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

Product Name: S-Butyl Acetate (SBA)
Product Uses: Industrial solvent.
Manufacturer/Supplier: TOP Solvent Company Limited
555/1 Energy Complex Building A, 11th Floor
Viphavadi Rangsit Road Chatuchak, Bangkok 10900
Thailand
Telephone: +66 2 299 0003 or +66 2 797 2993
Fax: +66 2 797 2983
Emergency Telephone Number: +66 2 299 0003 [working hours] or
+66 38 683090 ext.103 [out of working hours]
Other Information: TOPSol is a trademark owned by TOP Solvent Company Limited

2. HAZARDS IDENTIFICATION

GHS Classification: Flammable liquid, Category 2
Acute toxicity (Oral) Category 5
Skin corrosion/irritation Category 3
Serious eye damage/eye irritation Category 2A-2B
Specific target organ systemic toxicity (single exposure) Category 2(central nervous),
Category 3(respiratory irritation, drowsiness and dizziness)

GHS label elements
Symbol(s):

Signal words: Danger

GHS Hazard Statements
S-Butyl Acetate (SBA)
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Effective Date 1-June-2012

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Physical Hazards: H225 - Highly Flammable liquid and vapor.
Health Hazards:
- H303 - May be harmful if swallowed.
- H316 - Causes mild skin irritation.
- H320 - Causes eye irritation.
- H371 - May cause damage to central nervous.
- H335 - May cause respiratory irritation.
- H336 - May cause drowsiness and dizziness.

Environmental Hazards: Not classified as an environmental hazard under GHS criteria.

GHS Precautionary statements
Prevention:
- 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.
- P260 - Do not breathe mist/vapours/spray.
- P264 - Wash hands thoroughly after handling.
- P270 - Do not eat, drink or smoke when using this product.
- P280 - Wear protective gloves/protective clothing/eye protection/face protection.

Response:
- P303 + P361 + P353 - IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
- H305 + H351 + H310 - IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.
- H332 + H313 - If skin irritation occurs: Get medical advice/attention.
- H337 + H313 - If eye irritation persists: Get medical advice/attention.
- P370 + P378 - In case of fire, use water/water spray/water jet/carbon dioxide/sand/foam/alcohol resistant foam/chemical powder for extinguishment.
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Storage
- P403 + P233 - Store in a well-ventilated place. Keep container tightly closed.
- P405 - Store locked up.

Disposal
- P501: Dispose of contents and container to appropriate waste site or reclaimer in accordance with local and national regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Identity
- sec-Butyl Acetate, Acetic acid sec-butyl ester, SBA
- CAS No: 105-46-4
- EINECS No.: 203-300-1

Classification of components according to GHS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Synonyms</th>
<th>CAS</th>
<th>Hazard Class (category)</th>
<th>Hazard statement</th>
<th>Conc.</th>
</tr>
</thead>
</table>

4. FIRST AID MEASURES

General Information
- Keep victim calm. Obtain medical treatment immediately.

Inhalation
- Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.

Skin Contact
- Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

Eye Contact
- Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

Ingestion
- If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent
aspiration. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3° C), shortness of breath, chest congestion or continued coughing or wheezing. Give nothing by mouth. Do not induce vomiting.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Specific Hazards: Under conditions giving incomplete combustion, hazardous gases produced may consist of carbon monoxide carbon dioxide (CO2). Combustion gases of organic materials must in principle be graded as inhalation poisons. Vapors are heavier than air and may spread along floors.

Extinguishing Media: Foam, Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only. Do not discharge extinguishing waters into the aquatic environment.

Unsuitable Extinguishing Media: Do not use water in a jet.

Protective Equipment for Firefighters: Wear full protective clothing and self-contained breathing apparatus. (EN133)

Other Advice: Water runoff can cause environmental damage. Dike and collect water used to fight fire.

6. ACCIDENTAL RELEASE MEASURES

Observe all relevant local and international regulations.

Personal Precautions, Protective Equipment and Emergency Procedures: Avoid contact with spilled or released material. Immediately remove all contaminated clothing. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet.

Environmental Precautions: Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment (of product and fire fighting...
water) to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment.

Methods and material for containment and clean up: For small liquid spills (< 1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely. For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

Additional Advice: Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. Vapour may form an explosive mixture with air.

