Hanwha Chemical

SAFETY DATA SHEET

Date Printed: Jun 20, 2016
Version: 2
Revision Date: March 6, 2018
Regulation: According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

1. Identification

1.1 Product identifier

1.1.1 Product of name: N-BuOH

1.1.2 Other means of identification: n-butyl alcohol

1.2 Recommended use of the chemical and restrictions on use
1.2.1 Recommended use: Paint and raw material of DBT
1.2.2. Restrictions on use: Do not use for purposes other than those recommended

1.3 Details of the supplier of the safety data sheet
1.3.1 Manufacturer
Company name: Hanwha Chemical Co, Ltd.
Address: Yeosu plant, Hanwha Chemical Co, Ltd., 117, Yeosusandan 3-ro, Yeosu-si, Jeollanam-do, Korea
Prepared by: OA Production Team
Contact Telephone: (Yeosu plant) +82-61-689-4124
1.3.2 Supplier & Distributor
Company name: Hanwha Chemical Co, Ltd.
Address: Hanwha Bldg., Janggyo-dong, Jung-gu, Seoul, Korea
Prepared by: PLS Sales Team
Contact Telephone: +82-2-729-2990

1.4 Emergency phone number
Emergency phone: +82-61-689-4124

2. Hazard(s) identification

2.1 Classification of the substance or mixture
According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Physical / Chemical Hazards:
Flammable liquids: Category 3

Health Hazards:
Acute toxicity (oral): Category 3
Skin corrosion/irritation: Category 2
Serious eye damage /eye irritation: Category 2A
Specific target organ toxicity (single exposure): Category 3 (narcotic effects), Category 3 (respiratory tract irritation)
Aspiration Hazard: Category 2

Environmental Hazards:
Not Classified

2.2 Label elements, including precautionary statements
- **Pictogram and symbol**:

- **Signal word**: Warning
- **Hazard statements**:

H226 Flammable liquid and vapour.
H305 May be harmful if swallowed and enters airways
H315 Irritation to skin.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H336 May cause drowsiness or dizziness.

- **Precautionary statements:**

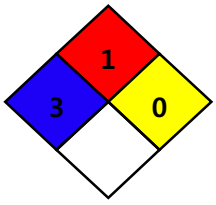
- Prevention:
P201 Obtain special instructions before use.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Wash thoroughly after handling the treated area.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

- Treatment:
P301+310 IF SWALLOWED: Immediately call a POISON CENTER/doctor/
P302+P352 If on skin: Wash with plenty of soap and water.
P303+P361+P353 If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a poison center or doctor/physician you feel unwell.
P321 Specific treatment (see information on this label).
P331 Do NOT induce vomiting.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P370+P378 In case of fire: Use the appropriate fire extinguishing agent for extinction.

- Storage:
P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P403+P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

- Disposal:
P501 Dispose the contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazard information not included in hazard classification (NFPA)



- **Health:** 1
- **Flammability:** 3
- **Reactivity:** 0

3. Composition/information on ingredients

Component	Common name and synonyms	CAS No.	Conc. / %
Butan-1-ol	n-butyl alcohol	71-36-3	100

4. First-aid measures

4.1 Description of first aid measures

Eye contact

- Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- Get immediate medical advice/attention.

Skin contact

- If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- If skin irritation or rash occurs: Get medical advice/attention.
- Get immediate medical advice/attention.
- Remove and isolate contaminated clothing and shoes.
- For minor skin contact, avoid spreading material on unaffected skin.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Wash skin with soap and water.

Inhalation

- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.
- If the user is not able to breath, give artificial respiration..
- If the user is not easy to breath, offer the oxygen .

Ingestion

- If swallowed: Immediately call a poison center or doctor/physician.

4.2 Most important symptoms and effects, both acute and delayed

- Inhalation: May cause acute toxicity of inhalation.
- Skin contact: May cause severe skin corrosion.
- Eye contact: May cause severe eye damage.

4.3 Indication of immediate medical attention and notes for physician

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. Fire-fighting measures

5.1 Extinguishing media

- **Suitable extinguishing media:** CO_2, dry chemical, water spray, alcohol-resistant foam
- **Unsuitable extinguishing media**: Fire suppression with low flashing point substances , extinguishing may be ineffective.

