETY DATA SHEET

Version 5.7  
Revision Date 06/02/2016  
Print Date 04/18/2017

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : *m*-Xylene

Product Number : 296325  
Brand : Sigma-Aldrich  
Index-No. : 601-022-00-9

CAS-No. : 108-38-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

## 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

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2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 3), H226  
Acute toxicity, Dermal (Category 4), H312  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 3), H402  
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H226 : Flammable liquid and vapour.  
H304 : May be fatal if swallowed and enters airways.  
H312 : Harmful in contact with skin.  
H315 : Causes skin irritation.  
H319 : Causes serious eye irritation.  
H335 : May cause respiratory irritation.

H412	Harmful to aquatic life with long lasting effects.
Precautionary statement(s)	
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms	: 1,3-Dimethylbenzene
Formula	: C <sub>8</sub> H <sub>10</sub>
Molecular weight	: 106.17 g/mol
CAS-No.	: 108-38-3
EC-No.	: 203-576-3
Index-No.	: 601-022-00-9

#### Hazardous components

Component	Classification	Concentration
<b>m-Xylene</b>		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H226, H304, H312, H315, H319, H335, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

---

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

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

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): Flammable liquids

## 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## 8.1 Control parameters

### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
m-Xylene	108-38-3	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		



		Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
m-Xylene	108-38-3	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1,500.000 0 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 30 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

### **Body Protection**

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### **Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### **Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

## **9. PHYSICAL AND CHEMICAL PROPERTIES**

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

a) Appearance	Form: liquid Colour: colourless
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: -48 °C (-54 °F) - lit.
f) Initial boiling point and boiling range	138 - 139 °C (280 - 282 °F) - lit.
g) Flash point	25.0 °C (77.0 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k) Vapour pressure	8.0 hPa (6.0 mmHg) at 20.0 °C (68.0 °F) 21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F)
l) Vapour density	No data available
m) Relative density	0.868 g/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	log Pow: 3.2 at 20 °C (68 °F)
p) Auto-ignition temperature	465.0 °C (869.0 °F) 528.0 °C (982.4 °F)
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available

t) Oxidizing properties      No data available

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - male - 6,602 mg/kg  
(OECD Test Guideline 401)

LC50 Inhalation - Rat - male - 4 h - 6700 ppm  
(Directive 67/548/EEC, Annex V, B.2.)

LD50 Dermal - Rabbit - male - 12,126 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Skin irritation - 24 h

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Severe eye irritation - 24 h

#### Respiratory or skin sensitisation

- Mouse

Result: Does not cause skin sensitisation.  
(OECD Test Guideline 429)

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:      3 - Group 3: Not classifiable as to its carcinogenicity to humans (m-Xylene)

IARC:      No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP:      No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### **Reproductive toxicity**

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

### **Specific target organ toxicity - single exposure**

Inhalation - May cause respiratory irritation.

### **Specific target organ toxicity - repeated exposure**

No data available

### **Aspiration hazard**

May be fatal if swallowed and enters airways.

### **Additional Information**

RTECS: ZE2275000

Liver injury may occur., Kidney injury may occur., Blood disorders, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance

Kidney -

---

## **12. ECOLOGICAL INFORMATION**

### **12.1 Toxicity**

Toxicity to fish                      mortality LC50 - Fish - 11.23 mg/l - 96 h  
(OECD Test Guideline 203)

Toxicity to daphnia and      Remarks: No data available  
other aquatic  
invertebrates

Toxicity to algae                  Remarks: No data available

### **12.2 Persistence and degradability**

No data available

### **12.3 Bioaccumulative potential**

Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

### **12.4 Mobility in soil**

No data available

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

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### **12.6 Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Harmful to aquatic life with long lasting effects.

No data available

---

## **13. DISPOSAL CONSIDERATIONS**

### **13.1 Waste treatment methods**

#### **Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**  
Dispose of as unused product.

---

#### 14. TRANSPORT INFORMATION

##### DOT (US)

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes  
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

##### IMDG

UN number: 1307      Class: 3      Packing group: III      EMS-No: F-E, S-D  
Proper shipping name: XYLENES

##### IATA

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes

---

#### 15. REGULATORY INFORMATION

##### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

##### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

##### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard

##### Massachusetts Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

##### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

##### New Jersey Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

##### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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#### 16. OTHER INFORMATION

##### Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.

H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

**HMIS Rating**

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

**NFPA Rating**

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.7

Revision Date: 06/02/2016

Print Date: 04/18/2017

## SAFETY DATA SHEET

Version 5.8  
Revision Date 05/27/2016  
Print Date 04/18/2017

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Naphthalene

Product Number : 147141  
Brand : Aldrich  
Index-No. : 601-052-00-2

CAS-No. : 91-20-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

## 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

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2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable solids (Category 2), H228  
Acute toxicity, Oral (Category 4), H302  
Carcinogenicity (Category 2), H351  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H228 Flammable solid.  
H302 Harmful if swallowed.  
H351 Suspected of causing cancer.  
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.  
P202 Do not handle until all safety precautions have been read and understood.

