SIBUR-KHIMPROM CJSC

SAFETY DATA SHEET

According to 1907/2006/EC (REACH), 1272/2008 (CLP) & 453/2010

n-BUTANOL

VERSION: 2.4
DATE CREATED: 26/06/2015

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

1.1 Product identifier

NAME OF SUBSTANCE:	butan-1-ol
SYNONYMS:	Butyl alcohol, 1-butanol, propyl carbinol
TRADE NAMES:	n-butanol
Index No (CLP)	603-004-00-6
CAS #:	71-36-3
EC #:	200-751-6
REGISTRATION #:	01-2119484630-38-0007

1.2 Relevant identified uses of the substance

See Annex 1
Most common technical function of substance:
Intermediates
Fuels and fuel additives
Uses advised against:
The use of the substance should be limited to those specified in Annex 1.

1.3 Details of the supplier of the safety data sheet

SUPPLIER:

Company name:	Sibur-Khimprom CJSC
Address:	98, Promishlennaya str., Perm, Perm region, 614055, Russian Federation
Contact phone:	+7 3422 90-83-72; 90-84-84; 90-82-82
Fax:	+7 3422 90-81-61; 90-86-60
Email Address:	mail@siburperm.ru
Emergency phone:	+7 3422 90-87-05 (round the clock) +7 3422 90-86-79, 290-87-18 (English, German, 8.00 to 18.00, GMT+5, leave the message.)

Emergency phone in the country of delivery: **112** (*Please note that emergency numbers may vary depending upon the country of delivery though 112 remains valid as universal number*)

ONLY REPRESENTATIVE:

Company name:	Gazprom Marketing and Trading France
Address:	68 avenue des Champs-Elysées, Paris, 75008, France
Contact phone:	+33 1 42 99 73 50
Fax:	+33 1 42 99 73 99
Email address:	yury.severinchik@gazprom-mt.com

SECTION 2. HAZARDS IDENTIFICATION

2.1 CLASSIFICATION
2.1.1 Classification and labelling according to EU CLP 2008:

Physical/Chemical Hazards:
Flam. Liquid 3 (Hazard statement: H226: Flammable liquid and vapour).

Health Hazards:
Acute Tox. 4 (Hazard statement: H302: Harmful if swallowed.)
Skin Irritation 2 (Hazard statement: H315: Causes skin irritation.)
Eye Damage 1 (Hazard statement: H318: Causes serious eye damage.)

Specific target organ toxicity - single: STOT Single Exp. 3 (Hazard statement: H335: May cause respiratory irritation.)
Specific target organ toxicity - single: STOT Single Exp. 3 (Hazard statement: H336: May cause drowsiness or dizziness.)

Environmental hazards:
None.

2.2 LABELLING
2.2.1 CLP LABELLING
Signal word: Danger
Hazard pictogram:

GHS02: flame

GHS05: corrosion

GHS07: exclamation mark

2.3 Relevant Hazard- and EU Hazard-statements
Hazard statement
H302: Harmful if swallowed.

H315: Causes skin irritation.
H318: Causes serious eye damage.
H226: Flammable liquid and vapour
H335: May cause respiratory irritation.
H336: May cause drowsiness or dizziness.

Precautionary statements:
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.
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.
P370+P378: In case of fire: Use water spray, alcohol-resistant foam, carbon dioxide for extinction.
P403+P235: Store in a well-ventilated place. Keep cool.
P501: Dispose of absorbed material in accordance with regulations.

2.4 Other hazards:
Assessment PBT / vPvB:
According to Annex XIII of Regulation (EC) No.1907/2006 concerning the Registration, Evaluation,
Authorisation and Restriction of Chemicals (REACH): Not fulfilling PBT (persistent/bioaccumulative/toxic) criteria.
According to Annex XIII of Regulation (EC) No.1907/2006 concerning the Registration, Evaluation,
Authorisation and Restriction of Chemicals (REACH): Not fulfilling vPvB (very persistent/verybioaccummulative) criteria.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Name	EC #	CAS #	Content,%	Classification EC#1272/2008 (CLP)
butan-1-ol	200-751-6	71-36-3	99.0-99.9	H226; H302; H315; H318; H335; H336
butyraldehyde *Index No(CLP): 605-006-00-2*	204-646-6	123-72-8	0.001- 0.1	H225
dibutyl ether Index *No(CLP): 603-054-00-9*	205-575-3	142-96-1	0.001- 0.1	H226; H319; H335; H315; H412
butyl formate *Index No(CLP): 607-017-00-8*	209-772-5	592-84-7	0.001 – 0.199	H225; H319; H335

Specific Conc. Limits (CLP): none
M-factor: none
The product does not contain impurities or additives that could affect product's labelling and classification according Regulation (EC) No 1272/2008 (CLP)

SECTION 4. FIRST-AID MEASURES

4.1 Description of first aid measures

INHALATION

Move any exposed person to fresh air at once. Keep warm and at rest. If there is respiratory distress give oxygen. If respiration stops or shows signs of failing, apply artificial respiration. Get medical attention immediately.

INGESTION

Potential for aspiration if swallowed. Get medical aid immediately. Wash out mouth with water and give plenty of water to drink, provided person is conscious. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have the exposed person lean forward.

SKIN CONTACT

Remove contaminated clothing and wash skin with plenty of running water, under a shower if affected area is large enough to warrant this. Get medical attention if irritation develops or persists.

