MATERIAL SAFETY DATA SHEET

N-BUTYL ISOCYANATE

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name:	N-Butyl Isocyanate
CAS Number:	111-36-4
EC Number:	203-862-8

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

Product use:	Laboratory chemicals, Industrial & for research use only

1.3 Details of the supplier of the safety data sheet

Company name:	East Harbour Group Ltd 20 Clough Road, Severalls Industrial Park Colchester, Essex, CO4 9QS United Kingdom
Telephone:	+44 (0) 333 242 0100
Email:	info@eastharbourgroup.com

1.4 Emergency telephone number

Emergency telephone:	0800 246 1274

Section 2: Hazardous identification

2.1 Classification of the substance or mixture

Flammable liquids, Category 2
Acute toxicity - Category 4, Oral
Skin corrosion, Sub-category 1B
Skin sensitization, Sub-category 1A
Serious eye damage, Category 1
Acute toxicity - Category 1, Inhalation
Specific target organ toxicity – single exposure, Category 3
Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 3

2.2 Label elements

Pictograms:

Signal Word Danger

N-BUTYL ISOCYANATE

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233	Keep container tightly closed.
P240	Ground and bond container and receiving equipment.
P241	Use explosion-proof [electrical/ventilating/lighting/...] equipment.
P242	Use non-sparking tools.
P243	Take action to prevent static discharges.
P280	Wear protective gloves/protective clothing/eye protection/face protection / hearing protection/...
P264	Wash ... thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P272	Contaminated work clothing should not be allowed out of the workplace.
P271	Use only outdoors or in a well-ventilated area.
P284	[In case of inadequate ventilation] wear respiratory protection.
P273	Avoid release to the environment.

Response

P303+P361+P353 IF ON SKIN: (or hair)	Take off immediately all contaminated clothing. Rinse affected areas with water [or shower].
P370+P378	In case of fire: Use ... to extinguish.
P301+P317	IF SWALLOWED: Get medical help.
P330	Rinse mouth.
P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P363	Wash contaminated clothing before reuse.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P316	Get emergency medical help immediately.
P321	Specific treatment (see ... on this label).
P305+P351+P338 IF IN EYES:	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P302+P352	IF ON SKIN: Wash with plenty of water/...
P333+P317	If skin irritation or rash occurs: Get medical help.
P362+P364	Take off contaminated clothing and wash it before reuse.
P305+P354+P338 IF IN EYES:	Immediately rinse with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P317	Get medical help.
P320	Specific treatment is urgent (see ... on this label).
P319	Get medical help if you feel unwell.

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Storage

P403+P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.

2.3 Other hazards
No data available

Section 3: Composition/information on ingredients

3.1 Substances

Chemical name:	Butyl isocyanate
Common names and synonyms:	Butyl isocyanate
CAS number:	111-36-4
EC number:	203-862-8
Concentration:	100%

Section 4: First aid measures

4.1 Description of first aid measures
If inhaled
Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.

Following skin contact
Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.

Following eye contact
Rinse with plenty of water for several minutes (remove contact lenses if easily possible).

Following ingestion
Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Refer immediately for medical attention.

4.2 Most important symptoms and effects, both acute and delayed
Excerpt from ERG Guide 155 [Substances - Toxic and/or Corrosive (Flammable / Water-Sensitive)]: TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death. Bromoacetates and chloroacetates are extremely irritating/lachrymators. Reaction with water or moist air will release toxic, corrosive or flammable gases. Reaction with water may generate much heat that will increase the concentration of fumes in the air. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. (ERG, 2016)

4.3 Indication of any immediate medical attention and special treatment needed
Noncardiogenic pulmonary edema and bronchospasm are the most immediate serious clinical consequences of isocyanate exposure. Markedly symptomatic patients should receive oxygen, ventilatory support, and an intervenors line. Treatment for asthma includes inhaled sympathomimetics (salbutamol, metaproterenol), intravenous theophylline, parenteral sympathomimetics (epinephrine, terbutaline), and steroids. Isocyanates

N-BUTYL ISOCYANATE

Section 5: Fire-fighting measures

5.1 Fire Fighting Media and Instructions:
Persons involved in fighting fires should wear a self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive pressure mode. ... Methyl isocyanate