P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>10</sub> H <sub>8</sub>
Molecular weight	: 128.17 g/mol
CAS-No.	: 91-20-3
EC-No.	: 202-049-5
Index-No.	: 601-052-00-2

#### Hazardous components

Component	Classification	Concentration
<b>Naphthalene</b>		
	Flam. Sol. 2; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H228, H302, H351, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available



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## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

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

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

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

Keep container tightly closed in a dry and well-ventilated place.

Storage class (TRGS 510): Flammable solid hazardous materials

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Naphthalene	91-20-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Hemolytic anemia Upper Respiratory Tract irritation Cataract Confirmed animal carcinogen with unknown relevance to humans		

		Danger of cutaneous absorption		
		TWA	10.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Hematologic effects Upper Respiratory Tract irritation Eye irritation Eye damage Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		STEL	15.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Hematologic effects Upper Respiratory Tract irritation Eye irritation Eye damage Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	10.000000 ppm 50.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	10.000000 ppm 50.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	15.000000 ppm 75.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	10 ppm 50 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	15 ppm 75 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	10 ppm 50 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	10 ppm 50 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	15 ppm 75 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	0.1 ppm 0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Naphthalene	91-20-3	1-Naphthol + 2-Naphthol			ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |  |   |
|--|---|
| a) Appearance                              | Form: flakes, granules<br>Colour: white               |
| b) Odour                                   | aromatic  |
| c) Odour Threshold                         | No data available                                     |
| d) pH                                      | No data available                                     |
| e) Melting point/freezing point            | Melting point/range: 80 - 82 °C (176 - 180 °F) - lit. |
| f) Initial boiling point and boiling range | 218 °C (424 °F) - lit.                                |

g) Flash point	80.0 °C (176.0 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 5.9 %(V) Lower explosion limit: 0.9 %(V)
k) Vapour pressure	1.3 hPa (1.0 mmHg) at 53.0 °C (127.4 °F) 0.04 hPa (0.03 mmHg) at 25.0 °C (77.0 °F)
l) Vapour density	No data available
m) Relative density	1.085 g/cm <sup>3</sup> at 24.7 °C (76.5 °F)
n) Water solubility	0.0308 g/l at 25 °C (77 °F) - OECD Test Guideline 105 - slightly soluble
o) Partition coefficient: n-octanol/water	log Pow: 3.4 at 25 °C (77 °F)
p) Auto-ignition temperature	526.0 °C (978.8 °F)
q) Decomposition temperature	No data available
r) Viscosity	1.05 mm <sup>2</sup> /s at 81.5 °C (178.7 °F) -
s) Explosive properties	No data available
t) Oxidizing properties	No data available

## 9.2 Other safety information

Surface tension	31.8 mN/m at 100.0 °C (212.0 °F)
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## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - 490.0 mg/kg

LC50 Inhalation - Rat - male and female - 4 h - > 0.4 mg/l  
(OECD Test Guideline 403)

LD50 Dermal - Rabbit - 20,000 mg/kg

No data available

**Skin corrosion/irritation**

Skin - Rabbit

Result: No skin irritation - 24 h

**Serious eye damage/eye irritation**

Eyes - Rabbit

Result: Mild eye irritation

**Respiratory or skin sensitisation**

Maximisation Test - Guinea pig

Result: Does not cause skin sensitisation.

(OECD Test Guideline 406)

**Germ cell mutagenicity**

Ames test

S. typhimurium

Result: negative

Rat - male

Result: negative

**Carcinogenicity**

Carcinogenicity - Rat - male and female - inhalation (vapour)

Tumorigenic: Tumors at site of application.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Naphthalene)

NTP: Reasonably anticipated to be a human carcinogen (Naphthalene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

Repeated dose toxicity Rat - male and female - Oral - NOAEL : 100 mg/kg - LOAEL : 400 mg/kg - OECD Test Guideline 408

RTECS: QJ0525000

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer., Naphthalene is retinotoxic and systemic absorption of its vapors above 15ppm, may result in: cataracts, optic neuritis, corneal injury, Eye irritation, Ingestion may provoke the following symptoms: hemolytic anemia, hemoglobinuria, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Convulsions, anemia, Kidney injury may occur., Seizures., Coma.

Heart -

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to fish flow-through test LC50 - Pimephales promelas (fathead minnow) - 7.9 mg/l - 96 h (OECD Test Guideline 203)

Toxicity to daphnia and other aquatic static test EC50 - Daphnia magna (Water flea) - 2.16 mg/l - 48 h

invertebrates

## 12.2 Persistence and degradability

Biodegradability                      aerobic - Exposure time 28 d  
Result: 2 % - Not readily biodegradable.