5.2 Specific hazards arising from the chemical

- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Thermal decomposition products: Carbon oxides ,Irritating, corrosive and/or toxic Gas
- Vapors may develop the explosive gas mixture with oxygen.
- Vapors may travel to a source of ignition and ignite.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas
- Indoor and outdoor drain, hazard of vapor explosion and addiction-risk exists.
- Containers could be exploded by the heat and could blow away when it is burst

5.3 Special protective equipment and precautions for fire-fighters

- Wear full protective firefighting gear including self-contained breathing apparatus (SCBA) for protection against possible exposure.
- The fire suppression is not fully protectable from the hazard.
- Inhalation and contact of the substance may cause irritation or burn on skin and eyes.
- Vapor may cause dizziness or suffocation.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- The very fine particles may cause a fire or explosion, eliminate all ignition sources.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Isolate hazard area.
- Keep unnecessary and unprotected personnel from entering.
- Eliminate all ignition sources.
- All equipment used when handling the product must be grounded.
- Stop leak if you can do it without risk.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- A vapor suppressing foam may be used to reduce vapors.

6.2 Environmental precautions

- Prevent entry into water ways : sewers, basements or confined areas.

6.3 Methods and materials for containment and cleaning up

- Dike and collect water used to fight fire.
- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Absorb the liquid and scrub the area with detergent and water.
- Large Spill; Dike far ahead of liquid spill for later disposal.
- Use clean non-sparking tools to collect absorbed material.

7. Handling and storage

7.1 Precautions for safe handling

- Use explosion-proof electrical/ventilating/lighting equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Avoid breathing dust/fume/gas/mist/vapours/spray
- Wash thoroughly after handling the treated area.
- Use only outdoors or in a well-ventilated area.
- Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition.
- Follow all SDS/label precautions even after container is emptied because they may retain product residues.
- Loosen closure cautiously before opening.
- All equipment used when handling the product must be grounded.
- Please work with reference to engineering controls and personal protective equipment.
- Be careful to heat.
- You need measurement of air concentration and ventilation in low, closed and confined areas due to lack of oxygen.

7.2 Conditions for safe storage, including any incompatibilities

- Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- Store in a well-ventilated place. Keep container tightly closed.
- Store in a well-ventilated place. Keep cool.
- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.

8. Exposure controls/personal protection

8.1 Occupational Exposure limits

- **ACGIH regulation**: TWA=50ppm, 150mg/m^3 (ceiling, skin)
- **Biological exposure index**: TWA=20 ppm
- **OSHA regulation**: TWA=100 ppm; TWA=300 mg/m^3, 50 ppm Ceiling; 150 mg/m^3 Ceiling
- **NIOSH regulation**: 50 ppm Ceiling; 150 mg/m^3 Ceiling, 1400 ppm IDLH (10% LEL)
- **EU regulation**:
  - Austria: TWA=50 ppm [TMW]; TWA=150 mg/m^3 [TMW]
  - Belgium: TWA=20 ppm (62 mg/m^3)
  - Finland: TWA=50 ppm (listed under Butanol); TWA=150 mg/m^3 (listed under Butanol)
- **Other**:
  - Brazil: TWA=40 ppm; (115 mg/m^3)
  - Canada: TWA=20 ppm; (60 mg/m^3)
  - China: TWA=100 mg/m^3

8.2 Exposure controls

Appropriate engineering controls

- If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the recommended exposure limit.
- Facilities for storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Individual protection measures, such as personal protective equipment

Respiratory protection

- Follow the OSHA respirator regulations found in 29 CFR 1910.134. Use a NIOSH/MSHA approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Eye protection

- Wear chemical splash goggle.

- An eye wash unit and safety shower station should be available nearby work place.

Hand protection

- Wear appropriate chemical resistant protective gloves by considering physical and chemical properties of chemicals.

Body protection

- Wear appropriate chemical resistant protective clothing by considering physical and chemical properties of chemicals.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Description: Liquid

Color:	Colorless
Odor :	Alcohol-like
Odor threshold :	Not available
pH :	7
Taste:	Banana-like, Petroleum-like
Taste threshold:	5.00X10-1ppm
Melting point/freezing point :	-89.9 ℃
Initial boiling point and boiling range :	117.6 ℃ (101.325 kPa)
Flash point :	29℃
Evaporation rate :	0.46 (butyl acetate= 1)
Flammability (solid, gas) :	Flammable liquid
Upper/lower flammability or explosive limits :	UEL 11.2 (14,000 – 112,000 ppm) LEL 1.4%
Vapor pressure :	0.56 hPa (20°C)
Vapor density :	2.6 (Air= 1)
Relative density	0.8097 (20/4°C)
Solubility :	77,000 mg/l (20℃)
Partition coefficient: n-octanol/water :	logKow= 1
Auto-ignition temperature :	365°C
Decomposition temperature	639.53 kg cal/g mol wt (25°C)
Viscosity :	36.1 cP (-50.9°C), 5.186 cP (0°C), 2.544 cP (25°C), 0.533 cP (100°C)
Molecular weight :	74.12g/mol

"NOTE: The physical data presented above are typical values and should not be construed as a specification"

10. Stability and reactivity

10.1 Reactivity/Chemical stability/Possibility of hazardous reactions:

- Stable under normal temperatures and pressures.