EYE CONTACT

Rinse immediately eye with plenty of low pressure water for at least 15 minutes.
Remove any contact lenses. Get medical attention immediately.

SECTION 5. FIRE-FIGHTING MEASURES

5.1 EXTINGUISHING MEDIA

Flammable liquid and vapour.
For small fires, use dry chemical, carbon dioxide, water spray or foam. For large fires, use water spray. Do NOT use straight streams of water. Material is lighter than water and a fire may be spread by the use of water.

5.2 SPECIAL FIRE FIGHTING PROCEDURES

Use flooding quantities of water to keep fire-exposed containers cool.

5.3 UNUSUAL FIRE & EXPLOSION HAZARDS

Vapour may cause flash fire.
Vapours are heavier than air. It may travel along the ground and be ignited at a distant location. The vapour readily mixes with air and explosive mixtures can easily be formed.

5.4 SPECIFIC HAZARDS

Combustion generates irritating and highly toxic fumes.

5.5 PROTECTIVE MEASURES IN FIRE

Wear full protective clothing and MSHA/NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS

See section 8.

6.2 ENVIRONMENTAL PRECAUTIONS
Take precautionary measures against discharges into the environment.

6.3 SPILL CLEAN UP METHODS
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

SECTION 7. HANDLING AND STORAGE

7.1 USAGE PRECAUTION
Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapour), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Take precautionary measures against static discharges. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

7.2 STORAGE PRECAUTIONS
Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

For more information please see the relevant exposure scenario in Appendix II of this SDS

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Occupational Exposure Limits

International Limit values[1)]

SUBSTANCE butan-1-ol CAS #71-36-3	**LTEL 8 hr TWA ppm**	**LTEL 8 hr TWA mg/m^3**	**STEL ppm**	**STEL mg/m^3**	**Note**
Austria	50	150	200	600	
Belgium	20	62			
Denmark	50	150	50	150	
France			50	150	
Germany (AGS)	100	310	100 (1)	310 (1)	(1) 15 minutes average value
Germany (DFG)	100	310	100	310	STV 15 minutes average value
Hungary		45		90	
Italy	-	-	-	-	

Poland		50			
Spain			50	154	skin
Sweden	15	45	30	90	
Switzerland	50	150	50	150	
The Netherlands	-	-	-	-	
United Kingdom			50	154	
USA - OSHA	100	300			
USA - NIOSH			50 (1)	150 (1)	(1) ceiling limit value
1) http://bgia-online.hvbg.de/LIMITVALUE/WebForm_ueliste.aspx					

8.1.2 DNEL/ PNEC – values:

DN(M)ELs for workers

Exposure pattern	Route	Descriptor	DNEL / DMEL
Acute - systemic effects	Dermal	N/A	N/A
Acute - systemic effects	Inhalation	N/A	N/A
Acute - local effects	Dermal	N/A	N/A
Acute - local effects	Inhalation	N/A	N/A
Long-term - systemic effects	Dermal	N/A	N/A
Long-term - systemic effects	Inhalation	N/A	N/A
Long-term - local effects	Dermal	N/A	N/A
Long-term - local effects	Inhalation	DNEL (Derived No Effect Level)	310 mg/m³

DN(M)ELs for the general population

Exposure pattern	Route	Descriptor	DNEL / DMEL
Acute - systemic effects	Dermal	N/A	N/A
Acute - systemic effects	Inhalation	N/A	N/A
Acute - systemic effects	Oral	N/A	N/A
Acute - local effects	Dermal	N/A	N/A
Acute - local effects	Inhalation	N/A	N/A
Long-term - systemic effects	Dermal	N/A	N/A
Long-term - systemic effects	Inhalation	N/A	N/A
Long-term - systemic effects	Oral	DNEL (Derived No Effect Level)	3.125 mg/kg bw/day NOAEL: 125.000 mg/kg bw/day
Long-term - local effects	Dermal	N/A	N/A
Long-term - local effects	Inhalation	DNEL (Derived No Effect Level)	55 mg/m³

PNEC water

PNEC	Assessment factor
PNEC aqua (freshwater): 0.082 mg/L	50
PNEC aqua (marine water): 0.0082 mg/L	500
PNEC aqua (intermittent releases): 2.25 mg/L	100

PNEC sediment

PNEC	Assessment factor
PNEC sediment (freshwater): 0.178 mg/kg sediment dw	none
PNEC sediment (marine water): 0.0178 mg/kg sediment dw	none

PNEC soil

PNEC	Assessment factor
PNEC soil: 0.015 mg/kg soil dw	none

PNEC sewage treatment plant

Value	Assessment factor
PNEC STP: 2476 mg/L	1

PNEC oral

PNEC	Assessment factor	Remarks/Justification
none	none	Since the substance exhibits a low log Pow secondary poisoning is unlikely to be a relevant exposure route.

8.2 Exposure Controls
8.2.1 PROTECTIVE EQUIPMENT
Protective gloves, safety goggles and protective clothing.

8.2.2 RESPIRATORY EQUIPMENT
Wear positive pressure self-contained breathing apparatus if exposure limits are exceeded or if irritation or other symptoms are experienced.