## 12.3 Bioaccumulative potential

Bioaccumulation                      Fish

Bioconcentration factor (BCF): 427 - 1,158

## 12.4 Mobility in soil

No data available

## 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

## 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Very toxic to aquatic life with long lasting effects.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1334                      Class: 4.1                      Packing group: III  
Proper shipping name: Naphthalene, crude  
Reportable Quantity (RQ): 100 lbs  
Marine pollutant: yes  
Poison Inhalation Hazard: No

### IMDG

UN number: 1334                      Class: 4.1                      Packing group: III                      EMS-No: F-A, S-G  
Proper shipping name: NAPHTHALENE, CRUDE  
Marine pollutant: yes                      Marine pollutant: yes

### IATA

UN number: 1334                      Class: 4.1                      Packing group: III  
Proper shipping name: Naphthalene, crude

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-07-01

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-07-01

**Pennsylvania Right To Know Components**

Naphthalene

CAS-No.  
91-20-3Revision Date  
2007-07-01**New Jersey Right To Know Components**

Naphthalene

CAS-No.  
91-20-3Revision Date  
2007-07-01**California Prop. 65 Components**WARNING! This product contains a chemical known to the  
State of California to cause cancer.

Naphthalene

CAS-No.  
91-20-3Revision Date  
1990-01-01

---

**16. OTHER INFORMATION****Full text of H-Statements referred to under sections 2 and 3.**

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Flam. Sol.	Flammable solids
H228	Flammable solid.
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

**HMIS Rating**

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	2

**NFPA Rating**

Health hazard:	2
Fire Hazard:	2
Reactivity Hazard:	2

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.8

Revision Date: 05/27/2016

Print Date: 04/18/2017

## SAFETY DATA SHEET

Version 5.5  
Revision Date 06/02/2016  
Print Date 07/11/2017

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**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : o-Xylene

Product Number : 95662  
Brand : Sigma-Aldrich  
Index-No. : 601-022-00-9

CAS-No. : 95-47-6

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

**1.4 Emergency telephone number**

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

---

**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 3), H226  
Acute toxicity, Inhalation (Category 4), H332  
Acute toxicity, Dermal (Category 4), H312  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 3), H402  
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word

Danger

Hazard statement(s)

H226 Flammable liquid and vapour.  
H304 May be fatal if swallowed and enters airways.  
H312 + H332 Harmful in contact with skin or if inhaled  
H315 Causes skin irritation.  
H319 Causes serious eye irritation.



H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.
Precautionary statement(s)	
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Synonyms	: 1,2-Dimethylbenzene
Formula	: C <sub>8</sub> H <sub>10</sub>
Molecular weight	: 106.17 g/mol
CAS-No.	: 95-47-6
EC-No.	: 202-422-2
Index-No.	: 601-022-00-9

#### Hazardous components

Component	Classification	Concentration
<b>o-Xylene</b>		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H226, H304, H312 + H332, H315, H319, H335, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

---

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

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

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): Flammable liquids

## 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## 8.1 Control parameters

### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
o-Xylene	95-47-6	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment		

		Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
o-Xylene	95-47-6	Methylhippuric acids	1,500.000 0 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 30 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |  |
|---|--|
| a) Appearance                                   | Form: liquid<br>Colour: colourless                                 |
| b) Odour  | No data available  |
| c) Odour Threshold                              | No data available  |
| d) pH   | No data available  |
| e) Melting point/freezing point                 | Melting point/range: -26 - -23 °C (-15 - -9 °F) - lit.             |
| f) Initial boiling point and boiling range      | 143 - 145 °C (289 - 293 °F) - lit.                                 |
| g) Flash point                                  | 31.0 °C (87.8 °F) - closed cup                                     |
| h) Evaporation rate                             | No data available  |
| i) Flammability (solid, gas)                    | No data available  |
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 6.7 %(V)<br>Lower explosion limit: 0.9 %(V) |
| k) Vapour pressure                              | 21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F)                          |
| l) Vapour density                               | No data available  |
| m) Relative density                             | 0.879 g/mL at 20 °C (68 °F)  |
| n) Water solubility                             | 0.1705 g/l at 25 °C (77 °F) - partly soluble                       |
| o) Partition coefficient: n-octanol/water       | log Pow: 3.12 at 20 °C (68 °F)                                     |
| p) Auto-ignition temperature                    | 464.0 °C (867.2 °F)  |
| q) Decomposition temperature                    | No data available  |
| r) Viscosity                                    | No data available  |

- s) Explosive properties      No data available  
t) Oxidizing properties      No data available

## 9.2 Other safety information

Surface tension      29.8 mN/m at 25.0 °C (77.0 °F)

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

LC50 Inhalation - Rat - male - 6 h - 18,800 mg/m<sup>3</sup>

Dermal: No data available

LD50 Intraperitoneal - Mouse - 1,364 mg/kg

#### Skin corrosion/irritation

Skin - Rabbit

Result: Irritating to skin. - 24 h

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

- Mouse

Result: Does not cause skin sensitisation.

