

GPS Safety Summary

Substance Name:

n-Butanol

1. General Statement

n-Butanol is produced in the plant of Oxochimie in Lavera (France) by hydrogenation of n-Butyraldehyde, itself obtained by 'Oxo' reaction on propylene (hydroformylation).
 The main uses of n-Butanol are solvent and intermediate for the manufacture of other chemicals.

2. Chemical Identity

Name:	n-Butanol
Brand names:	n-BUTANOL
Chemical name (IUPAC):	Butan-1-ol
CAS number:	71-36-3
EC number:	200-751-6
Molecular formula:	C ₄ H ₁₀ O
Structure:	



3. Use and applications

n-Butanol has two main industrial uses:

- **Use as a chemical intermediate:**
 n-Butanol is transformed into a variety of other chemicals, such as n-Butyl acrylate, n-Butyl methacrylate, n-Butyl glycol ethers and n-Butyl acetate. These ingredients are used in:
 - water-based paints and coatings;
 - construction adhesives and pressure-sensitive adhesives;
 - coatings for textiles, wood and paper;
 - leather finishing, particularly for nubuck and suede;
 - manufacture of various plastics;
 - as solvents for paints, inks and coating resins;
 - as cleaning fluids.

- **Use as solvent:**
 n-Butanol is used alone and in mixtures with other organic solvents:
 - by industry and professionals: in coatings (paints, ink, toners, adhesives), cleaning agents, lubricants, metal working fluids/rolling oils;
 - by consumers: in coatings, cleaning agents, lubricants, consumer care products or disinfectants.

4. Physical / Chemical properties

n-Butanol is a flammable liquid organic substance with the following physicochemical properties:

Property	Value
Physical state	Liquid at 20°C and 1013 hPa
Colour	Colourless
Odour	Stinging
Molecular weight	74.1 g/mol
Density	0.81 g/cm ³ at 20°C
Vapour pressure	10 hPa at 26.3°C
Freezing / boiling points	< -90°C / 119°C at 1013 hPa
Flash point – flammability	35°C at 1013 hPa – flammable liquid
Self-ignition temperature	355°C at 1013 hPa
Explosive / oxidizing properties	Not expected based on structure
Water solubility	66 g/L at 20°C
Octanol-water partition coefficient (Log K _{ow})	1 at 25°C

5. Health Effects

n-Butanol is a hazardous chemical which should be handled with care.

Effect Assessment	Results
Acute Toxicity Oral / inhalation / dermal	Harmful if swallowed. May be harmful in contact with skin. Of low toxicity if vapour is inhaled.
Irritation / corrosion Skin / eye/ respiratory tract	Irritating to skin. Severely irritating to eyes with irreversible damage. Vapours are irritating to the respiratory tract.
Sensitisation	Does not cause allergic skin reactions.
Toxicity after repeated exposure Oral / inhalation / dermal	Single or repeated exposure to vapours may cause CNS depression (drowsiness or dizziness). The other predominant effect is local irritation.
Genotoxicity / Mutagenicity	The substance did not cause genetic damage when tested <i>in vitro</i> and <i>in vivo</i> .
Carcinogenicity	Not anticipated to cause cancer under conditions of normal use.
Reproductive / Developmental Toxicity	Did not cause birth defects in laboratory animals. No adverse effects were seen in the foetus at doses that were not toxic to the mother. Similar materials did not cause reproductive effects in laboratory animals. In addition, no compound-related adverse effects on reproductive organs were noted in subchronic animal studies with n-Butanol.

6. Environmental Effects

n-Butanol is not classified for short- or long-term toxicity to aquatic organisms (fish, invertebrates and algae).

n-Butanol is unlikely to persist in the environment since it biodegrades rapidly in sewage treatment plants. It is not expected to bind to soil or sediment due to its negligible adsorption coefficient ($\log K_{oc} = 0.4$). If released to air, slow photochemical degradation is expected to occur. It is not expected to accumulate in the food chain, *i.e.*, the bioaccumulative potential is negligible due to the low octanol-water partition coefficient ($\log K_{ow} = 1$).

Effect Assessment	Result
Aquatic Toxicity	Acute, Chronic: low hazard.

Fate and behaviour	Result
Biodegradation	Readily biodegradable
Bioaccumulation potential	Not expected to bioaccumulate
PBT / vPvB conclusion	Not considered to be PBT* or vPvB**

*: Persistent, Bioaccumulative and Toxic (PBT)

** : Very Persistent and very Bioaccumulative (vPvB)

7. Exposure

7.1 Human health

Consumers:

Consumers may be exposed to n-Butanol when present in mixtures used in coatings, as cleaning agents, lubricant, consumer care product or disinfectant. Dermal and/or inhalation exposure is possible, depending on the type of mixture, its container and whether gloves are used.