8.2.3 HAND PROTECTION
Wear appropriate protective gloves to prevent skin exposure.

8.2.4 EYE PROTECTION
Wear approved safety goggles.

8.2.5 HYGIENE MEASURES
Wash your hands at the end of each work shift, before and after eating, drinking, smoking or using the toilet.

8.2.6 SKIN PROTECTION
Wear protective clothing.

For more information please see the relevant exposure scenario in Appendix II of this SDS

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Results
Physical state at 20°C and 1013 hPa	liquid
Melting / freezing point	< -90° C
Boiling point	119 °C at 1013.25 hPa
Relative density	0.81 g/cm³ at 20°C
Vapour pressure	< 10 hPa at 20 °C
Surface tension	69.9 mN/m at 20°C and 1000 mg/L
Water solubility	66 g/L at 20°C
Partition coefficient n-octanol/water (log value)	Log Kow (Pow): 1 at 25 °C
Flash point	35° C at 1013 hPa
Flammability	flammable Flammability derived from flash point. Based on chemical structure pyrophoric properties and flammability in contact with water are not predicted.
Explosive properties	non explosive There are no chemical groups associated with explosive properties present in the molecule.
Self-ignition temperature	355° C at 1013 hPa
Oxidizing properties	no oxidizing properties The Substance is incapable of reacting exothermically with combustible materials on the basis of the chemical structure.
Granulometry	not applicable Substance is marketed or used in a non solid or granular form.
Stability in organic solvents and identity of relevant degradation products	not applicable The stability of the substance is not considered as critical.
Dissociation constant	not applicable The substance does not contain any ionic structure.
Viscosity	2.947 mPa/s at 20° C (dynamic)

SECTION 10. STABILITY AND REACTIVITY

10.1 STABILITY
Flammable liquid. Stable under normal temperatures and pressures.

10.2 MATERIALS TO AVOID
Strong oxidizing agents, strong acids, alkali metals, halogens.

10.3 CONDITIONS TO AVOID
Incompatible materials, ignition sources, excess heat, confined spaces.

10.4 HAZARDOUS DECOMPOSITION PRODUCTS
(CO)x: carbon monoxide, carbon dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Property	Results	Remarks
Acute toxicity: Oral The substance is classified according to the Annex I of 67/548/EEC as "harmful if swallowed" (R22), corresponding to Cat. 4 following 1272/2008/EC (CLP) requirements. Dermal Due to the slight dermal toxicity of butan-1-ol (rabbit LD50 ca. 3430 mg/kg bw), the substance has not to be classified according to 67/548/EEC and 1272/2008/EC (CLP) requirements. Inhalation Due to the very low inhalative toxicity of butan-1-ol, the substance has not to be classified according to 67/548/EEC and 1272/2008/EC (CLP) requirements.		
oral	LD50 (oral): 2290 mg/kg bw rat	similar OECD 401; Union Carbide Corporation 1967
inhalation	LC50 (inhalation): 17760 mg/m³ air rats (vapour)	similar OECD 403; BASF 1979
dermal	LD50 (dermal): 3430 mg/kg bw /rabbits	similar OECD 402, Union Carbide Corporation 1951 inhalation
Irritation: Skin The classification of the substance was discussed in the ECB. Results of studies performed with a mixture typically for the production process led to a classification as skin irritant (R 38 according to Annex I of 67/548/EEC and Cat. 2 according to 1272/2008/EC (CLP) criteria, respectively). Eye Due to the irreversible and severe effects on corneal opacity, iritis, conjunctivae redness and chemosis within 7 d, butan-1-ol is classified as risk for serious eye damage (R41) according to Annex I of 67/548/EEC and has to be classified as Cat. 1 according to 1272/2008/EC (CLP)		

Property	Results	Remarks
requirements. Respiratory system Due to the observed effects on the respiratory system in an inhalation hazard test, butan-1-ol is classified as Irritant to the respiratory system (R37, according to Annex I of 67/548/EEC) and has to be classified as STOT Single Exposure Cat. 3 according to 1272/2008/EC (CLP) requirements.		
Eye irritant	rabbit, 24 h, 0.1 mL: risk of serious eye damage due to irreversible effects after 7 d observation period rabbit, 24 h, 0.1 mL: irritating due to reversible effects within 21 d human, 10 a study on workers: No effects on human eyes in concentrations <= 310 mg/m3 (= 100 ppm)	Based on experimental result OECD 405, GLP; Hoechst 1988 OECD 405, GLP; ECETOC 1998 Sterner et. al. 1949;
Skin irritant	rabbit, 2 h, occlusive: irritating rabbit, 24 h, occlusive: irritating	Based on experimental result production substance; standardized BASF test; BASF 1979a production substance; Draize test; BASF 1979b
Respiratory tract	Rat, inhalation hazard test, 7 h: irritating effects on the respiratory system	BASF 1980
Corrosivity:	Category 1 (irreversible effects on the eye)	OECD Guideline 405 (Acute Eye Irritation / Corrosion); rabbit
Sensitisation: skin sensitization/ Respiratory system	not sensitizing	QSAR. Oasis Times Mix v2.26.4: (parent substance and two main metabolites; BASF SE 2010) equivalent or similar to OECD Guideline 406 (Skin Sensitization); guinea pig
Repeated dose toxicity:	Due to the observations made in the subchronic study, which were indicative for CNS depression which is common for alcohols, there is currently no need for classification of butan-1 -ol for repeated dose systemic toxicity. Repeated dermal application can cause skin dryness. NOAEL: 125 mg/kg bw/day	
oral	rat, 90d: NOAEL = 125 mg/kg bw	based on CNS effects; US EPA 1986
inhalation	rat, 90 d, vapour: NOAEL local/systemic = 2.35	Based on experimental result David et al. 2001

