SAFETY DATA SHEET (1907/2006)

R0718352

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BUTENEDIOL PURIFIED

ANNEX

1. OVERVIEW OF EXPOSURE SCENARIOS

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

Number (ES)	Short description of exposure scenario	Product Category (PC)	Life cycle stage covered by ES						Sector of use (SU)	Process category (PROC)	Article Category (AC)	Environmental release category (ERC)
			Manufacture	Formulation	End use			Service Life				
					Industrial	Professional	Consumer					
1	Manufacture, distribution, and bulk handling of 1,4-Butenediol; CAS: 110-64-5	19	x		x			No	8 9 10	1, 2, 3, 4, 5, 8a, 8b, 9	n/a	1 2
2	Use of 1,4-Butenediol in industrial and professional laboratories; CAS: 110-64-5	21			x	x		Yes		15	n/a	4 8a

1.1 Assessment of Releases to the Environment

In the chemical safety assessment performed according to Article 14(3) in connection with Annex I section 3 (Environmental Hazard Assessment) and section 4 (PBT/ vPvB Assessment) no hazard was identified. Therefore, according to REACH Annex I (5.0) an exposure estimation is not necessary. Consequently all identified uses of the substance are assessed as safe for the environment.

1.2 Assessment of Worker Exposures

In industrial and professional (workplace) settings, ingestion is not an anticipated route of exposure. Relevant routes are exposure by inhalation or skin contact.

Product characteristics	
- Physical form of product	Liquid
- Vapour pressure	vapour pressure < 0.5 kPa [OC3].
- Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently in the respective ES) [G13].
- Amounts used	*Not applicable*
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently in the respective ES) [G2]
Human factors not influenced by risk management	*Not applicable*
Other Operational Conditions affecting worker exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].

The following operational conditions should be considered for worker inhalation :

1. Exposures by inhalation are predicted in the range of 0-0.1 ppm at ambient temperatures in open systems and elevated temperatures in closed systems;
2. Processing and/or handling of this substance is not recommended in open systems at elevated temperatures.

The following operational conditions should be considered for worker dermal exposures:

1. All of the uses should be non-dispersive and exposure either incidental or intermittent, leading to basic skin exposures of either 0.1 mg/cm2/day or 1 mg/cm2/day, respectively;
2. Skin surface area exposed should be limited to hands only (= 840 cm2);
3. In no scenario, workers are expected to submerge their entire hands in the substance or in products containing the substance, even when gloves and other protective clothing are worn.

1.3 Consumer exposures

There are no consumer exposures associated with any of the exposure scenarios.

1.4 Indirect exposure of humans via the environment (oral)

The substance is readily biodegradable and unlikely to persist in the environment, therefore an assessment of indirect exposures of humans via the environment is irrelevant.

2. EXPOSURE SCENARIO 1: MANUFACTURE, DISTRIBUTION, AND BULK HANDLING

2.1 Description of Exposure scenario

Section 1	**Exposure Scenario Title**
Manufacture, distribution, and bulk handling of 1,4-Butenediol; CAS: 110-64-5	
Use Descriptor	**Sector of Use**: Industrial (SU3, SU8, SU9, SU10)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC 5, PROC8a, PROC8b, PROC9
	Environmental Release Categories: ERC1, ERC2
Processes, tasks, activities covered	Manufacture of 1,4-Butenediol (B2D) and/or use as a reactive intermediate or reactive process chemical in the production of other substances or preparations. Includes recycling/ recovery, material transfers, storage, sampling, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).
Section 2	**Operational conditions and risk management measures**
2.1 Risk Management Measures	***Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.***
During the whole process	Wear suitable gloves tested to EN374 [PPE15].
2.2 Operational conditions	***Additional good practice advice beyond the REACH Chemical Safety Assessment***
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

2.2 Worker exposures

Exposure estimates for worker exposures are presented in Appendix 1. A summary of the data is presented below.

