SIBUR-KHIMPROM CJSC

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

ISO-BUTANOL

VERSION: 2.4
DATE CREATED: 11/01/2014

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

1.1 Product identifier

NAME OF SUBSTANCE:	2-methyl-propan-1-ol
SYNONYMS:	Isobutyl alcohol, isobutanol, IBA, 2-methyl-1-propanol, Isopropylcarbinol
TRADE NAMES:	Iso-butanol
Index No (CLP)	603-108-00-1
CAS #:	78-83-1
EC #:	201-148-0
REGISTRATION #:	01-2119484609-23-0003

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 Page 1 of 29; 90-86-60
Email Address:	mail@siburperm.ru
Emergency phone:	+7 3422 90-87-05 (round the clock) +7 3422 Page 1 of 29 90-86-79, 290-87-18 (English, German, 9.00 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 DSD / DPD
Classification in Annex I of Directive 67/548/EEC

Physical/Chemical Hazards:
R10 Flammable.

Health Hazards:
Xi; R37/38 Irritant: Irritating to respiratory system and skin
Xi; R41 Irritant; Risk of serious damage to eyes.
R67 Vapours may cause drowsiness and dizziness R67. Vapours may cause drowsiness and dizziness

Environmental hazards:
None.

2.1.2 EU LABELLING

Indication of danger: irritant

Symbol: Xi

2.2.1 Classification according to EC/1272/2008 Annex VI (CLP (GHS)):

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

Health Hazards:
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.

2.2.2 CLP LABELLING

Signal word: Danger

Hazard pictogram:

GHS07: exclamation mark

GHS05: corrosion

GHS02: flame

2.3 RELEVANT HAZARD- AND EU HAZARD-STATEMENTS

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

Safety Advice (S-phrases:):
S2 - keep out of the reach of children
S7/9 - keep container tightly closed and in a well-ventilated place
S13 - keep away from food, drink and animal feedings tuffs
S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S37/39 - wear suitable gloves and eye/face protection
S46 - if swallowed, seek medical advice immediately and show this container or label

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.
P243: Take precautionary measures against static discharge.

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, dry extinguishing media, 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-No	CAS-No	Content,%	Classification 67/548/EEC/EU CLP 2008
Isobutanol	201-148-0	78-83-1	98.5-99.8	R10, Xi;R37/38-41, R67 H226; H302; H315; H318; H335; H336;
butan-1-ol	200-751-6	71-36-3	0.002-0.1	None
Index No(CLP): 603-004-00-6				
dibutyl ether	205-575-3	142-96-1	0.002-0.22	None
Index No(CLP): 603-054-00-9				

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 to Regulation (EC) No 67/548/EEC and Regulation (EC) No 1272/2008 (CLP)

SECTION 4. FIRST-AID MEASURES

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 victim 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.
SPECIFIC HAZARDS
Combustion generates irritating and highly toxic fumes.

5.4 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 International Limit values[1)]

SUBSTANCE 2-methyl-propan-1-ol CAS #78-83-1	**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	50	154			
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	-	-	-	-	
Italy	-	-	-	-	
Poland		100		200	
Spain	50	154			
Sweden	50	150	75	250	
Switzerland	50	150	50	150	
The Netherlands	-	-	-	-	
United Kingdom	50	154	75	231	
USA - OSHA	100	300			
USA - NIOSH	50	150			
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)	25 mg/kg bw/day NOAEL: 1,000 mg/kg bw/day
Long-term - local effects	Dermal	Hazard sufficiently covered by derivation of the respective DNEL for inhalative exposure	
Long-term - local effects	Inhalation	DNEL (Derived No Effect Level)	55 mg/m³

PNEC water

PNEC	Assessment factor	Remarks
PNEC aqua (freshwater): 0.4 mg/L	50	Extrapolation method: assessment factor Acute studies are available on all three trophic levels. Furthermore long-term studies are available on two trophic levels. The PNEC derivation based on the lowest long-term result (Daphnia magna 21 days reproduction; NOEC = 20 mg/L).
PNEC aqua (marine water): 0.04 mg/L	500	Extrapolation method: assessment factor The PNEC derivation based on the freshwater data.