Property	Results	Remarks
	mg/L (corresponding to 500 ppm) based on reduced body weight, transient CNS effects and necropsy in the olfactory epithelium rat, 90 d, vapour: NOAEL systemic = 2.35 mg/L, corresponding to 500 ppm, based on reduced body weight	 David et al. 1998
dermal	rabbit, 12*5h, occlusive: drying of the skin- no systemic toxicity observed	Omie et al. 1949
Mutagenicity:	negative	
Cytogenicity in vivo data	Gene mutation in bacteria S. typhimurium TA 1535, TA 1537, TA 98 and TA 100, with and without metabolic activation (Ames test): negative (NTP 1995) Gene mutation in mammalian cells V79 cells, HPRT Test, with and without metabolic activation: negative (GLP, OECD 476; BASF SE 2010) Cytogenicity in mammalian cells CHL V79 cells, in vitro micronucleus test, without metabolic activation: negative (Lasne et al. 1984)	
In vitro data	Cytogenicity in mammals mouse (micronucleus test): negative (OECD 474; BASF 1998)	
Carcinogenicity:	No data available	There is at present no evidence for a carcinogenic potential of butan-1-ol. Therefore a carcinogenicity classification is not justified
Toxicity for reproduction:	The available data indicates that there is currently no need for classification of butan-1-ol concerning toxicity to reproduction or teratogenicity according to 67/548/EEC and 1272/2008/EC (CLP) requirements. There were no effects seen in non-maternal toxic doses.	
Effects on fertility	inhalation, rat, 6 wks before mating: NOAEL P/paternal and F1 >= 18.5 mg/L (Nelson et al. 1989) oral, rat, up to 7/8 weeks before mating: NOAEL P/maternal >= 5000 mg/kg bw (Sitarek et al. 1994) oral, rat, 90 d without mating: NOAEL reproductive organs >= 500 mg/kg bw (GLP; US EPA 1986) Isobutanol (read-across) inhalation, rat, 2-gen: NOAEL P/F1/F2 = ca. 7.37 mg/L (=2500 ppm); GLP, EPA guideline OPPTS 870.3800; WIL Res. Lab. Inc., 2003	

Property	Results	Remarks
Developmental toxicity	oral, rat, gestation day 1-19: NOAEL maternal and fetotoxicity = 1454 mg/kg bw; NOAEL teratogenicity >= 5654 mg/kg bw (Ema et al. 2005) inhalation, rat, gestation day 1-19: NOAEL maternal and fetotoxicity = 10.8 mg/L; NOAEL teratogenicity = 24.7 mg/L (Nelson et al. 1989) oral, rat, up to 7/8 weeks before and during mating: NOAEL maternal and teratogenicity >= 5000 mg/kg bw (Sitarek et al. 1994) inhalation, rat, gestation day 1-20: NOAEL behavioural teratogenicity >= 18.5 mg/L (Nelson et al. 1989)	
Toxicokinetics (absorption, metabolism, distribution and elimination)	**Absorption** Ready absorption through the skin, intestinal tract and lungs (ECETOC JACC 2003) dermal: dog: 8.8 mg/min*cm2 over 60 min (DiVincenzo and Hamilton, 1979) dermal: human in vitro: 0.048 – 2.3 mg/h*cm2 (Scheuplein et al. 1971, Boman et al. 1996) inhalation: dog: 55% absorption of 50 ppm (0.15 mg/L) butan-1-ol over 6 h (DiVincenzo and Hamilton, 1979) **Distribution** inhalation: dog: no detection in blood after exposure to 50 ppm (0.15 mg/L) butan-1-ol over 6 h (DiVincenzo and Hamilton, 1979) Metabolism Primarily performed by alcohol and aldehyd dehydrogenases (ECETOC JACC 2003) **Excretion** rat: 83% of an oral dose of 450 mg/kg bw exspired as CO2 within 24 h (DiVincenzo and Hamilton, 1979)	
Other effects: **Neurotoxicity: butan-1 -ol does not exhibit selective or cumulative neurotoxicity in laboratory animals.** Effects indicative for CNS depression were observed after single and repeated application (see also Acute Toxicity and Repeated Dose Toxicity). Therefore, the substance has to be classified with R67 according to 67/548/EEC critera and STOT single exposure, Cat. 3 (for narcotic effects) according to 1272/2008/EC (CLP) criteria, respectively.		