Exposure Estimates ES#1 – Manufacture, distribution, and bulk handling of 1,4-Butenediol; CAS: 110-64-5				
Contributing scenario	***Predicted inhalatory exposure No Modifiers (ppm)***	***Predicted dermal exposure External Dose (mg/kg/day)***	***Predicted inhalatory exposure Modified (ppm)***	***Predicted dermal exposure Internal Dose# (mg/kg/day)***
PROCs 1 – 3:	0.1	0.12	0.1^	0.0012
PROC 1 - Use in closed process, no likelihood of exposure. Continuous; daily; >4 hours PROC 2 - Use in closed, continuous process with occasional controlled exposure . Continuous; daily; >4 hours. Temp. <73 PROC 3 - Use in closed batch process (synthesis or formulation). Continuous; daily; >4 hours.				
Contributing scenario	***Predicted inhalatory exposure No Modifiers (ppm)***	***Predicted dermal exposure External Dose (mg/kg/day)***	***Predicted inhalatory exposure Modified (ppm)***	***Predicted dermal exposure Internal Dose# (mg/kg/day)***
PROCs 4 – 8:	0.1	1.2	0.1^	0.0121
PROC 4 - Use in batch and other process (synthesis) where opportunity for exposure arises . Continuous; daily; >4 hours, closed process or ambient temperature when process is open.				
PROC 5 -Mixing or blending in batch processes (multistage and/or significant contact). Continuous; daily; >4 hours, closed process or ambient temperature when process is open.				
PROC 8a -Transfer of chemicals from/to vessels/ large containers at non dedicated facilities. Daily, >4 hours; closed process or ambient temperature when process is open. e.g. drum, railcar, and truck filling.				
PROC 8b -Transfer of chemicals from/to vessels/ large containers at dedicated facilities. Daily, >4 hours; closed process or ambient temperature when process is open. e.g. drum, railcar, and truck filling.				
PROC 9 -Transfer of chemicals into small containers (dedicated filling line). Daily, >4 hours; closed process or ambient temperature when process is open.				
^No modification of the starting point was necessary if OCs are followed. ***#Internal dose calculated using ConsExpo v4.1 and Permeability Constant (Kp) of 0.000127 cm/hr.***				

3. EXPOSURE SCENARIO 2: USE IN LABORATORY SETTINGS

3.1 Description of Exposure scenario

Section 1	Exposure Scenario Title
Use of 1,4-Butenediol in industrial and professional laboratories; CAS: 110-64-5	
Use Descriptor	Sector of Use: Industrial (SU3, SU8), Professional (SU22)
	Process Categories: PROC15
	Environmental Release Categories: ERC4, ERC8a
Processes, tasks, activities covered	Use of 1,4-Butenediol (B2D) within industrial and professional laboratory settings.
Section 2	**Operational conditions and risk management measures**
2.1 Risk Management Measures	***Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment.***
PROC 15 - Use of laboratory reagents in small scale laboratories. Daily; >4 hours, ambient temp unless handled in a fume hood; small quantities.	Wear suitable gloves tested to EN374 [PPE15].
2.2 Operational conditions	**Additional good practice advice beyond the REACH Chemical Safety Assessment**
Control of Worker Exposure	Good practice RMM phrases are {indicated} and incorporated within the ES Section 2 or consolidated into the main sections of the SDS.
Control of environmental exposure	As a result of the hazard assessment carried out in accordance to article 14.3, the registrant concludes that the substance does not meet the criteria for classification as dangerous for the environment; therefore risk characterisations for environmental endpoints were not developed.

3.2 Worker exposures

Exposure estimates for worker exposures are presented in Appendix 1. A summary of the data is presented below.

Exposure Estimates ES#2 – Use of 1,4-Butenediol in industrial and professional laboratories; CAS: 110-64-5				
Contributing scenario	***Predicted inhalatory exposure No Modifiers (ppm)***	***Predicted dermal exposure External Dose (mg/kg/day)***	***Predicted inhalatory exposure Modified (ppm)***	***Predicted dermal exposure Internal Dose# (mg/kg/day)***
1. PROC 15 - Use of laboratory reagents in small scale laboratories. Daily; >4 hours, ambient temp unless handled in a fume hood; small quantities.	0.1	0.12	0.1^	0.0012
^No modification of the starting point was necessary if OCs are followed. ***#Internal dose calculated using ConsExpo v4.1 and Permeability Constant (Kp) of 0.000127 cm/hr.***				