7. HANDLING AND STORAGE

General Precautions: Avoid breathing vapours or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. On guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

Precautions for safe Handling: Avoid contact with skin, eyes, and clothing. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of
electrostatic discharge (<= 1 m/sec until fill pipe submerged to twice its diameter, then <= 7 m/sec). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations. The vapour is heavier than air, spreads along the ground and distant ignition is possible. Handle and open container with care in a well ventilated area. Ventilate workplace in such a way that the Occupational Exposure Limit (OEL) is not exceeded. Do not empty into drains.

Conditions for safe Storage: Must be stored in a diked (bunded) well-ventilated area, away from sunlight, ignition sources and other sources of heat. Bulk storage tanks should be diked (bunded). Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not harmful or toxic to man or to the environment. Storage Temperature: Ambient.

Product Transfer: Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<= 1 m/sec until fill pipe submerged to twice its diameter, then <= 7 m/sec). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations. Keep containers closed when not in use. Do not use compressed air for filling, discharging or handling.

Recommended Materials: For containers, or container linings use carbon steel, stainless steel. For container paints, use epoxy paint, zinc silicate paint.

Unsuitable Materials: Avoid prolonged contact with natural, butyl or nitrile rubbers.

Container Advice: Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.

Other Advice: Ensure that all local regulations regarding handling and storage facilities are followed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION
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If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

### Occupational Exposure Limits

<table>
<thead>
<tr>
<th>Material</th>
<th>Source</th>
<th>Type</th>
<th>ppm</th>
<th>mg/m³</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-Butyl acetate</td>
<td>ACGIH</td>
<td>TWA</td>
<td>200</td>
<td>950</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OHSA</td>
<td>TWA</td>
<td>200</td>
<td>950</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NIOHS</td>
<td>TWA</td>
<td>200</td>
<td>950</td>
<td></td>
</tr>
</tbody>
</table>

### Engineering measures
General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred. Explosion-proof equipment (for example fans, switches, and grounded ducts) should be used in mechanical ventilation systems.

### Personal protective equipment

#### General advice
Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Use only in an area equipped with a safety shower. Hold eye wash fountain available.

#### Hygiene measures
When using, do not eat, drink or smoke. Take off all contaminated clothing immediately. Wash hands before breaks and immediately after handling the product.

#### Respiratory protection
If aerosols or vapors are present, respiratory protection is required (gas filter A).

#### Eye Protection
Tightly fitting safety goggles. In addition to goggles, wear a face shield if there is a reasonable chance for splash to the face. Equipment should conform to EN 166.

#### Skin protection
Impervious clothing.

#### Hand protection
Chemicals resistant gloves. (Butyl Rubber) or refer to glove manufacturer's recommendation. (EN 374: level 3)

### 9. PHYSICAL AND CHEMICAL PROPERTIES

- **Appearance**: Colourless Liquid.
- **Odour**: Fruity.
- **Odour threshold**: Data not available.
- **pH**: Not applicable.
- **Boiling point**: Typical 112 °C
- **Melting / freezing point**: Typical -98.4 °C
- **Flash point**: Typical 18 °C (Closed cup)
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Explosion / Flammability : 1.7-9.8 % (V)

Auto-ignition temperature : 410 °C

Vapour pressure : Typical 3.2 kPa at 25

Density : Typical 870 kg/m3 at 20 °C (ASTM D-1298)

Water solubility : 6.2 g/L at 20 °C

Decomposition temperature : Note: Stable under normal conditions of use.

Vapor density : 4.0 (air = 1)

Evaporation rate : 1.8 (ASTM D 3539, nBuAc=1)

10. STABILITY AND REACTIVITY

Reactivity : Stable under normal conditions of handling, use and transportation.

Chemical stability : No decomposition if used as directed. If heated to thermal decomposition the following decomposition products may occur depending on the conditions. carbon oxides.

Conditions to Avoid : Avoid any source of ignition. Avoid contact with heat, sparks, open flame, and static discharge.

Incompatible materials : Keep away from:, peroxides, oxidizing agents, strong acids, amines.

Possibility of hazardous Reactions : Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Information on Toxicological effects

Basis for Assessment : Information given is based on product testing, and/or similar products, and/or components.

Likely routes of exposure : Exposure may occur via inhalation, ingestion, skin absorption, skin or eye contact, and accidental ingestion.