SECTION 12. ECOLOGICAL INFORMATION

Property	Value	Remarks
AQUATIC TOXICITY		
Fish:		
Short-term toxicity testing	With high probability acute not	Based on experimental result

Property	Value	Remarks
on fish. *(Pimephales promelas)*	harmful to fish LC50 (96 h): 1376 mg/L test mat. (meas. (not specified)) LC0 (96 h): > 100 mg/L test mat. (nominal)	OECD Guideline 203 (Fish, Acute Toxicity Test) Dow Chemical Company (1975b)
Long-term toxicity to fish: Not applicable In Annex IX of Regulation (EC) No 1907/2006, it is laid down that chronic toxicity tests shall be proposed by the registrant if the chemical safety assessment indicates the need to investigate further the effects on fish. According to Annex I of this regulation, the chemical safety assessment triggers further action when the substance or the preparation meets the criteria for classification as dangerous according to Directive 67/548/EEC or Directive 1999/45/EC or is assessed to be a PBT or vPvB. The hazard assessment of Butan-1-ol reveals neither a need to classify the substance as dangerous to the environment, nor is it a PBT or vPvB substance, nor are there any further indications that the substance may be hazardous to the environment. Therefore, and for reasons of animal welfare, a long-term toxicity study in fish is not provided.		
Aquatic invertebrates:		
Short-term toxicity to aquatic invertebrates (*Daphnia Magna)*	With high probability acute not harmful to aquatic invertebrates EC50 (48 h): 1328 mg/L test mat. (meas. (not specified)) based on: mobility	Based on experimental result OECD Guideline 202 (Daphnia sp. Acute Immobilisation Test)
Long-term toxicity to aquatic invertebrates (*Daphnia Magna)*	NOEC (21 d): 4.1 mg/L test mat. based on: reproduction	Based on experimental result OECD Guideline 211 (Daphnia magna Reproduction Test)
Algae and aquatic plants *(Selenastrum capricornutum, new name: Pseudokirchnerella subcapitata)* (algae)	With high probability acute not harmful to algae EC50 (96 h): 225 mg/L test mat. (meas. (not specified)) based on: growth rate EC50 (72 h): > 500 mg/L test mat. (nominal) based on: growth rate	Based on experimental result OECD Guideline 201 (Alga, Growth Inhibition Test) Scenedesmus-cell multiplication inhibition test, DIN 38412 Part 9
Toxicity to aquatic micro-organisms *(Pseudomonas putida)*	The inhibition of the degradation activity of activated sludge is not anticipated when introduced in appropriate low concentrations EC10 (17 h): 2476 mg/L test mat. (nominal) based on: growth inhibition EC50 (17 h): 4390 mg/L test mat. (nominal) based on: growth inhibition	Based on experimental result DIN 38412, part 8 (Pseudomonas cell multiplication inhibition test) BASF AG (1989)
Sediment organisms: Not applicable Butan-1-ol has a low potential for adsorption or bioaccumulation, exhibits a very high solubility in water and is readily biodegradable. In addition, results from the aquatic studies indicate no harmful effects. Therefore exposure of sediment organisms is unlikely and testing towards sediment dwelling organisms not necessary. Furthermore, the equilibrium partitioning method can be used for assessing the hazard of sediment organisms.		

Property	Value	Remarks
Toxicity to soil macro-organisms: Not applicable The substance has no potential for adsorption to soils, is not bioaccumulative and readily biodegradable. Furthermore, results of aquatic studies clearly indicate no harmful effects. Therefore, the equilibrium partitioning method has been used to assess the hazard potential to soil organisms.		
Toxicity to soil micro-organisms: Not applicable For Butan-1 -ol there are no appropiate data on terrestrial toxicity available for a derivation of $PNEC_{soil}$. The substance however, exhibits little potential for adsorption, is not bioaccumulative and readily biodegradable. Furthermore, results of aquatic tests revealed no harmful effects of Butan-1 -ol, and by thereby suggesting little hazardous potential towards soil organisms. Therefore, the equilibrium partitioning method has been used to assess the hazard potential of Butan-1 -ol for soil organisms.		
Toxicity to terrestrial plants: Not applicable The substance has no potential for adsorption to soils, is not bioaccumulative and readily biodegradable. Furthermore, results of aquatic studies clearly indicate no harmful effects. Therefore, the equilibrium partitioning method has been used to assess the hazard potential to soil organisms. *Lactuca sativa*: EC50 (3 d): ca. 390 mg/l test mat. (nominal) based on: Germination (ECETOC (2003) OECD (2005c)) *Cucumis sativus*: EC50: 2500 mg/l test mat. based on: germination (Smith CW, Siegel SM (1975) OECD (2005c))		
Toxicity to birds: Not applicable. No information on acute or chronic effects on birds is available. However, since the substance exhibits a low log Pow, secondary poisoning is unlikely to be a relevant exposure route.		
DEGRADATION		
ABIOTIC DEGRADATION: Degradation of butan-1-ol by abiotic processes are of minor importance. Due to its molecular stucture, i. e. absence of hydrolyzable groups, Butan-1-ol exhibits no potential for hydrolysis. Furthermore, after evaporation or exposure to air, the product will be slowly degraded by photochemical processes (t1/2 = 46.3 hours). Direct photodegradation in water is unlikely, since Butan-1-ol shows no relevant absorption above a wavelength of 295 nm. There are no data concerning the phototransformation in soil available, however these are not required for a registration under REACH.		
Abiotic hydrolysis: Not applicable According to REACH Annex VIII column 2 this study does not need to be conducted if the substance is readily biodegradable. Hence, no hydrolysis test is required for n-butanol.		
Phototransformation in air	After evaporation or exposure to the air, the product will be slowly degraded by photochemical processes. Half-life (DT50): 46 — 53.5 h Half-life (DT50): 55.9 h	key study, experimental result Atkinson R (1989) estimated by calculation (Computer programme: SRC AOP v1.92 12 Aug 2008, Calculated t 1/2 is based on a 24 h day)
Biodegradation in water: Not applicable Direct photolysis in water is not expected due to the molecular structure of butan-1-ol (no relevant absorption above a wavelength of 295 nm).		