5.2 Special hazards arising from the substance or mixture
Excerpt from ERG Guide 155 [Substances - Toxic and/or Corrosive (Flammable / Water-Sensitive)]: HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. Vapors form explosive mixtures with air: indoors, outdoors and sewers explosion hazards. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapors may travel to source of ignition and flash back. Those substances designated with a (P) may polymerize explosively when heated or involved in a fire. Substance will react with water (some violently) releasing flammable, toxic or corrosive gases and runoff. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated or if contaminated with water. (ERG, 2016)

5.3 Special protective actions for firefighters
Use dry powder, foam, carbon dioxide. NO water. In case of fire: keep drums, etc., cool by spraying with water. NO direct contact with water. Combat fire from a sheltered position.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Evacuate danger area! Ventilation. Remove all ignition sources. Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Do NOT wash away into sewer. Do NOT let this chemical enter the environment.

6.2 Environmental precautions
Evacuate danger area! Ventilation. Remove all ignition sources. Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Do NOT wash away into sewer. Do NOT let this chemical enter the environment.

6.3 Methods and materials for containment and cleaning up
Collect and arrange disposal. Keep the chemical in suitable and closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Adhered or collected material should be promptly disposed of, in accordance with appropriate laws and regulations.

Section 7: Handling and storage

7.1 Precautions for safe handling
NO open flames, NO sparks and NO smoking. Closed system, ventilation, explosion-proof electrical equipment and lighting. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

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7.2 Conditions for safe storage, including any incompatibilities
Fireproof. Separated from strong oxidants and food and feedstuffs. Cool. See Chemical Dangers. Store in an area without drain or sewer access.

Section 8: Exposure controls/personal protection

8.1 Control parameters
Occupational Exposure limit values

Component	Butyl isocyanate			
CAS No.	111-36-4			
	Limit value - Eight hours		Limit value - Short term	
	ppm	mg/m³	ppm	mg/m³
Latvia		1		
	Remarks			

Biological limit values
No data available

8.2 Appropriate engineering controls
Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

8.3 Individual protection measures, such as personal protective equipment (PPE)
Eye/face protection
Wear safety goggles or eye protection in combination with breathing protection.

Skin protection
Protective gloves. Protective clothing.

Respiratory protection
Use ventilation, local exhaust or breathing protection.

Thermal hazards
No data available

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state:	N-butyl isocyanate is a clear, colorless liquid with a pungent odor. Very toxic by ingestion, and may also be toxic by skin absorption and inhalation. Vapors heavier than air. Less dense than water and insoluble in water. Produces toxic oxides of nitrogen during combustion.
Colour:	Colorless liquid
Odour:	No data available
Melting point/freezing point:	315°C(lit.)
Boiling point or initial boiling: point and boiling range	115°C
Flammability	Highly flammable. Heating will cause rise in pressure with risk of bursting.

Lower and upper explosion: limit/flammability limit	No data available
Flash point:	19°C(lit.)
Auto-ignition temperature:	425°C
Decomposition temperature:	No data available
pH:	No data available
Kinematic viscosity:	No data available
Solubility:	In water, 1.4X10+3 mg/L at 25 deg C (est)
Partition coefficient: n-octanol/water	log Kow = 2.26 (est)
Vapour pressure:	10.6 mm Hg (20 °C)
Density and/or relative density	0.88
Relative vapour density:	3 (vs air)
Particle characteristics:	No data available

Section 10: Stability and Reactivity

10.1 Reactivity
The substance may polymerize due to heating. Decomposes on burning. This produces toxic gases including nitrogen oxides and hydrogen cyanide. Reacts violently with strong oxidants and water.

10.2 Chemical stability
No data available

10.3 Possibility of hazardous reactions
The vapour mixes well with air, explosive mixtures are easily formed.Isocyanates and thioisocyanates are incompatible with many classes of compounds, reacting exothermically to release toxic gases. Reactions with amines, aldehydes, alcohols, alkali metals, ketones, mercaptans, strong oxidizers, hydrides, phenols, and peroxides can cause vigorous releases of heat. Acids and bases initiate polymerization reactions in these materials. Some isocyanates react with water to form amines and liberate carbon dioxide. Base-catalysed reactions of isocyanates with alcohols should be carried out in inert solvents. Such reactions in the absence of solvents often occur with explosive violence [Wischmeyer 1969].