(OECD Test Guideline 429)

#### Germ cell mutagenicity

Ames test

Salmonella typhimurium

Result: negative

#### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:      3 - Group 3: Not classifiable as to its carcinogenicity to humans (o-Xylene)

IARC:      No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.  
No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.  
No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

May be fatal if swallowed and enters airways.

**Additional Information**

RTECS: ZE2450000

narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance, Liver injury may occur., Kidney injury may occur., Blood disorders

Nerves. -

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish LC50 - *Lepomis macrochirus* (Bluegill) - 16.10 mg/l - 96 h

### 12.2 Persistence and degradability

Biodegradability aerobic - Exposure time 28 d  
Result: 69.67 % - Not readily biodegradable.  
(OECD Test Guideline 301F)  
Remarks: The 10 day time window criterion is not fulfilled.

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Harmful to aquatic life with long lasting effects.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes  
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 1307      Class: 3      Packing group: III      EMS-No: F-E, S-D  
Proper shipping name: XYLENES

### IATA

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.



H312 + H332	Harmful in contact with skin or if inhaled
H315	Causes skin irritation.
H319	Causes serious eye irritation.

**HMIS Rating**

Health hazard:	1
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	0

**NFPA Rating**

Health hazard:	1
Fire Hazard:	3
Reactivity Hazard:	0

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.5

Revision Date: 06/02/2016

Print Date: 07/11/2017

## SAFETY DATA SHEET

Version 5.7  
Revision Date 05/24/2016  
Print Date 07/13/2017

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Phenol

Product Number : P4161  
Brand : Sigma  
Index-No. : 604-001-00-2

CAS-No. : 108-95-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

## 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Acute toxicity, Oral (Category 3), H301  
Acute toxicity, Inhalation (Category 3), H331  
Acute toxicity, Dermal (Category 3), H311  
Skin corrosion (Category 1B), H314  
Serious eye damage (Category 1), H318  
Germ cell mutagenicity (Category 2), H341  
Specific target organ toxicity - repeated exposure (Category 2), H373  
Acute aquatic toxicity (Category 3), H402  
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H301 + H311 + H331  
H314  
H318  
H341  
H373

Toxic if swallowed, in contact with skin or if inhaled  
Causes severe skin burns and eye damage.  
Causes serious eye damage.  
Suspected of causing genetic defects.  
May cause damage to organs through prolonged or repeated exposure.

H402	Harmful to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 + 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 CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms	: Hydroxybenzene
Molecular weight	: 94.11 g/mol
CAS-No.	: 108-95-2
EC-No.	: 203-632-7
Index-No.	: 604-001-00-2
Registration number	: 01-2119471329-32-XXXX

#### Hazardous components

Component	Classification	Concentration
<b>Phenol</b>		
	Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Muta. 2; STOT RE 2; Aquatic Acute 3; Aquatic Chronic 2; H301 + H311 + H331, H314, H318, H341, H373, H402, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

---

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**

No data available

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**

No data available

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

**6.2 Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Phenol	108-95-2	TWA	5.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Upper Respiratory Tract irritation Lung damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	5.000000 ppm 19.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		C	15.600000 ppm 60.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption 15 minute ceiling value		
		TWA	5.000000 ppm 19.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation The value in mg/m3 is approximate.		
		PEL	5 ppm 19 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Phenol	108-95-2	Phenol	250mg/g Creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

### 8.2 Exposure controls

#### Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

#### Personal protective equipment

##### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

##### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

### Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |   |
|---|---|
| a) Appearance                                   | Form: solid   |
| b) Odour  | No data available   |
| c) Odour Threshold                              | No data available   |
| d) pH   | 6.0   |
| e) Melting point/freezing point                 | Melting point/range: 38 - 43 °C (100 - 109 °F)                                      |
| f) Initial boiling point and boiling range      | 182.0 °C (359.6 °F)   |
| g) Flash point                                  | 79.0 °C (174.2 °F) - closed cup   |
| h) Evaporation rate                             | No data available   |
| i) Flammability (solid, gas)                    | No data available   |
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 8.6 %(V)<br>Lower explosion limit: 1.7 %(V)                  |
| k) Vapour pressure                              | 6.3 hPa (4.7 mmHg) at 55.0 °C (131.0 °F)<br>0.5 hPa (0.4 mmHg) at 20.0 °C (68.0 °F) |
| l) Vapour density                               | No data available   |
| m) Relative density                             | 1.07 g/cm <sup>3</sup>  |
| n) Water solubility                             | 84 g/l at 20 °C (68 °F)   |
| o) Partition coefficient: n-octanol/water       | log Pow: 1.46   |
| p) Auto-ignition temperature                    | 715.0 °C (1,319.0 °F)   |
| q) Decomposition temperature                    | No data available   |
| r) Viscosity                                    | No data available   |
| s) Explosive properties                         | No data available   |
| t) Oxidizing properties                         | No data available   |

### 9.2 Other safety information

- |                 |                                 |
|-----------------|---------------------------------|
| Surface tension | 38.2 mN/m at 50.0 °C (122.0 °F) |
|-----------------|---------------------------------|

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

## 10.2 Chemical stability

Stable under recommended storage conditions.