Property	Value	Remarks
Biodegradation in soil	**Not applicable**	No requirement under REACH
BIODEGRADATION: Readily biodegradable (according to OECD criteria)		
Biodegradation in water	readily biodegradable % Degradation of test substance: 68 after 5 d (O_2 consumption) 87 after 10 d (O_2 consumption) 92 after 15 d (O_2 consumption) 92 after 20 d (O_2 consumption)	BOD (Standard Methods for the Examination of Water and Wastewater. 1971. 13th Ed. American Public Health Association, New York, NY), OECD (2005a)
Biodegradation in soil	study scientifically unjustified	Substance is readily biodegradable (according to OECD criteria), therefore no further biodegradation testing required
Fate and behavior in the Environment:		
Adsorption/desorption screening	Adsorption to solid soil phase is not expected. Adsorption coefficient: Koc: 2.443 log Koc: 0.388	Study type: adsorption (soil) Calculated PCKOCWIN v1.66
Volatilization	Henry's Law constant H: 0.0539 Pa m^3/mol Henry's Law constant H: 0.986 Pa m^3/mol at 25 °C	key study, estimated by calculation OECD SIDS (2005) Calculated using SRC HENRYWIN v3.10 (BASF SE 2008)
Environmental distribution Percent distribution in media:	Percent distribution in media: Air (%): 27.07 Water (%): 72.85 Soil (%): 0.04 Sediment (%): 0.04 Susp. sediment (%): 0 Biota (%): 0 Aerosol (%): 0	key study, estimated by calculation (BASF SE 2008)
Bioaccumulation:		
Aquatic bioaccumulation	BCF: 3.16	This is supported by a calculation using EPISUITE v.3.10 and BCFWIN v.2.14 with a log Kow of 0.88, resulting in a BCF of 3.162 L/kg (OECD SIDS 2005).
Terrestrial bioaccumulation Due to the low log Pow = 0.81, accumulation in organisms is not to be expected.		

Property	Value	Remarks
Secondary poisoning Due to the log Pow, significant accumulation in organisms is not expected. Therefore, secondary poisoning is of no concern for this substance.		
PBT/vPvB Properties	Regarding all available data on biotic and abiotic degradation, bioaccumulation and toxicity it can be stated that the substance does not fulfill the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).	

WATER HAZARD CLASSIFICATION
According to the German VwVwS: WGK- 1 (low danger for water pollution)

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 GENERAL INFORMATION
Place into a suitable closed container for disposal.

13.2 DISPOSAL METHODS
Dispose of in accordance with local and national regulations. DO NOT CUT, DRILL, GRIND, WELD OR PERFORM SIMILAR OPERATIONS ON OR NEAR CONTAINERS EVEN WHEN EMPTY.

For more information please see the relevant exposure scenario in Appendix III of this SDS

SECTION 14. TRANSPORT INFORMATION

GENERAL
The product is covered by international regulations on the transport of dangerous goods under UN DOT, hazard class 3.3 (flammable liquid).

	UN	ADR	RID	IMDG	ICAO
UN number	1120	1120	1120	1120	1120
Class	3	3	3	3	3
Packing group	III	III	III	III	III
Transport category		3	3		
Hazard label		3	3		

CHRIS code	BAN
CHRIS compatibility group	20; alcohols, glycols

USCG regulated	yes
USCG flammable/combustible cargo	yes
USCG flammability/combustibility grade	D

SECTION 15. REGULATORY INFORMATION

REGULATORY
Chemical Safety Report has been performed for butan-1-ol.
APPENDIX II to the e-SDS: Exposure scenarios. Human health exposure assessment, risk characterisation.
APPENDIX III to the e-SDS: Exposure scenarios. Environmental exposure assessment, risk characterisation.

KEY LITERATURE REFERENCES AND SOURCES

DOCUMENTS, PROVIDED BY CONSORTIUM "BUTANOL AND 2·METHYLPROPAN-1": CHEMICAL SAFETY REPORT Butanol (CAS 71-36-3).

EU DIRECTIVES
REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC

Regulation (EC) No 1272/2008 REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

Regulations. Commission regulation (EU) no 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

DIRECTIVE 1999/45/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations
Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labeling of dangerous substances.
COMMISSION DECISION of 16 January 2001 amending Decision 2000/532/EC as regards the list of wastes (notified under document number (2001/118/EC)

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations 1988. Health and Safety at Work Act 1974.

ENVIRONMENTAL LISTING
Control of Pollution Act 1974.

STATUTORY INSTRUMENTS
Notification of New Substances Regulations (NONS) 1993. The Export and Import of Dangerous Chemicals Regulations 2005 number 928.

APPROVED CODE OF PRACTICE
Classification and Labelling of Substances and Preparations Dangerous for Supply (EU 2001/59/EC). Safety Data Sheets for Substances and Preparations (REACH)

GUIDANCE NOTES
Workplace Exposure Limits EH40. Introduction to Local Exhaust Ventilation HS(G)37. CHIP for everyone HSG(108).

NATIONAL REGULATIONS
The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002. No. 1689.
Workplace Exposure Limits 2005 (EH40).
The Carriage of Dangerous Goods and use of transportable pressure equipment regulations 2004.
Control of Substances hazardous to health regulations 2002 (as amended).