10.2 Conditions to avoid:

- Keep away from heat/sparks/open flames/hot surfaces. No smoking.

10.3 Incompatible materials:

- Metal, Flammable material, oxidizing agents, metallic salts.

10.4 Hazardous decomposition products:

- Carbon oxides, irritating, corrosive and/or toxic vapors.

11. Toxicological information

Information on toxicological effects	
(a) Acute toxicity	
Oral	Not classified

	- rat, LD_{50} = ca. 2,292 mg/kg bw (OECD TG 401)
Dermal	Not classified
	- rabbit (male), LD_{50} = ca. 3,430 mg/kg bw , LD_{50} = 4.24 mL/kg bw (OECD TG 402, GLP)
Inhalation	Not classified
	- rat (male), EC_{50} = > 6530 ppm
(b) Skin Corrosion/ Irritation	Category 2
	- In the test with rabbit, this substance is corrosive to rabbit skin. (score : 0.56) (OECD TG 405, GLP)
(c) Serious Eye Damage/ Irritation	Category 2A
	- In the test with human, this substance produce severely injured to human eyes. Corena score: 2.67, Iris score: 1 , Counjunctiva score: 3, Chemosis score: 2.33 (OECD TG 405, GLP)
(d) Respiratory sensitization	Not available
(e) Skin Sensitization	Not classified
	- In the test with guinea pig, this substance was not observed the skin sensitization. (OECD TG 406) (read-across)
(f) Carcinogenicity	Not classified
	- IARC, ACGIH, NTP, OSHA, EU CLP 1272/2008: Not listed
(g) Mutagenicity	Not classified
	- *In vitro*: Mammalian cell gene mutation assay with/ without metabolic activation: Negative (OECD TG 476, GLP) *In vitro*: Mammalian cell gene mutation assay with/ without metabolic activation (*S. typhimurium TA 102*) : Negative *In vivo*: In the in vivo mutagenicity test with mouse : Negative
(h) Reproductive toxicity	Not classified
	- In the test with rat, in 750, 1500, 2000ppm concentration, no toxicity during two generation. In 1500ppm, 2000ppm Effects on body weight/body weight gain and food consumption, no other histopathological effects were observed, Growth retardation and post-weaning is observed to pups in 2000ppm. NOEC=2000ppm, NOAEC=750ppm (OECD TG 416, GLP) (read-across)
(i) Specific target organ toxicity (single exposure)	Category 3(anesthesia), Category 3(irritation in respiratory organ)
	- In the test with rat, in ca. 21.48mg/l concentration during 7 hours, rapid and intermittence breathing is observed. Irritation in respiratory organ is observed. (LC0> 21.48 mg/L 7h) - In the test with the rat, in 3,160, 3,980, 5,000, 6300mg/kg concentration, comatose state, dehydrated state and death are observed. LD_{50} = 4360mg/kg bw (OECD TG 401)
(j) Specific target organ toxicity (repeat exposure)	Not classified
	- 1-chloro-2,3-epoxypropane In 13 weeks sub-chronic oral study with rat, in ca. 2.35, 7.05, 14.1 mg/L concentration, moderate decline of activity, awareness, react is observed in 3000ppm.

	Diarrhea and discoloration on the chin hair is also observed. (NOAEL = 1mg/kg/ bw/day) (OECD TG 408)
(k) Aspiration Hazard	Category 2
	2.947 mPa s (dymanic)(20℃), primary alcochol consisting of C3~13