## 10.3 Possibility of hazardous reactions

No data available

## 10.4 Conditions to avoid

No data available

## 10.5 Incompatible materials

Strong oxidizing agents, Strong bases, Strong acids

## 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

In the event of fire: see section 5

---

# 11. TOXICOLOGICAL INFORMATION

## 11.1 Information on toxicological effects

### Acute toxicity

LD50 Oral - Rat - 317.0 mg/kg

Remarks: Behavioral:Convulsions or effect on seizure threshold.

LD50 Oral - Rat - 410.0 - 650.0 mg/kg

LC50 Inhalation - Rat - 8 h - 900 mg/m<sup>3</sup>

LD50 Dermal - Rabbit - 630.0 mg/kg

No data available

### Skin corrosion/irritation

Skin - Rabbit

Result: Severe skin irritation - 24 h

### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Corrosive

(OECD Test Guideline 405)

### Respiratory or skin sensitisation

No data available

### Germ cell mutagenicity

In vitro tests showed mutagenic effects

### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### Reproductive toxicity

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

May cause damage to organs through prolonged or repeated exposure.

**Aspiration hazard**

No data available

**Additional Information**

RTECS: Not available

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Circulatory collapse, tachypnea, paralysis, Convulsions, Coma., necrosis of mouth and G.I. Tract, Jaundice, respiratory failure, cardiac arrest

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to fish LC50 - *Leuciscus idus* (Golden orfe) - 14.00 - 25.00 mg/l - 48 h

LC50 - *Carassius auratus* (goldfish) - 36.10 - 68.80 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates EC50 - *Daphnia magna* (Water flea) - 56 mg/l - 48 h

Toxicity to algae EC50 - *Chlorella vulgaris* (Fresh water algae) - 370.00 mg/l - 96 h

**12.2 Persistence and degradability**

Biodegradability Result: - Readily biodegradable

**12.3 Bioaccumulative potential**

Bioaccumulation *Danio rerio* (zebra fish) - 5 h  
- 2 mg/l

Bioconcentration factor (BCF): 17.5

Remarks: Does not bioaccumulate.

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Toxic to aquatic life with long lasting effects.

---

**13. DISPOSAL CONSIDERATIONS****13.1 Waste treatment methods****Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.



---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1671      Class: 6.1      Packing group: II  
Proper shipping name: Phenol, solid  
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 1671      Class: 6.1      Packing group: II      EMS-No: F-A, S-A  
Proper shipping name: PHENOL, SOLID  
Marine pollutant:yes

### IATA

UN number: 1671      Class: 6.1      Packing group: II  
Proper shipping name: Phenol, solid

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Dam.	Serious eye damage
H301	Toxic if swallowed.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.

H331	Toxic if inhaled.
H341	Suspected of causing genetic defects.
H373	May cause damage to organs through prolonged or repeated exposure.
H402	Harmful to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
Muta.	Germ cell mutagenicity
Skin Corr.	Skin corrosion
STOT RE	Specific target organ toxicity - repeated exposure

**HMIS Rating**

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

**NFPA Rating**

Health hazard:	3
Fire Hazard:	2
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.7

Revision Date: 05/24/2016

Print Date: 07/13/2017

## SAFETY DATA SHEET

Version 3.8  
Revision Date 05/23/2016  
Print Date 07/11/2017

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : *p*-Xylene

Product Number : 95682

Brand : Sigma-Aldrich

Index-No. : 601-022-00-9

CAS-No. : 106-42-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

## 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

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2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 3), H226

Acute toxicity, Inhalation (Category 4), H332

Acute toxicity, Dermal (Category 4), H312

Skin irritation (Category 2), H315

Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H226

H312 + H332

H315

H401

Flammable liquid and vapour.

Harmful in contact with skin or if inhaled

Causes skin irritation.

Toxic to aquatic life.

Precautionary statement(s)

P210

P233

P240

Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Keep container tightly closed.

Ground/bond container and receiving equipment.

P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER/doctor if you feel unwell.
P322	Specific measures (see supplemental first aid instructions on this label).
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms	: 1,4-Dimethylbenzene
Formula	: C <sub>8</sub> H <sub>10</sub>
Molecular weight	: 106.17 g/mol
CAS-No.	: 106-42-3
EC-No.	: 203-396-5
Index-No.	: 601-022-00-9

#### Hazardous components

Component	Classification	Concentration
<b>p-Xylene</b>		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Aquatic Acute 2; H226, H312 + H332, H315, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available

---

### 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing media

##### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

No data available

#### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

Use water spray to cool unopened containers.

