

## **Safety Data Sheet**

## Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

BC-519 Liquid Scintillator

**Product Name** 

· Liquid Scintillator

**Synonyms** 

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

Relevant identified use(s)

· Liquid Scintillator

## 1.3 Details of the supplier of the safety data sheet

Manufacturer • Luxium Solutions 17900 Great Lakes

Parkway Hiram, OH 44234-9681

**United States** 

www.luxiumsolutions.com

Telephone (General) • 440-834-5600

## 1.4 Emergency telephone number

Contract # 6493674

U.S. & Canada • 1-800-255-3924 – VelocityEHS

International • +1-813-248-0585 – VelocityEHS

#### Section 2: Hazards Identification

#### **EU/EEC**

According to: Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 2015/830]

### 2.1 Classification of the substance or mixture

• Skin Irritation 2 - H315 Eye Irritation 2 - H319

Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335

Carcinogenicity 2 - H351

Hazardous to the aquatic environment Chronic 2 - H411

### 2.2 Label Elements

**CLP** 

#### WARNING







Hazard statements • H315 - Causes skin irritation

H319 - Causes serious eye irritation H335 - May cause respiratory irritation H351 - Suspected of causing cancer.

H411 - Toxic to aquatic life with long lasting effects

### Precautionary statements

**Prevention** • P201 - Obtain special instructions before use.

P202 - Do not handle until all safety precautions have been read and understood.

P261 - Avoid breathing mist, vapours and/or spray.

P264 - Wash thoroughly after handling.

P271 - Use only outdoors or in a well-ventilated area.

P273 - Avoid release to the environment.

P280 - Wear protective gloves/protective clothing/eye protection/face protection.

Response • P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for

breathing.

P312 - Call a POISON CENTER/doctor if you feel unwell. P302+P352 - IF ON SKIN: Wash with plenty of water.

P362+P364 - Take off contaminated clothing and wash it before reuse. P321 - Specific treatment, see supplemental first aid information. P332+P313 - If skin irritation occurs: Get medical advice/attention.

P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes.

Remove contact lenses, if present and easy to do. Continue rinsing. P337+P313 - If eye irritation persists: Get medical advice/attention. P308+P313 - IF exposed or concerned: Get medical advice/attention.

P391 - Collect spillage.

**Storage/Disposal** • P403+P233 - Store in a well-ventilated place. Keep container tightly closed.

P405 - Store locked up.

P501 - Dispose of content and/or container in accordance with local, regional,

national, and/or international regulations.

#### 2.3 Other Hazards

CLP

 According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

#### United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

#### 2.1 Classification of the substance or mixture

OSHA HCS 2012

Flammable Liquids 4
Skin Irritation 2
Eye Irritation 2

Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation

Specific Target Organ Toxicity Single Exposure 3: Narcotic Effects

Germ Cell Mutagenicity 2 Carcinogenicity 2 Reproductive Toxicity 2

Specific Target Organ Toxicity Repeated Exposure 1

## 2.2 Label elements

OSHA HCS 2012

#### **DANGER**





Hazard statements · Combustible liquid

Causes skin irritation

Causes serious eye irritation May cause respiratory irritation

May cause drowsiness or dizziness Suspected of causing genetic defects.

Suspected of causing cancer.

Suspected of damaging fertility or the unborn child.

Causes damage to organs through prolonged or repeated exposure.

### **Precautionary statements**

**Prevention** • Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood. Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking.

Do not breathe mist, vapours and/or spray.

Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area.

Wash thoroughly after handling.

Wear protective gloves/protective clothing/eye protection/face protection.

#### Response •

In case of fire: Use appropriate media for extinction.

IF INHALED: Remove person to fresh air and keep comfortable for breathing.

Call a POISON CENTER/doctor if you feel unwell.

If on skin: Wash with plenty of water.

Take off contaminated clothing and wash before reuse. Specific treatment, see supplemental first aid information. If skin irritation occurs: Get medical advice/attention.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses,

if present and easy to do. Continue rinsing.

If eye irritation persists: Get medical advice/attention. IF exposed or concerned: Get medical advice/attention.

Get medical advice/attention if you feel unwell.

#### Storage/Disposal •

Store in a well-ventilated place. Keep container tightly closed. Keep cool.

Store locked up.

Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

### 2.3 Other hazards

**OSHA HCS 2012** 

Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

#### Canada

According to: WHMIS 2015

### 2.1 Classification of the substance or mixture

**WHMIS 2015** 

Flammable Liquids 4 Skin Irritation 2

Eye Irritation 2

Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation

Specific Target Organ Toxicity Single Exposure 3: Narcotic Effects

Germ Cell Mutagenicity 2 Carcinogenicity 2 Reproductive Toxicity 2

Specific Target Organ Toxicity Repeated Exposure 1

## 2.2 Label elements

**WHMIS 2015** 

#### DANGER





Hazard statements · Combustible liquid Causes skin irritation Causes serious eye irritation May cause respiratory irritation May cause drowsiness or dizziness Suspected of causing genetic defects.

Suspected of causing cancer.

Suspected of damaging fertility or the unborn child.

Causes damage to organs through prolonged or repeated exposure.

## **Precautionary statements**

#### Prevention •

Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood.

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.

No smoking.

Do not breathe mist, vapours and/or spray.

Wash thoroughly after handling.

Do not eat, drink or smoke when using this product.

Use only outdoors or in a well-ventilated area.

Wear protective gloves/protective clothing/eye protection/face protection.

#### Response •

In case of fire: Use appropriate media for extinction.

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.

IF ON SKIN: Wash with plenty of water.

Take off contaminated clothing and wash it before reuse. Specific treatment, see supplemental first aid information.

If skin irritation occurs: Get medical advice/attention.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses,

if present and easy to do. Continue rinsing.

If eye irritation persists: Get medical advice/attention. IF exposed or concerned: Get medical advice/attention.

Get medical advice/attention if you feel unwell.

#### Storage/Disposal •

Store in a well-ventilated place. Keep container tightly closed.

Store locked up.

Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

#### 2.3 Other hazards

**WHMIS 2015** 

In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

## Section 3 - Composition/Information on Ingredients

### 3.1 Substances

Material does not meet the criteria of a substance.

#### 3.2 Mixtures

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Mineral oil, white	CAS:8042-47-5 EC Number:232- 455-8	< 60%	Ingestion/Oral-Rat LD50 • >5000 mg/kg	EU CLP: Not Classified OSHA HCS 2012: Not Classified WHMIS 2015: Not Classified	NDA
				<b>EU CLP:</b> Annex VI, Table 3.1: Flam. Liq. 3, H226; Acute Tox. 4, H332; Skin Irrit. 2, H315; Eye Irrit. 2,	

1,2,4- Trimethylbenzene	CAS:95-63-6 EC Number:202- 436-9 EU Index:601- 043-00-3	< 40%	Ingestion/Oral-Rat LD50 • 5 g/kg Inhalation-Rat LC50 • 18000 mg/m³ 4 Hour (s)	H319; STOT SE 3: Resp. Irrit. (inhl), H335; Aquatic Chronic 2, H411  OSHA HCS 2012: Flam. Liq. 3; Skin Irrit. 2; Eye Irrit. 2; STOT SE 3: Narc; STOT SE 3: Resp. Irrit. (inhl); Asp. Tox. 1  WHMIS 2015: Flam. Liq. 3; Skin Irrit. 2; Eye Irrit. 2; STOT SE 3: Narc; STOT SE 3: Resp. Irrit. (inhl); Asp. Tox. 1	NDA
Proprietary	Proprietary	< 7%	Ingestion/Oral-Rat LD50 • 490 mg/kg Skin-Rabbit LD50 • >20 g/kg	EU CLP: Annex VI, Table 3.1: Acute Tox. 4, H302; Carc. 2, H351; Aquatic Acute 1, H400; Aquatic Chronic 1, H410  OSHA HCS 2012: Flam. Sol. 2; Acute Tox. 4 (Oral); Skin Irrit. 2; Muta. 2; Carc. 2; Repr. 2; STOT SE 3: Narc.; STOT RE 1 (Blood, Eyes - Oral, Inhl)  WHMIS 2015: Flam. Sol. 2; Acute Tox. 4 (Oral); Skin Irrit. 2; Muta. 2; Carc. 2; Repr. 2; STOT SE 3: Narc.; STOT RE 1 (Blood, Eyes - Oral, Inhl)	NDA
Other Aromatics	Proprietary	< 1%	NDA	EU CLP: Not Classified OSHA HCS 2012: Not Classified WHMIS 2015: Not Classified	NDA

See Section 16 for full text of H-statements.

### **Section 4 - First Aid Measures**

## 4.1 Description of first aid measures

Inhalation

 Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.