12. Ecological information

12.1 Toxicity	
Acute toxicity	- Not classified - Fish: 96hr, NOEC (*Pimephales promelas*) = 519 mg/L LC_{50}= 1,376 mg/L (OECD TG 203, GLP) Crustacean: 48 hr, NOEC (*Daphnia magna*) = 415 mg/L , EC50 = 1,328 mg/L (OECD TG 202, GLP) Algae: Not available
Chronic toxicity	- Not classified - 21 d, NOEC (*Daphnia magna*) = 4.1 mg/L , EC50 = 18 mg/L (OECD TG 211 GLP)
12.2 Persistence and degradability	- Persistence: Low persistency (log Kow is less than 4) (Log Kow = 1) (Estimated) Degradability : BA degrades in air by reaction with hydroxyl radicals, having a half-life in air of 1.2 to 2.3 days.
12.3 Bioaccumulative potential	- Bioaccumulation: Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (Estimated) Biodegradation: Not available
12.4 Mobility in soil	- No potency of mobility to soil. (Koc = 2.443) (Estimated)
12.5 Hazardous to the ozone layer	- Not Classified
12.6 Other adverse effects	- Not available

13. Disposal considerations

13.1 Disposal method

Waste must be disposed of in accordance with federal, state and local environmental control regulation.

13.2 Disposal precaution

Consider the required attentions in accordance with waste treatment management regulation.

14. Transport information

14.1 UN No.: 1993

14.2 UN Proper shipping name: FLAMMABLE LIQUID, N.O.S.

14.3 Transport Hazard classes:

ADR: 3
IMDG: 3
ICAO/IATA: 3
RID: 3

14.4 Packing group: I

14.5 Environmental hazards: Not applicable

14.6 Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code): Not established

14.7 Special precautions for user

in case of fire: F-E

in case of leakage: S-E

15. Regulatory information

15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture

USA Regulatory Information

TSCA (Toxic Substances Control Act): Section8(b) inventory: Present

Proposition 65: Regulated

OSHA Regulation: Not regulated

CERCLA Regulation: 5,000 lb final RQ; 2,270 kg final RQ

SARA 302 Regulation: Not regulated

SARA 304 Regulation: Not regulated

SARA 313 Regulation: Regulated

SARA 311/312 Regulation: Not regulated

Foreign Regulatory Information

Substance of Roterdame Protocol: Not regulated

Substance of Stockholme Protocol: Not regulated

Substance of Montreal Protocol: Not regulated

Foreign Inventory Status

- Korea management information: Phase-in substance subject to registration (KE-03867)
- European List of Notified Chemical Substances (ELINCS)): Present (200-751-6)
- Japan management information: Existing and New Chemical Substances (ENCS): Present ((2)-3049)
- China management information: Inventory of Existing Chemical Substances (IECSC): Present (41348)
- Canada management information: Domestic Substances List (DSL): Present
- Australia management information: Australian Inventory of Chemical Substances (AICS): Present
- New Zealand management information: New Zealand Inventory of Chemicals (NZIoC): HSNO Approval: HSR001096
- Philippines management information: Philippine Inventory of Chemicals and Chemical Substances (PICCS): Present

16. Other information, including date of preparation or last revision

16.1 Indication of changes:

Preparation date: Jun 20, 2016
Version: 2
Revision date: March 6, 2018

16.2 Key literature reference and sources for data:

○ National chemicals information systems ; http://ncis.nier.go.kr
○ Pubchem; http://pubchem.ncbi.nlm.nih.gov/
○ AKRON; http://ull.chemistry.uakron.edu/erd/
○ IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; http://monographs.iarc.fr
○ ECHA; http://echa.europa.eu/registration-dossier/-/registered-dossier/15859
○ OECD SIDS; http://webnet.oecd.org/
○ HSDB; http://toxnet.nlm.nih.gov/
○ NIOSH (The National Institute for Occupational Safety and Health)
○ ACGIH (American Conference of Governmental Industrial Hygienists)
○ TOMES-LOLI® ; http://www.rightanswerknowledge.com/loginRA.asp
○ National Emergency Management Agency-Korea dangerous material inventory management system; http://www.nema.go.kr/hazmat/main/main.jsp
○ Waste Control Act enforcement regulation attached [1]

16.3 Abbreviations

ACGIH: American Conference of Governmental Industrial hygienists
NIOSH: The National Institute for Occupational Safety and Health
OSHA: Occupational Safety & Health Administration
IARC: International Agency for Research on Cancer
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
IMDG: International Maritime Dangerous Goods
ICAO/IATA: International Civil Aviation Organization/ International Air Transport Association
RID: Regulations Concerning the International Transport of Dangerous Goods by Rail

16.4 Other

- Product should be handled, stored, and used in accordance with the generally accepted industrial hygiene practices and in conformity with all the applicable legal regulations.
- The information provided herein is based on the knowledge possessed at this present time from the view point of safety requirements.
- It should, therefore, not be construed as guaranteeing specific properties.