---

### 6. ACCIDENTAL RELEASE MEASURES

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

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

#### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

#### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

#### 6.4 Reference to other sections

For disposal see section 13.

---

### 7. HANDLING AND STORAGE

#### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

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

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

#### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### 8.1 Control parameters

##### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
p-Xylene	106-42-3	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation		

		Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		

		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
p-Xylene	106-42-3	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1,500.000 0 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 30 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

a) Appearance	Form: liquid, clear Colour: colourless
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: 12 - 13 °C (54 - 55 °F) - lit.
f) Initial boiling point and boiling range	138 °C (280 °F) - lit.
g) Flash point	25.0 °C (77.0 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k) Vapour pressure	21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F) 12.0 hPa (9.0 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	0.861 g/mL at 20 °C (68 °F)
n) Water solubility	0.2 g/l
o) Partition coefficient: n-octanol/water	log Pow: 3.15
p) Auto-ignition temperature	529.0 °C (984.2 °F)
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

**9.2 Other safety information**

Surface tension	28.3 mN/m at 20.0 °C (68.0 °F)
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**10. STABILITY AND REACTIVITY****10.1 Reactivity**

No data available

**10.2 Chemical stability**

Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**

Vapours may form explosive mixture with air.

**10.4 Conditions to avoid**

Heat, flames and sparks.



## 10.5 Incompatible materials

Strong oxidizing agents

## 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - 5,000 mg/kg

LD50 Oral - Rat - male - 3,523 mg/kg

LC50 Inhalation - Rat - 4 h - 4550 ppm

Remarks: Lungs, Thorax, or Respiration:Chronic pulmonary edema. Liver:Other changes. Blood:Changes in cell count (unspecified).

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Moderate skin irritation - 4 h

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (p-Xylene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

#### Reproductive toxicity

No data available

May cause reproductive disorders.

#### Specific target organ toxicity - single exposure

No data available

#### Specific target organ toxicity - repeated exposure

No data available

#### Aspiration hazard

No data available

#### Additional Information

RTECS: ZE2625000

narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Gastrointestinal disturbance, Liver injury may occur., Kidney injury may occur., Blood disorders

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 2.60 mg/l - 96 h
	LC50 - Carassius auratus (goldfish) - 18.00 mg/l - 24 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 35.50 - 63.10 mg/l - 48 h
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 3.20 - 4.40 mg/l - 72 h

### 12.2 Persistence and degradability

Biodegradability Result: 87.8 % - Readily biodegradable

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Toxic to aquatic life.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

#### DOT (US)

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes  
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

#### IMDG

UN number: 1307      Class: 3      Packing group: III      EMS-No: F-E, S-D  
Proper shipping name: XYLENES

#### IATA

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes

---

## 15. REGULATORY INFORMATION

#### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

#### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:  
CAS-No.      Revision Date

**SARA 311/312 Hazards**

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

**16. OTHER INFORMATION****Full text of H-Statements referred to under sections 2 and 3.**

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H312	Harmful in contact with skin.
H312 + H332	Harmful in contact with skin or if inhaled
H315	Causes skin irritation.
H332	Harmful if inhaled.

**HMIS Rating**

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

**NFPA Rating**

Health hazard:	1
Fire Hazard:	3
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 3.8

Revision Date: 05/23/2016

Print Date: 07/11/2017

## SAFETY DATA SHEET

Version 5.10  
Revision Date 09/23/2016  
Print Date 04/18/2017

---

**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Toluene

Product Number : 244511  
Brand : Sigma-Aldrich  
Index-No. : 601-021-00-3

CAS-No. : 108-88-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

**1.4 Emergency telephone number**

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

---

**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 2), H225  
Skin irritation (Category 2), H315  
Reproductive toxicity (Category 2), H361  
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336  
Specific target organ toxicity - repeated exposure (Category 2), H373  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word

Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.  
H304 May be fatal if swallowed and enters airways.  
H315 Causes skin irritation.  
H336 May cause drowsiness or dizziness.  
H361 Suspected of damaging fertility or the unborn child.  
H373 May cause damage to organs through prolonged or repeated exposure.  
H401 Toxic to aquatic life.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>7</sub> H <sub>8</sub>
Molecular weight	: 92.14 g/mol
CAS-No.	: 108-88-3
EC-No.	: 203-625-9
Index-No.	: 601-021-00-3
Registration number	: 01-2119471310-51-XXXX

### Hazardous components

Component	Classification	Concentration
<b>Toluene</b>		
	Flam. Liq. 2; Skin Irrit. 2; Repr. 2; STOT SE 3; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H225, H304, H315, H336, H361, H373, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

---

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**

No data available

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**

Use water spray to cool unopened containers.