PNEC aqua (intermittent releases): 11 mg/L	100	Extrapolation method: assessment factor EC50 (48h) 1100 mg/L (Daphnia pulex)

PNEC sediment

PNEC	Assessment factor	Remarks
PNEC sediment (freshwater): 1.52 mg/kg sediment dw	N/A	Extrapolation method: partition coefficientCalculated using equilibrium partitioning method according to RIP 3.2-2, Chapter R.16.
PNEC sediment (marine water): 0.152 mg/kg sediment dw	N/A	Calculated using equilibrium partitioning method according to RIP 3.2-2, Chapter R.16.

PNEC soil

PNEC	Assessment factor	Remarks/Justification
PNEC soil: 0.0699 mg/kg soil dw	N/A	Extrapolation method: partition coefficient Calculated using equilibrium partitioning method according to RIP 3.2-2, Chapter R.10.6.1.

PNEC sewage treatment plant

Value	Assessment factor	Remarks/Justification
PNEC STP: 10 mg/L	10	Extrapolation method: assessment factor Justification based on MITI 301C. Under the test condition of 100 mg/L test concentration the substance was readily biodegradable.

Secondary poisoning. Toxicity to mammals. Calculation of PNECoral.
PNEC oral

PNEC	Assessment factor	Remarks/Justification
		As the substance is not considered bioaccumulative, secondary poisoning is not a relevant exposure route. Hence, a respective assessment is not performed for this substance.

8.2 Exposure Controls

PROTECTIVE EQUIPMENT
Protective gloves, safety goggles and protective clothing.

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

HAND PROTECTION
Wear appropriate protective gloves to prevent skin exposure.

EYE PROTECTION
Wear approved safety goggles.

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

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	108 °C at 1013 hPa
Relative density	0.8017 g/cm³ at 20° C
Vapour pressure	< 16 hPa at 20° C
Surface tension	69.7 mN/m at 20° C (1 g/L)
Water solubility	70 g/L at 20° C
Partition coefficient n-octanol/water (log value)	Log Kow (Pow): 1 at 25 °C
Flash point	31° 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 to be expected.
Explosive properties	non explosive There are no chemical groups associated with explosive properties present in the molecule.
Self-ignition temperature	400° C at 1007 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	not applicable The stability of the substance is not considered as critical.

Property	Results
products	
Dissociation constant	not applicable The substance does not contain any ionic structure.
Viscosity	3.1028 mPa s at 20°C (dynamic)

SECTION 10. STABILITY AND REACTIVITY

10.1 STABILITY
Flammable liquid. Stable under normal temperatures and pressures. May form unstable peroxides.

10.2 MATERIALS TO AVOID
Strong oxidising agents.
CONDITIONS TO AVOID
Incompatible materials, ignition sources, excess heat, prolonged exposure to air, confined spaces.

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

SECTION 11. TOXICOLOGICAL INFORMATION

Property	Results	Remarks
Acute toxicity: The available data for isobutanol indicate a relative low potential for acute toxicity		
oral	LD50 (oral): 2830 mg/kg bw Rat	OECD 401
inhalation	LC50 (inhalation): 18200 mg/m³ air Rat, 6 h	GLP, neurotoxicity guideline
dermal	LD50 (dermal): 2000 mg/kg bw Rabbit	OECD 402
Irritation		
Eye irritant	irritant	Rabbit: serious risk of eye damage (irreversible corneal opacity and conjunctivae redness; OECD 405, GLP, Hoechst AG 1988) Due to the irreversible irritation effects on rabbit eyes, isobutanol has to be classified as posing the risk of serious eye damage according to Annex I of 67/548/EEC (R41) and as eye irritant Cat. 1 according to 1272/2008/EC (CLP) criteria.
Skin irritant	irritant	Rabbit, 4 h, occlusive: irritating