NATIONAL REGULATIONS (GERMANY)
Major Accident Hazard Legislation 82/501/EWG.

SECTION 16. OTHER INFORMATION

16.1. Indication of changes

VERSION	Date of change	Section	Description of changes
Version: 1	16/03/2010		Version created according to Regulations (EC) No 1907/2006 (Article 31.1)
Version: 2.1	07/02/2011		Version created according to Regulation (EC) No 1272/2008 (Regulation CLP) & 453/2010
Version: 2.2	07/04/2011	Appendix II	Appendix II was fully updated.
Version: 2.3	11/07/2011	3; 7; 8; 13; 15; 16. Appendix II; III	1. Index No (CLP) for hazard impurities was added to Section 3. 2. Section 8 was fully updated 3. The link to Appendix II was added to Section 7, 8 4. The link to Appendix III was added to Section 13 5. Appendix II was renamed into Appendix III. 6. Appendix II to the eSDS was added. 7. Sections 15, 16 were fully updated
Version: 2.4	26/06/2015	2, 3, 16.1, 16.3	1. Sections 2, 3 were updated. 2. Information from Section 16.3 was transferred to the Section 3.

16.2 Abbreviations and acronyms

ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
AGS	The German Committee on Hazardous Substances (Ausschuss für Gefahrstoffe – AGS)
BCF	Bioconcentration factor
DFG	Germany Research Foundation

DNEL	Derived No Effect Level
IMDG	International Maritime Dangerous Goods
ICAO-TI	Technical Instructions for the Safe Transport of Dangerous Goods by Air
K_{oc}	Adsorption coefficient
Kow	octanol-water partition coefficient
LC50	Lethal Concentration to 50 % of a test population
LD50	Lethal Dose to 50% of a test population (Median Lethal Dose)
LOAEC	Lowest Observable Adverse Effect Concentration
LTEL	Long Term Exposure Limit
NIOSH	National Institute for Occupational Safety and Health *(USA CDC)*
NOEC	No Observed Effect Concentration
NOAEL	No Observed Adverse Effect Level
OECD	Organization for Economic Co-operation and Development
OSHA	Occupational Safety & Health Administration *(USA)*
PNEC	Predicted No Effect Concentration
PBT	Persistent, bioaccumulative, toxic chemical
vPvB	Very Persistent, Very Bioaccumulative
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
STEL	Short Term Exposure Limit
STOT	Specific Target Organ Toxicity
(STOT) RE	Repeated Exposure
(STOT) SE	Single Exposure
TWA	Time Weighted Average
UN	United Nations
WGK	Wassergefährdungsklasse *(German: Water Hazard Class)*

16.3 List of ES given in Appendix I to the extended SDS

ES1	Manufacturing of substance
ES2	Use of intermediates
ES3	Formulation of substance
ES4	Use in coatings- industrial
ES4	Use in coatings -professional
ES4	Use in coatings -consumer
ES5	Use in cleaning agents- industrial
ES5	Use in cleaning agents-professional
ES5	Use in cleaning agents-consumer
ES6	Use in laboratories - professional
ES7	Use in lubricants – industrial
ES7	Use in lubricants –professional
ES7	Use in lubricants-consumer
ES8	Use as metal working fluid / rolling oil - industrial
ES8	Use as metal working fluid / rolling oil - professional
ES 9	Personal care products

ES10	Distribution of substance
ES11	Use in polymer production

DISCLAIMER

This information is based on our current level of knowledge. This information may be subject to revision as new knowledge and experience becomes available, and SIBUR makes no warranties and assumes no liability in connection with any use of this information. Since SIBUR cannot be aware of all aspects of your business and the impact the REACH Regulation has for your company, SIBUR strongly encourages you to get familiar with the REACH Regulation in order to comply with its requirements and timelines.

Annex 1

Relevant identified uses of the substance

Table 1. Uses by workers in industrial settings

Identified Use (IU) name	Use descriptors
Manufacture ES1	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 15: Use as laboratory reagent **Environmental release category (ERC):** ERC 1: Manufacture of substances ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates) **Sector of end use (SU):** SU 3: Industrials uses SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals
Use as Intermediate ES2	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) **Environmental release category (ERC):** ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates) **Sector of end use (SU):** SU 3: Industrials uses SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals

Identified Use (IU) name	Use descriptors
Formulation & (re)packing of substances and mixtures ES3	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 15: Use as laboratory reagent **Environmental release category (ERC):** ERC 2: Formulation of preparations **Sector of end use (SU):** SU 3: Industrials uses SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
Distribution of substance ES4	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 15: Use as laboratory reagent **Environmental release category (ERC):** ERC 1: Manufacture of substances ERC 2: Formulation of preparations **Sector of end use (SU):** SU 3: Industrials uses SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals

Identified Use (IU) name	Use descriptors
Use in coatings (paints, ink, toners, adhesives) ES5	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 7: Industrial spraying PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 13: Treatment of articles by dipping and pouring PROC 15: Use as laboratory reagent **Environmental release category (ERC):** ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles **Sector of end use (SU):** SU 3: Industrials uses
Use in cleaning agents ES6	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 7: Industrial spraying PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 13: Treatment of articles by dipping and pouring **Environmental release category (ERC):** ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles **Sector of end use (SU):** SU 3: Industrials uses
Use in lubricants ES7	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 7: Industrial spraying