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

**6.2 Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Handle and store under inert gas.

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Toluene	108-88-3	TWA	100 ppm 375 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	150 ppm 560 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z37.12-1967		
		CEIL	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		Peak	500 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Visual impairment Female reproductive Pregnancy loss 2015 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 375 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		ST	150 ppm 560 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Toluene	108-88-3	Toluene	0.0200 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			
		Toluene	0.0300 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		o-Cresol	0.3000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

### 8.2 Exposure controls

#### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## Personal protective equipment

### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |  |                                       |
|--|---------------------------------------|
| a) Appearance                              | Form: liquid<br>Colour: colourless    |
| b) Odour                                   | aromatic                              |
| c) Odour Threshold                         | No data available                     |
| d) pH                                      | No data available                     |
| e) Melting point/freezing point            | Melting point/range: -93 °C (-135 °F) |
| f) Initial boiling point and boiling range | 110 - 111 °C (230 - 232 °F)           |
| g) Flash point                             | 4.0 °C (39.2 °F) - closed cup         |
| h) Evaporation rate                        | No data available                     |
| i) Flammability (solid, gas)               | No data available                     |



j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.2 %(V)
k)	Vapour pressure	29.1 hPa (21.8 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.865 g/mL at 25 °C (77 °F)
n)	Water solubility	0.5 g/l at 15 °C (59 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	535.0 °C (995.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - > 5,580 mg/kg

LC50 Inhalation - Rat - 4 h - 12,500 - 28,800 mg/m<sup>3</sup>

LD50 Dermal - Rabbit - 12,196 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Skin irritation - 24 h

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: No eye irritation

(OECD Test Guideline 405)

### **Respiratory or skin sensitisation**

No data available

### **Germ cell mutagenicity**

Rat

Liver

DNA damage

### **Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### **Reproductive toxicity**

Damage to fetus possible

Suspected human reproductive toxicant

Reproductive toxicity - Rat - Inhalation

Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Experiments have shown reproductive toxicity effects in male and female laboratory animals.

Developmental Toxicity - Rat - Oral

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

### **Specific target organ toxicity - single exposure**

No data available

### **Specific target organ toxicity - repeated exposure**

No data available

### **Aspiration hazard**

No data available

### **Additional Information**

RTECS: XS5250000

Lung irritation, chest pain, pulmonary edema, Inhalation studies on toluene have demonstrated the development of inflammatory and ulcerous lesions of the penis, prepuce, and scrotum in animals., Central nervous system

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

## **12. ECOLOGICAL INFORMATION**

### **12.1 Toxicity**

Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 7.63 mg/l - 96 h

NOEC - Pimephales promelas (fathead minnow) - 5.44 mg/l - 7 d

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 8.00 mg/l - 24 h

Immobilization EC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h

Toxicity to algae EC50 - Chlorella vulgaris (Fresh water algae) - 245.00 mg/l - 24 h

EC50 - Pseudokirchneriella subcapitata (green algae) - 10.00 mg/l - 24 h

### **12.2 Persistence and degradability**

Biodegradability Result: - Readily biodegradable

### **12.3 Bioaccumulative potential**

Bioconcentration factor (BCF): 90

No data available

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic life.

### 13.1 Waste treatment methods

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Dispose of as unused product.

UN number: 1294      Class: 3  
Proper shipping name: Toluene  
Reportable Quantity (RQ): 1000 lbs

Packing group: II

Poison Inhalation Hazard: No

UN number: 1294      Class: 3  
Proper shipping name: TOLUENE

Packing group: II

EMS-No: F-E, S-D

UN number: 1294      Class: 3  
Proper shipping name: Toluene

Packing group: II

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

The following components are subject to reporting levels established by SARA Title III, Section 313:

CAS-No.	Revision Date
108-88-3	2007-07-01

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

CAS-No.	Revision Date
108-88-3	2007-07-01

CAS-No.	Revision Date
108-88-3	2007-07-01

## CAS-No. Revision Date

Toluene

108-88-3

2007-07-01

**California Prop. 65 Components**

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene

CAS-No.  
108-88-3

Revision Date  
2009-02-01

---

**16. OTHER INFORMATION**

**Full text of H-Statements referred to under sections 2 and 3.**

Aquatic Acute	Acute aquatic toxicity
Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.
Repr.	Reproductive toxicity
Skin Irrit.	Skin irritation

**HMIS Rating**

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

**NFPA Rating**

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.10

Revision Date: 09/23/2016

Print Date: 04/18/2017

## SAFETY DATA SHEET

Version 5.9  
Revision Date 05/24/2016  
Print Date 05/16/2017

**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Xylenes

Product Number : 214736  
Brand : Aldrich  
Index-No. : 601-022-00-9

CAS-No. : 1330-20-7

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

Identified uses : Laboratory chemicals, Synthesis of substances

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

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

**1.4 Emergency telephone number**

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 3), H226  
Acute toxicity, Inhalation (Category 4), H332  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335  
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, Liver, Kidney, H373  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word

Danger

Hazard statement(s)

H226 Flammable liquid and vapour.  
H304 May be fatal if swallowed and enters airways.  
H315 Causes skin irritation.  
H319 Causes serious eye irritation.  
H332 Harmful if inhaled.