Property	Results	Remarks
		(superficial necrosis in 2/6 animals; OECD 404, GLP; Union Carbide Corporation 1993) In summary, results of the available studies led to the classification as skin irritant (R38) according to Annex I of 67/548/EEC, corresponding to skin irritation Cat. 2 following 1272/2008/EC (CLP) requirements.
Respiratory tract	Irritating to the respiratory tract	Acute inhalation study, rat: (Kushneva et al. 1983; Val. 4) Due to the effects observed in an acute inhalation study, isobutanol has to be classified as irritant to the respiratory tract (R37 according to Annex I of 67/548/EEC; STOT Cat. 3 according to 1272/2008/EC (CLP) requirements).
Corrosivity	Corrosive Category 1 (irreversible effects on the eye) rabbit	OECD Guideline 405 (Acute Eye Irritation / Corrosion)
Sensitisation: skin sensitization/ Respiratory system	not sensitising This information is not available	OECD Guideline 406 (Skin Sensitisation) and Calculation QSAR
Repeated dose toxicity:	There is currently no need for classification of effects according to 67/548/EEC and 1272/2008/EC (CLP) requirements due to repeated exposure to the test substance	
oral	NOAEL >= ca. 1450 mg/kg bw/ day/= 16000 ppm; no effects observed (90 d, rat, drinking water) NOAEL >= 1000 mg/kg bw/ day (90 d, rat, gavage) NOEL =316 mg/kg bw/day due to transient clinical signs and transient body weight gain reduction	OECD 408, GLP; BG Chemie 1990 GLP; US EPA 1985
inhalation	90 d, rat, 6 h/d, 5 d/wk: NOAEL systemic >= ca. 7.5 mg/L/day (2500 ppm);	GLP, neurotoxicity guideline, CMA 1996a

Property	Results	Remarks
	NOEL systemic = ca.3.0 mg/L/day due to slight hematologic effects with questionable biological significance 2-gen study/ca. 17 wks for the parental generation, 6 h/d, 7 d/wk: NOAEL systemic >= ca. 7.5 mg/L/day (2500 ppm, no effects observed;	GLP, EPA OPPTS 870.3800; ACC 2003
dermal	4-6 times 0.3 mL for 24 h within 7 d, rabbit, occlusive: no systemic toxicity studied; local: highly irritant	TSCATS OTS 0510692, 1986; Val. 4
Mutagenicity:	The test substance was not genotoxic during in vitro experiments using human, rodent, and bacterial cells or in vivo experiments in mice. For isobutanol, there is therefore no need for classification for mutagenic effects according to 67/548/EEC and 1272/2008/EC (CLP) requirements.	
Cytogenicity in vivo data	NMRI mouse (micronucleus test), up to 2000 mg/kg: negative (CMA 2000) NMRI mouse (micronucleus test), up to 1500 mg/kg: negative (BG Chemie 1999).	
In vitro data	Gene mutation in bacteria S. typhimurium TA 1535, TA 1537, TA 97, TA 98 and TA 100, with and without metabolic activation (Ames test): negative (standardized test protocol; Zeiger et al.1988) Gene mutation in mammalian cells CHL V79 cells (HPRT test), with and without metabolic activation: negative (Kreja and Seidel, 2002). Mouse L5178Y cells with and without metabolic activation (Mouse lymphoma assay): negative (TSCATS OTS 0513186, 1987)	
Carcinogenicity	No data available	Due to the lack of mutagenicity, a cancerogenic potential of isobutanol based mutagenic effects can widely be ruled out. Additionally, no structural fragments were found in a structure-activity-relationship model (CASE) indicating a carcinogenic potential. Thus, there is at present no evidence for a carcinogenic potential of isobutanol. Therefore a carcinogenicity study is not justified.
Toxicity for reproduction:	Due to the lack of toxicity on fertility and development in definite studies with isobutanol, there is no need for classification according to reproductive toxicity according to 67/548/EEC and 1272/2008/EC (CLP) requirements.	