Identified Use (IU) name	Use descriptors
	PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 13: Treatment of articles by dipping and pouring PROC 17: Lubrication at high energy conditions and in partly open process PROC 18: Greasing at high energy conditions **Environmental release category (ERC):** ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles ERC 7: Industrial use of substances in closed systems **Sector of end use (SU):** SU 3: Industrials uses
Metal working fluids / rolling oils ES8	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 7: Industrial spraying PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 13: Treatment of articles by dipping and pouring PROC 17: Lubrication at high energy conditions and in partly open process **Environmental release category (ERC):** ERC 4: Industrial use of processing aids in processes and products not becoming part of articles **Sector of end use (SU):** SU 3: Industrials uses

Identified Use (IU) name	Use descriptors
Use in lubricants ES7	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 11: Non industrial spraying PROC 13: Treatment of articles by dipping and pouring PROC 17: Lubrication at high energy conditions and in partly open process PROC 18: Greasing at high energy conditions PROC 20: Heat and pressure transfer fluids in dispersive, professional use but closed systems **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems ERC 8d: Wide dispersive outdoor use of processing aids in open systems ERC 9a: Wide dispersive indoor use of substances in closed systems ERC 9b: Wide dispersive outdoor use of substances in closed systems **Sector of end use (SU):** SU 22: Professional uses
Metal working fluids / rolling oils ES8	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 10: Roller application or brushing PROC 11: Non industrial spraying PROC 13: Treatment of articles by dipping and pouring PROC 17: Lubrication at high energy conditions and in partly open process **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems **Sector of end use (SU):** SU 22: Professional uses
Use in laboratories ES10	**Process category (PROC):** PROC 10: Roller application or brushing PROC 15: Use as laboratory reagent **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems **Sector of end use (SU):** SU 22: Professional uses

Table 2. Uses by professional workers

Identified Use (IU) name	Use descriptors
Distribution of substance ES4	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 15: Use as laboratory reagent **Environmental release category (ERC):** ERC 1: Manufacture of substances ERC 2: Formulation of preparations **Sector of end use (SU):** SU 22: Professional uses
Use in coatings (paints, ink, toners, adhesives) ES5	**Process category (PROC):** PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 11: Non industrial spraying PROC 13: Treatment of articles by dipping and pouring PROC 15: Use as laboratory reagent PROC 19: Hand-mixing with intimate contact and only PPE available. **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems ERC 8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix ERC 8d: Wide dispersive outdoor use of processing aids in open systems ERC 8f: Wide dispersive outdoor use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 22: Professional uses
Use in	**Process category (PROC):**

Identified Use (IU) name	Use descriptors
cleaning agents ES6	PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 11: Non industrial spraying PROC 13: Treatment of articles by dipping and pouring **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems ERC 8d: Wide dispersive outdoor use of processing aids in open systems **Sector of end use (SU):** SU 22: Professional uses

Table 3. Uses by consumers

Identified Use (IU) name	Use descriptors
Use in coatings (paints, ink, toners, adhesives) ES5	**Process category (PROC):NA** **Product category (PC):** PC 1: Adhesives, sealants PC 4: Anti-freeze and de-icing products PC 9a: Coatings and paints, thinners, paint removes PC 9b: Fillers, putties, plasters, modeling clay PC 9c: Finger paints PC 15: Non-metal-surface treatment products PC 18: Ink and toners PC 23: Leather tanning, dye, finishing, impregnation and care products PC 24: Lubricants, greases, release products PC 31: Polishes and wax blends **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems ERC 8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix ERC 8d: Wide dispersive outdoor use of processing aids in open systems ERC 8f: Wide dispersive outdoor use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 21: Consumer uses

Use in cleaning agents ES6	**Process category (PROC):NA** **Product category (PC):** PC 4: Anti-freeze and de-icing products PC 9a: Coatings and paints, thinners, paint removes PC 9b: Fillers, putties, plasters, modeling clay PC 9c: Finger paints PC 24: Lubricants, greases, release products PC 35: Washing and cleaning products (including solvent based products) PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems ERC 8d: Wide dispersive outdoor use of processing aids in open systems **Sector of end use (SU):** SU 21: Consumer uses
Use in lubricants ES7	**Process category (PROC): NA** **Product category (PC):** PC 1: Adhesives, sealants PC 24: Lubricants, greases, release products PC 31: Polishes and wax blends PC 35: Washing and cleaning products (including solvent based products) **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems ERC 8d: Wide dispersive outdoor use of processing aids in open systems ERC 9a: Wide dispersive indoor use of substances in closed systems ERC 9b: Wide dispersive outdoor use of substances in closed systems **Sector of end use (SU):** SU 21: Consumer uses
Use as consumer care product or disinfectant ES9	**Process category (PROC): NA** **Product category (PC):** PC 28: Perfumes, fragrances PC 39: Cosmetics, personal care products **Environmental release category (ERC):** ERC 8a: Wide dispersive indoor use of processing aids in open systems ERC 8d: Wide dispersive outdoor use of processing aids in open systems **Sector of end use (SU):** SU 21: Consumer uses

Most common technical function of substance (what it does):

Intermediates

Fuels and fuel additives

DISCLAIMER

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END OF SDS