10.4 Conditions to avoid
No data available

10.5Incompatible materials
No data available

10.6Hazardous decomposition products
Energy of decomposition (in range 160 to 450 deg C) measured as 0.55 kJ/g

Section 11: Toxicological Information

11.1 Toxicological effects:
Acute toxicity

Oral:	LD50 Guinea pig oral 250 mg/kg
Inhalation:	LC50 Rat inhalation 0.059 mg/L/4 hr 99.5% purity
Dermal:	No data available

Skin corrosion/irritation
No data available

Serious eye damage/irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
No data available

Reproductive toxicity
No data available

STOT- single exposure
The substance is corrosive to the eyes, skin and respiratory tract. Inhalation may cause lung oedema. See Notes.

STOT- repeated exposure
Repeated or prolonged contact may cause skin sensitization. See Notes.

Aspiration hazard
A harmful contamination of the air will be reached quickly on evaporation of this substance at 20°C.

Section 12: Ecological Information

12.1 Toxicity

Toxicity to fish:	No data available
Toxicity to daphnia and other aquatic invertebrates:	No data available
Toxicity to algae:	No data available
Toxicity to microorganisms:	No data available

12.2 Persistence and degradability
Isocyanates undergo rapid hydrolysis under environmental conditions with half-lives of less than 10 minutes(1). Therefore, hydrolysis is expected to be the dominant fate process for n-butyl isocyanate in moist soil and water(SRC). Biodegradation is not expected to compete with hydrolysis as an important fate process(SRC).

12.3 Bioaccumulative potential
Isocyanates undergo rapid hydrolysis under environmental conditions with half-lives of less than 10 minutes(1). Therefore, hydrolysis is expected to be the dominant fate process for n-butyl isocyanate in water(SRC). Bioconcentration is not expected to compete with hydrolysis as an important environmental process(SRC).

12.4 Mobility in soil
Isocyanates undergo rapid hydrolysis under environmental conditions with half-lives of less than 10 minutes(1). Therefore, hydrolysis is expected to be the dominant fate process for n-butyl isocyanate in

moist soil and water(SRC). Adsorption to soil and sediment is not expected to compete with hydrolysis as an important environmental process(SRC).

12.5 Other adverse effects
No data available

Section 13: Disposal considerations

13.1 Waste treatment methods
Product
The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging
Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

Section 14: Transport Information

14.1 UN Number

ADR/RID:	UN2485 (For reference only, please check.)
IMDG:	UN2485 (For reference only, please check.)
IATA:	UN2485 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID:	n-BUTYL ISOCYANATE (For reference only, please check.)
IMDG:	n-BUTYL ISOCYANATE (For reference only, please check.)
IATA:	n-BUTYL ISOCYANATE (For reference only, please check.)

14.3 Transport hazard class(es)

ADR/RID:	6.1 (For reference only, please check.)
IMDG:	6.1 (For reference only, please check.)
IATA:	6.1 (For reference only, please check.)

14.4 Packing group, if applicable

ADR/RID:	I (For reference only, please check.)
IMDG:	I (For reference only, please check.)
IATA:	I (For reference only, please check.)

14.5 Environmental hazards
ADR/RID: No IMDG: No IATA: No

14.6 Special precautions for user
No data available

14.7 Transport in bulk according to IMO instruments
No data available.

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Section 15: Regulatory Information

15.1Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
Butyl isocyanate	Butyl isocyanate	111-36-4	203-862-8
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Listed.
China Catalog of Hazardous chemicals 2015			Listed.
New Zealand Inventory of Chemicals (NZIoC)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Listed.
Korea Existing Chemicals List (KECL)			Listed.

Section 16: Other Information

Abbreviations and acronyms

CAS: Chemical Abstracts Service
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
IMDG: International Maritime Dangerous Goods
IATA: International Air Transportation Association
TWA: Time Weighted Average
STEL: Short term exposure limit LC50: Lethal Concentration 50%
LD50: Lethal Dose 50%
EC50: Effective Concentration 50

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