Property	Results	Remarks
Effects on fertility	NOAEL: >= 7.5 mg/L air (analytical) (male/female) based on: test mat. (original value: 2500 ppm; no effects observed)	EPA OPPTS 870.3800 (Reproduction and Fertility Effects)
Developmental toxicity	inhalation, rat, gestation day 6-15: NOAEL maternal, teratogenicity and fetotoxicity >= 10 mg/L inhalation, rabbit, gestation day 7-19: NOAEL maternal = 2.5 mg/L due to slight impairment of body weight gain; NOAEL teratogenicity and fetotoxicity = 10 mg/L	OECD Guideline 414 (Prenatal Developmental Toxicity Study)
Toxicokinetics (absorption, metabolism, distribution and elimination)	Isobutanol is rapidly absorbed following oral administration and inhalation exposures. Isobutanol is metabolised to isobutyraldehyde and isobutyric acid in rats and humans, primarily by alcohol and aldehyde dehydrogenases.	
Other effects: Neurotoxicity 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.		
Inhalation	90 d, rat: NOAEL neurotoxicity >= 7.5 mg/L (2500 ppm); 90 d, rat: NOAEL neurotoxicity/ behaviour >= 7.5 mg/L (2500 ppm); Acute, rat: LOEL neurotoxicity = 4.5 mg/L (1500 ppm)	GLP, neurotoxicity guideline 82-7 F, CMA 1996a GLP, neurotoxicity guideline 85 F, CMA 1996b). EPA guidelines 798.6050 & 789.6200; CMA 1994

SECTION 12. ECOLOGICAL INFORMATION

Property	Value	Remarks
AQUATIC TOXICITY		
Fish:		
Short-term toxicity testing on fish.	With high probability the test substance is acutely not harmful to	Based on experimental result

(Pimephales promelas)	fish. LC50 (96 h): 1430 mg/L test mat. (meas. (not specified))	Method according to Brooke LT et al. (1984). Acute Toxicities of Organic Chemicals to Fathead Minnows
Long-term toxicity to fish: study scientifically unjustified 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 iso-butanol reveals neither a need to classify the substance as dangerous for the environment, nor is it a PBT or vPvB substance. 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 the test substance is acutely not harmful to aquatic invertebrates EC50 (48 h): 1100 mg/L test mat. (nominal) based on: mobility	Based on experimental result Method: ASTM Methods (1984) Standard practice for conducting acute toxicity tests with fishes, macroinvertebrates, and amphibians (Standard E-729-80) and Standard practice for conducting static acute toxicity tests on wastewaters with Daphnia (Standard D4229-84)
Long-term toxicity to aquatic invertebrates (*Daphnia Magna)*	NOEC (21 d): 20 mg/L test mat. (nominal) based on: reproduction	Based on experimental result Method: The test was conducted in line with the provisional procedure proposed by the Federal Environmental Agency (Umweltbundesamt, 1 Jan 1984).
Algae and aquatic plants *(Selenastrum capricornutum, new name: Pseudokirchnerella subcapitata)* (algae)	With high probability acute not harmful to algae EC50 (72 h): 1799 mg/L test mat. (meas. (arithm. mean)) based on: growth rate NOEC (72 h): 53 mg/L test mat. (meas. (arithm. mean)) based on: biomass EC50 (48 h): 2300 mg/L test mat. (nominal) based on: growth rate NOEC (48 h): 900 mg/L test mat. (nominal) based on: growth rate	Based on experimental result OECD Guideline 201 (Alga, Growth Inhibition Test)/ Dow Chemical Company (2007) 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 TGK (16 h): 280 mg/L test mat. (nominal) based on: growth inhibition	Based on experimental result Method: Cell multiplication inhibition
Sediment organisms: Not applicable Since the physicochemical data indicate that the substance is not very adsorptive or bioaccumulative, a relevant distribution into the sediment compartment and a considerable exposure of sediment organisms is not expected.		
Toxicity to soil macro-organisms: Not applicable The substance exhibits low potential for adsorption to soil, is not bioaccumulative and is readily biodegradable. This means that the substance will be rapidly mineralized by microorganisms in soil. Furthermore, results of aquatic tests revealed no harmful effects of the substance and by thereby suggesting low hazardous potential towards soil organisms. Therefore, the equilibrium partitioning method has been used to derive PNEC for soil organisms and no need for testing is deemed.		
Toxicity to soil micro-organisms: Not applicable The substance exhibits low potential for adsorption to soil, is not bioaccumulative and is readily biodegradable. This means that the substance will be rapidly mineralized by microorganisms in soil. Furthermore, results of aquatic tests revealed no harmful effects of the substance and by thereby suggesting low hazardous potential towards soil organisms. Therefore, the equilibrium partitioning method has been used to derive PNEC for soil organisms and no need for testing is deemed.		
Toxicity to terrestrial plants: Not applicable The substance exhibits low potential for adsorption to soil, is not bioaccumulative and is readily biodegradable. This means that the substance will be rapidly mineralized by microorganisms in soil. Furthermore, results of aquatic tests revealed no harmful effects of the substance and by thereby suggesting low hazardous potential towards soil organisms. Therefore, the equilibrium partitioning method has been used to derive PNEC for soil organisms and no need for testing is deemed.		
Toxicity to birds: Not applicable. Secondary poisoning is of no concern for this substance. Therefore, and for reasons of animal welfare, no tests on bird toxicity are performed. Furthermore, no PNECoral is derived.		
DEGRADATION		
ABIOTIC DEGRADATION:		
Abiotic hydrolysis: study scientifically unjustified substance is readily biodegradable		
Phototransformation in air	After evaporation or exposure to the air, the product will be slowly degraded by photochemical processes Half-life (DT50): 56 h	key study, experimental result Computer programme: SRC AOP v1.91/[BASF SE 2006].
Biodegradation in water: study scientifically unjustified		