Indirect exposure via the environment is negligible due to the biodegradability and negligible bioaccumulative potential.

Workers:

n-Butanol is industrially manufactured within closed systems or other processes minimizing the occupational exposure potential. Exposure may occur either in manufacturing facilities or in facilities using n-Butanol. Workers may be exposed during cleaning, maintenance, transfer, sampling and analysis.

The industrial use as a chemical intermediate and the formulation (mixing) also occur within closed systems or other processes minimizing exposure. Exposure potential during industrial and professional uses in coatings, cleaning agents, lubricants, metal working fluids or rolling oils is related to the specific processes involved (spraying, roller application, treatment of articles, high-energy lubrication or greasing).

Procedures, controls, collective and personal risk management measures are in place, which limit the occupational exposure during the manufacture and use of the substance. Workers who might accidentally come into contact with the undiluted substance should follow the safety measures recommended in the Extended Safety Data Sheet.

Based on the risk assessment, the risk is controlled when activities are carried out under conditions recommended in the Extended Safety Data Sheet (see Chap. 8 and Exposure Scenarios).

7.2 Environment

n-Butanol is industrially manufactured and generally used in closed systems in a continuous or batch process, or chemically transformed into other substances, minimizing release to the environment. These correspond to point sources. The professional uses in coatings, cleaning agents, lubricants, metal working fluids or rolling oils are wide dispersive uses, *i.e.* they are widespread across Europe. Potential releases may occur via wastewater and exhaust gases.

For industrial and professional uses, procedures, controls and risk management measures are in place, which limit the environmental exposure.

The main expected release compartment is the atmosphere due to the volatility, and wastewater due to the solubility. Any release to wastewater would biodegrade rapidly in waste water treatment plants. The fraction reaching the atmosphere is expected to be slowly photodegraded.

Based on the risk assessment, the risk is controlled when activities are carried out under conditions recommended in the Extended Safety Data Sheet (see Chap. 8 and Exposure Scenarios).

8. Risk Management recommendations

Human health measures	
Organizational	Collect the latest available Safety Data Sheet. Implement good basic standards of occupational hygiene. Ensure operatives are well informed of the hazards and trained to minimise exposures. Handle and store according to the indications of the Safety Data Sheet.
Engineering controls	Should be handled in well ventilated areas. Prevention of inflammation should be in place. Provide appropriate local exhaust ventilation at points of emission. Ensure that eye- and handwash stations and safety showers are close to workstation locations.
Protection	Eye/Face protection: Tightly fitting safety glasses
	Skin protection: Plasticized flexible apron, boots
	Hand protection: Neoprene or butyl-rubber gloves complying with EN374
	Respiratory protection: Respirator if ventilation is insufficient
Environment protective measures	
Do not release into the environment. Do not let product enter drains.	

9. Regulatory Information / Classification and Labelling




9.1 Regulatory Information

This substance has notably been registered and assessed under:

- EU Regulation EC 1907/2006 (REACH)
- OECD SIDS (Screening Information Data Set) program

9.2 Classification and labelling

Under GHS, substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the eSDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers and emergency responders) can better understand the hazards of the chemicals in use. Substances registered for REACH are classified according to CLP (EC) 1272/2008, implementation of the GHS in the European Union.

Classification	
<ul style="list-style-type: none">– Flammable liquids: Category 3.– Acute toxicity – Oral: Category 4.– Skin irritation: Category 2.– Serious eye damage: Category 1.– Specific target organ toxicity – single exposure (inhalation): Category 3.	
Signal word	
Danger	
Pictograms	
<ul style="list-style-type: none">– GHS02: Flame	
<ul style="list-style-type: none">– GHS05: Corrosion	
<ul style="list-style-type: none">– GHS07: Exclamation mark	
Hazard statements	
<ul style="list-style-type: none">– H226: Flammable liquid and vapour– H302: Harmful if swallowed.– H315: Causes skin irritation.– H318: Causes serious eye damage.– H335: May cause respiratory irritation.– H336: May cause drowsiness or dizziness.	
Alternative/Additional classification according to Globally Harmonized System (GHS)	
<ul style="list-style-type: none">– Acute toxicity – Oral: Category 5; May be harmful if swallowed.*– Acute toxicity – Dermal: Category 5; May be harmful in contact with skin.	

*: self-classification based on actual data overrides CLP harmonized classification in Category 4

10. Contact Information within Company

For further information on this substance or product safety summary in general, please contact:

- **ICCA portal where the GPS Safety Summary is posted:**
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>
- Arkema-acrylics-reach-uses@arkema.com

11. Date of Issues / Revision

- Date of issue: 2012/09/04
- Date of revision:

12. Disclaimer

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