Skin

Wash skin with soap and water. Take off contaminated clothing and wash before reuse. If irritation develops and persists, get medical attention.

Eye

• In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.

Ingestion

Do NOT induce vomiting. Give vegetable oil demulcents. Get medical attention immediately.

## 4.2 Most important symptoms and effects, both acute and delayed

• Refer to Section 11 - Toxicological Information.

## 4.3 Indication of any immediate medical attention and special treatment needed

**Notes to Physician** 

All treatments should be based on observed signs and symptoms of distress in the
patient. Consideration should be given to the possibility that overexposure to materials
other than this product may have occurred.

## Section 5 - Firefighting Measures

## 5.1 Extinguishing media

Suitable Extinguishing Media • Alcohol resistant foam, carbon dioxide, dry chemical, or water spray.

Unsuitable Extinguishing Media

Solid water stream.

## 5.2 Special hazards arising from the substance or mixture

**Unusual Fire and Explosion Hazards** 

HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
 Containers may explode when heated.
 Vapor explosion hazard indoors, outdoors or in sewers.

Many liquids are lighter than water.

Most vapors are heavier than air. They will spread along ground and collect in low or

confined areas (sewers, basements, tanks).

Runoff to sewer may create fire or explosion hazard.

Vapors may form explosive mixtures with air.

Vapors may travel to source of ignition and flash back.

# **Hazardous Combustion Products**

Emits toxic fumes of carbon monoxide and carbon dioxide.

## 5.3 Advice for firefighters

• Structural firefighters' protective clothing will only provide limited protection.

Wear positive pressure self-contained breathing apparatus (SCBA).

Move containers from fire area if you can do it without risk.

LARGE FIRES: Cool containers with flooding quantities of water until well after fire is

out.

Water or foam may cause frothing if liquid is burning but it still may be a useful extinguishing agent if carefully applied to the fire.

### Section 6 - Accidental Release Measures

## 6.1 Personal precautions, protective equipment and emergency procedures

#### **Personal Precautions**

• Take proper precautions to minimize exposure by using appropriate personal protective equipment. Do not walk through spilled material.

#### **Emergency Procedures**

As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. LARGE SPILL: Consider initial downwind evacuation for at least 300 meters (1000 feet) ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering.

## 6.2 Environmental precautions

Prevent entry into waterways, sewers, basements or confined areas.

## 6.3 Methods and material for containment and cleaning up

# Containment/Clean-up Measures

Stop leak if you can do it without risk.

Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

Use clean non-sparking tools to collect absorbed material. A vapor suppressing foam may be used to reduce vapors.

All equipment used when handling the product must be grounded. LARGE SPILLS: Dike far ahead of liquid spill for later disposal.

LARGE SPILLS: Water spray may reduce vapor; but may not prevent ignition in closed spaces.

#### 6.4 Reference to other sections

 Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

## Section 7 - Handling and Storage

## 7.1 Precautions for safe handling

### Handling

Use only in well ventilated areas. Keep away from heat, sparks, and flame. Wear
appropriate personal protective equipment, avoid direct contact. Do not breathe mist,
vapors, or spray. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap
and water after handling and before eating, drinking, or using tobacco. Containers of
this material may be hazardous when empty since all emptied containers retain
product residues.

## 7.2 Conditions for safe storage, including any incompatibilities

### Storage

• Keep container tightly closed. Store in a cool, dry, well-ventilated place.

## 7.3 Specific end use(s)

· Refer to Section 1.2 - Relevant identified uses.