substance is readily biodegradable		
Biodegradation in soil: study scientifically unjustified substance is readily biodegradable		
BIODEGRADATION: Readily biodegradable (according to OECD criteria)		
Biodegradation in water	readily biodegradable % Degradation of test substance: 70 — 80 after 28 d (O2 consumption) 90 — 100 after 14 d (O2 consumption)	Based on experimental result OECD Guideline 301 D (Ready Biodegradability: Closed Bottle Test) OECD Guideline 301 C (Ready Biodegradability: Modified MITI Test (I))/ Japan Chemical Industry Ecology-Toxicology & Information Center (JETOC) (1992)
Biodegradation in soil: study scientifically unjustified substance is readily biodegradable		
Fate and behaviour in the Environment: Based upon a calculated log Koc adsorption to solid soil phase is not expected. Iso-butanol slowly evaporates from the water surface into the atmosphere.		
Adsorption/desorption screening	Adsorption coefficient: Koc: 2.1 log Koc: 0.31	Study type: adsorption (soil) Calculated SRC PCKOCWIN v1.66/(BASF AG (2006b)
Volatilisation	Iso-butanol slowly evaporates from the water surface into the atmosphere. Henry's Law constant H: 1.012 Pa m³/mol at 25 °C	key study, estimated by calculation SRC HENRYWIN v3.10 (BASF AG (2006c))
Environmental distribution Percent distribution in media:	Percent distribution in media: Air (%): 32.02 Water (%): 67.92 Soil (%): 0.03 Sediment (%): 0.03	key study, estimated by calculation Calculation according to Mackay, Level I (BASF AG (2006d)
Bioaccumulation:		
Aquatic bioaccumulation: study scientifically unjustified Regarding the 1-octanol/water partition coefficient, accumulation of the test substance in organisms		

is not to be expected.	
Terrestrial bioaccumulation: study scientifically unjustified Regarding the 1-octanol/water partition coefficient, accumulation of the test substance in organisms is not to be expected.	
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	1212	1212	1212	1212	1212
Class	3	3	3	3	3
Packing group	III	III	III	III	III
Transport category		3	3		
Hazard label		3	3		

Response guide: 129
CHRIS code: IAL
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 2-methyl-propan-1-ol.

APPENDIX II to the e-SDS: Exposure scenarios. Human health exposure assessment and 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 for 2-methyl-propan-1-ol (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

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.

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. Section 15, 16 were fully updated
Version: 2.4	11/01/2014	APPENDIX II	The dossier was updated by the Lead Registrant This update contains an updated CSR including revised exposure scenarios.

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 ESs given in Appendix I to the extended SDS

ES1 Manufacture of isobutanol

ES2 Use as intermediate

ES3 Formulation & (re)packaging of substances and mixtures

ES4 Distribution of isobutanol

ES5 Use in coatings (paints, ink, toners, adhesives)

ES6 Use in cleaning agents

ES7 Use in lubricants

ES8 Metal working fluids / rolling oils

ES9 Use as consumer care product or disinfectant

ES10 Use in laboratories

Annex I

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

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 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 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

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 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 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

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 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

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END OF SDS