Acute Toxicity

Acute Oral Toxicity : LD50 : 3200 mg/kg, rat

Acute Dermal Toxicity : No data available

Toxicity
Skin corrosion/irritation: irritating to the skin (HSDB, 2005)
Serious eye damage/irritation: Vapor and liquid stimulates an eye (HSDB (2005)), and obstacle of the recovery of a grade 5 (the highest grade 10) by the study of the rabbit (HSDB (2005)). So it were set to Category 2A-2B. Since it is unknown about recovery period, subdivide Category cannot be classification. (It is more desirable to be set as 2A from a viewpoint of safety, when subdivide Category needs to be performed by display etc.)

Skin Sensitization: No data available.
Germ cell mutagenicity: Strains TA98, TA100, TA1535, TA1537, and TA1538 or to Escherichia coli WP2uvrA/pKM101, and it failed to cause gene conversion in yeast (Saccharomyces cerevisiae JD1).
Carcinogenicity: Not classified as carcinogen (ACGIH, IARC, NTP)
Reproductive toxicity: Classification not possible due to lack of data.
Specific target organ toxicity - Single exposure: Category 3 (respiratory irritation) based on the description that there is respiratory irritation as vapor (HSDB (2005)), Category 3 (anesthetic action) based on the description of anesthetic action (ACGIH (2001)), and it is classified into Category 2 (central nervous) based on the description about the effect of steam exposure to dizziness, unconsciousness, and central nervous (HSDB (2005), ICSC (2003)).
Specific target organ toxicity - Repeated exposure: Classification not possible due to lack of data.
Aspiration hazard: No data available.

12. ECOLOGICAL INFORMATION

Ecotoxicity: sec-Butyl acetate's production and use may lead to its release to the environment through various waste streams. Tetrahymena thermophila (48h) EC50: 234～316 mg/L.

Bio-degradability: Although no biodegradation studies have been performed on sec-butyl acetate, studies on structurally similar compounds have shown that, in general, alkyl acetates are biodegradable.
Degradability: Based on a vapor pressure of 17 mm Hg at 20 deg C, sec-butyl acetate is expected to exist solely as a vapor in the
ambient atmosphere. Vapor-phase sec-butyl acetate is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals with an atmospheric half-life of about 70 hours. In water, sec-butyl acetate is not expected to adsorb to sediment or particulate matter given its estimated Koc value. This compound is expected to volatilize from water surfaces given its Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 5 and 119 hours respectively. Hydrolysis is expected to occur slowly based upon hydrolysis half-lives of 12.6 years, 1.26 years and 46 days at pH 7 and 8 and 9 respectively.

Bioaccumulative potential : The potential for bioconcentration in aquatic organisms is considered low based on an estimated BCF value 10.

Mobility in soil : sec-Butyl acetate is expected to possess moderate mobility in soils based upon an estimated Koc value of 200. Volatilization from dry soil surfaces is expected based upon the vapor pressure of this compound. Volatilization from moist soil surfaces is also expected based upon the estimated Henry's Law constant of $4.2 \times 10^{-4}$ atm-cum/mol.

13. DISPOSAL CONSIDERATIONS

Material Disposal : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses. Waste product should not be allowed to contaminate soil or water.

Container Disposal : Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard. Do not, puncture, cut, or weld uncleaned drums. Send to drum recoverer or metal reclaimer.

Local Legislation Disposal should be in accordance with applicable regional, national, and local laws and regulations.
### 14. TRANSPORT INFORMATION

| Land (as per ADR classification) | Regulated |
| Class                          | 3          |
| Packing group                  | II         |
| Hazard identification no.      | 33         |
| UN No.                         | 1123       |
| Danger label (primary risk)    | 3          |
| Proper shipping name           | BUTYL ACETATES |
| Environmentally Hazardous      | No         |

#### IMDG

- Identification number: UN 1123
- Proper shipping name: BUTYL ACETATES
- Class / Division: 3
- Packing group: II
- Marine pollutant: No

#### IATA (Country variations may apply)

- UN No.: 1123
- Proper shipping name: Butyl Acetates
- Class / Division: 3
- Packing group: II

### 15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

**Chemical Inventory Status**

- AICS: Listed.
- DSL: Listed.
- INV (CN): Listed.
- TSCA: Listed.
- EINECS: Listed. 203-300-1
- PICCS (PH): Listed.
16. OTHER INFORMATION

MSDS Version Number : 2.1
MSDS Effective Date : 1-June-2012
Uses and Restrictions : Raw material for use in the chemical industry.
Use only in industrial processes
MSDS Distribution : The information in this document should be made available to all who may handle the product
Disclaimer : This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.