## **Section 8 - Exposure Controls/Personal Protection**

## 8.1 Control parameters

			Exposure Limits	s/Guidelines		
	Result	ACGIH	Canada British Columbia	Canada Manitoba	Canada New Brunswick	Canada Northwest Territories
Proprietary	STELs	Not established	15 ppm STEL	Not established	15 ppm STEL; 79 mg/m3 STEL	15 ppm STEL
(Proprietary)	TWAs	10 ppm TWA	10 ppm TWA	10 ppm TWA	10 ppm TWA; 52 mg/m3 TWA	10 ppm TWA
	*	Ex	posure Limits/Gu	idelines (Con't.)	*	
	Result	Canada Nova Scotia	Canada Nunavut	Canada Ontario	Canada Quebec	Canada Yukon
Proprietary	TWAs	10 ppm TWA	10 ppm TWA	10 ppm TWA	10 ppm TWAEV; 52 mg/m3 TWAEV	10 ppm TWA; 50 mg/m3 TWA
(Proprietary)	STELs	Not established	15 ppm STEL	15 ppm STEL	15 ppm STEV; 79 mg/m3 STEV	15 ppm STEL; 75 mg/m3 STEL
		Ex	posure Limits/Gu	idelines (Con't.)		
	Result	China	Denmark	Finland	France	Germany DFG
	STELs	75 mg/m3 STEL	Not established	Not established	Not established	Not established
Proprietary (Proprietary)	TWAs	50 mg/m3 TWA	10 ppm TWA; 50 mg/m3 TWA	1 ppm TWA; 5 mg/m3 TWA	10 ppm TWA [VME]; 50 mg/m3 TWA [VME]	Not established
	TWAs	Not established	20 ppm TWA; 100 mg/m3 TWA	20 ppm TWA; 100 mg/m3 TWA	20 ppm TWA [VME] (restrictive limit); 100 mg/m3 TWA [VME] (restrictive limit)	Not established
1,2,4-	STELs	Not established	Not established	Not established	50 ppm STEL [VLCT] (restrictive limit); 250 mg/m3 STEL [VLCT] (restrictive limit)	Not established
Trimethylbenzene (95-63-6)	Ceilings	Not established	Not established	Not established	Not established	40 ppm Peak (all isomers, listed under Trimethylbenzene); 200 mg/m3 Peak (all isomers, listed under Trimethylbenzene)
	MAKs	Not established	Not established	Not established	Not established	20 ppm TWA MAK; 100 mg/m3 TWA MAK
Mineral oil, white	Ceilings	Not established	Not established	Not established	Not established	20 mg/m3 Peak (respirable fraction)
(8042-47-5)	MAKs	Not established	Not established	Not established	Not established	5 mg/m3 TWA MAK (respirable fraction)
		Ex	posure Limits/Gu	idelines (Con't.)		
	Result	Germany TRGS	Greece	Hungary	Ireland	Italy
		0.1 ppm TWA AGW (The risk of damage				

Proprietary (Proprietary)	TWAs	to the embryo or fetus can be excluded when AGW and BGW values are observed; sum of vapor and aerosol, inhalable fraction, exposure factor 1); 0.5 mg/m3 TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed; sum of vapor and aerosol, inhalable fraction, exposure factor 1)	10 ppm TWA; 50 mg/m3 TWA	50 mg/m3 TWA [AK]	10 ppm TWA; 50 mg/m3 TWA	Not established
	STELs	Not established	Not established	Not established	15 ppm STEL; 75 mg/m3 STEL	Not established
1,2,4- Trimethylbenzene (95-63-6)	TWAs	20 ppm TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2); 100 mg/m3 TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2)	25 ppm TWA; 125 mg/m3 TWA	100 mg/m3 TWA [AK]	20 ppm TWA; 100 mg/m3 TWA	20 ppm TWA Media Ponderata nel Tempo; 100 mg/m3 TWA Media Ponderata nel Tempo
	STELs	Not established	Not established	Not established	60 ppm STEL (calculated); 300 mg/m3 STEL (calculated)	Not established
Mineral oil, white (8042-47-5)	TWAs	5 mg/m3 TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, respirable fraction, exposure factor 4)	Not established	Not established	Not established	Not established
		1	posure Limits/Gu	` ` `	•	
	Result	Netherlands	NIOSH	OSHA	Poland	Portugal
	STELs	80 mg/m3 STEL	15 ppm STEL; 75 mg/m3 STEL	Not established	50 mg/m3 STEL [NDSCh]	15 ppm STEL [VLE- CD]
Proprietary (Proprietary)	TWAs	50 mg/m3 TWA	10 ppm TWA; 50 mg/m3 TWA	10 ppm TWA; 50 mg/m3 TWA	20 mg/m3 TWA [NDS]	10 ppm TWA [VLE- MP] (indicative limit value); 50 mg/m3 TWA [VLE-MP] (indicative limit value)
			u			