H335	May cause respiratory irritation.
H373	May cause damage to organs (Central nervous system, Liver, Kidney) through prolonged or repeated exposure if inhaled.
H401	Toxic to aquatic life.
Precautionary statement(s)	
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P314	Get medical advice/ attention if you feel unwell.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Synonyms	: Xylene mixture of isomers
Formula	: C <sub>8</sub> H <sub>10</sub>
Molecular weight	: 106.17 g/mol
CAS-No.	: 1330-20-7
EC-No.	: 215-535-7
Index-No.	: 601-022-00-9

#### Hazardous components

Component	Classification	Concentration
<b>Xylene</b>		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H226, H304, H315, H319, H332, H335, H373, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

---

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

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## 6. ACCIDENTAL RELEASE MEASURES

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

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): Flammable liquids

## 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## 8.1 Control parameters

### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Xylene	1330-20-7	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		



		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		STEL	150 ppm 655 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	300 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	100 ppm 435 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Xylene	1330-20-7	Methylhippuric acids	1,500.000 0 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1,500.000 0 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 35 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |  |
|---|--|
| a) Appearance                                   | Form: clear, liquid<br>Colour: colourless                        |
| b) Odour  | No data available  |
| c) Odour Threshold                              | No data available  |
| d) pH   | No data available  |
| e) Melting point/freezing point                 | < 0 °C (< 32 °F)   |
| f) Initial boiling point and boiling range      | 137 - 140 °C (279 - 284 °F) - lit.                               |
| g) Flash point                                  | 25 °C (77 °F) - closed cup                                       |
| h) Evaporation rate                             | No data available  |
| i) Flammability (solid, gas)                    | No data available  |
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 7 %(V)<br>Lower explosion limit: 1.1 %(V) |
| k) Vapour pressure                              | 24 hPa (18 mmHg) at 37.70 °C (99.86 °F)                          |
| l) Vapour density                               | 3.67 - (Air = 1.0)   |
| m) Relative density                             | 0.86 g/mL at 25 °C (77 °F)                                       |
| n) Water solubility                             | No data available  |
| o) Partition coefficient: n-octanol/water       | No data available  |
| p) Auto-ignition temperature                    | No data available  |

- |                              |                   |
|------------------------------|-------------------|
| q) Decomposition temperature | No data available |
| r) Viscosity                 | No data available |
| s) Explosive properties      | No data available |
| t) Oxidizing properties      | No data available |

## 9.2 Other safety information

Relative vapour density 3.67 - (Air = 1.0)

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## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - 3,523 mg/kg

LC50 Inhalation - Rat - 4 h - 5000 ppm

LD50 Dermal - Rabbit - 12,126 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Skin irritation - 24 h

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Moderate eye irritation

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Xylene)

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

#### **Reproductive toxicity**

No data available

No data available

#### **Specific target organ toxicity - single exposure**

May cause respiratory irritation.

#### **Specific target organ toxicity - repeated exposure**

Inhalation - May cause damage to organs through prolonged or repeated exposure. - Central nervous system, Liver, Kidney

#### **Aspiration hazard**

May be fatal if swallowed and enters airways.

#### **Additional Information**

RTECS: Not available

Blurred vision, Incoordination., Headache, Nausea, Vomiting, Dizziness, Weakness, anemia, Prolonged or repeated exposure to skin causes defatting and dermatitis.

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

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## **12. ECOLOGICAL INFORMATION**

### **12.1 Toxicity**

Toxicity to fish LC50 - *Oncorhynchus mykiss* (rainbow trout) - 3.3 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates EC50 - *Daphnia magna* (Water flea) - 75.49 mg/l - 24 h

Toxicity to algae Growth inhibition EC50 - *Pseudokirchneriella subcapitata* - 72 mg/l - 14 d

### **12.2 Persistence and degradability**

Biodegradability Result: - Readily biodegradable

### **12.3 Bioaccumulative potential**

No data available

### **12.4 Mobility in soil**

No data available

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

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### **12.6 Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Toxic to aquatic life.

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## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

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## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes  
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 1307      Class: 3      Packing group: III      EMS-No: F-E, S-D  
Proper shipping name: XYLENES

### IATA

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Xylene	1330-20-7	1993-04-24

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Xylene	1330-20-7	1993-04-24

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Xylene	1330-20-7	1993-04-24

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Xylene	1330-20-7	1993-04-24

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Asp. Tox.	Aspiration hazard
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H373	May cause damage to organs (/*_2ORG_REP_INH/\$/) through prolonged or repeated exposure if inhaled.
H401	Toxic to aquatic life.

### HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

### NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

### Further information

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### Preparation Information

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.9

Revision Date: 05/24/2016

Print Date: 05/16/2017