1,2,4- Trimethylbenzene (95-63-6)	TWAs 100 mg/r		n.⊀ IVVA I	25 ppm TWA; 125 mg/m3 TWA	Not established	100 mg/m3 TWA [NDS]	20 ppm TWA [VLE-MP] (indicative limit value); 100 mg/m3 TWA [VLE-MP] (indicative limit value)	
	STELs	200 mg/m3 STEL		Not established	Not established	170 mg/m3 STEL [NDSCh]	Not established	
	Exposure Limits/Guidelines (Con't.)							
Result				S	Spain		Sweden	
Proprietary	Proprietary (Proprietary)		STELs	15 ppm STEL [VLA-EC]; 80 mg/m3 STEL [VLA-EC]		15 ppm Indicative STLV; 80 mg/m3 Indicative STLV		
(Proprietary)			TWAs	10 ppm TWA [VLA-ED]; 53 mg/m3 TWA [VLA-ED]		10 ppm LLV; 50 mg/m3 LLV		
1,2,4-Trimethylbenzene		•		20 ppm TWA [VLA-ED] (indicative limit value); 100 mg/m3 TWA [VLA-ED] (indicative limit value)		25 ppm LLV; 120 mg/m3 LLV		
(95-63-6)			STELs	Not established	Not established		35 ppm Indicative STLV; 170 mg/m3 Indicative STLV	

#### **Exposure Control Notations**

#### China

•Proprietary (Proprietary): Skin: (Skin notation)

#### **Portugal**

• Proprietary (Proprietary): Carcinogens: (A4 - Not Classifiable as a Human Carcinogen) | Skin: (skin - potential for cutaneous exposure)

#### Hungary

• Proprietary (Proprietary): **Skin:** (potential for cutaneous absorption)

#### France

•Proprietary (Proprietary): Carcinogens: (Carcinogen category 2)

#### Spain

• Proprietary (Proprietary): **Skin:** (skin - potential for cutaneous exposure)

#### **ACGIH**

• Proprietary (Proprietary): **Carcinogens**: (A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans) | **Skin**: (Skin - potential significant contribution to overall exposure by the cutaneous route)

### **Germany TRGS**

•Proprietary (Proprietary): Skin: (skin notation)

#### **Germany DFG**

- •1,2,4-Trimethylbenzene (95-63-6): Pregnancy: (no risk to embryo/fetus if exposure limits adhered to)
- •Mineral oil, white (8042-47-5): Pregnancy: (no risk to embryo/fetus if exposure limits adhered to (respirable fraction))
- Proprietary (Proprietary): Carcinogens: (Category 2 (considered to be carcinogenic for man)) | Skin: (skin notation)

## **Exposure Limits Supplemental**

#### **ACGIH**

• Proprietary (Proprietary): **BEIs:** (Time: end of shift Parameter: 1-Naphthol with hydrolysis plus 2-Naphthol with hydrolysis (nonquantitative, nonspecific)) | **TLV Basis - Critical Effects:** (cataract; upper respiratory tract irritation; hemolytic anemia)

#### **Germany TRGS**

•1,2,4-Trimethylbenzene (95-63-6): **BELs**: (400 mg/g Medium: urine Time: end of shift Parameter: Dimethylbenzoic acid (sum of all isomers after hydrolysis; measured as mg/g Creatinine); 400 mg/g Medium: urine Time: end of several shifts Parameter: Dimethylbenzoic acid (sum of all isomers after hydrolysis; measured as mg/g Creatinine; for long-term exposures))

## 8.2 Exposure controls

# **Engineering Measures/Controls**

Good general ventilation should be used. Ventilation rates should be matched to
conditions. If applicable, use process enclosures, local exhaust ventilation, or other
engineering controls to maintain airborne levels below recommended exposure limits.
If exposure limits have not been established, maintain airborne levels to an acceptable
level. Explosion proof exhaust ventilation should be used.

#### **Personal Protective Equipment**

Respiratory

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face Skin/Body

- Wear chemical splash safety goggles. A full face shield may also be necessary.
- Wear appropriate gloves. Wear chemical resistant apron or full body suit.

# **Environmental Exposure Controls**

Controls should be engineered to prevent release to the environment, including
procedures to prevent spills, atmospheric release and release to waterways. Follow
best practice for site management and disposal of waste.

#### Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

LLV = Limit Level Value is the exposure limit for 8-hour work

MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

STEV = Short Term Exposure Value

TLV = Threshold Limit Value determined by the American Conference of Governmental Industrial Hygienists (ACGIH)

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

TWAEV = Time-Weighted Average Exposure Value

## **Section 9 - Physical and Chemical Properties**

## 9.1 Information on Basic Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Clear, blue fluorescence liquid with light aromatic odor.
Color	Clear, blue.	Odor	Light aromatic.
Odor Threshold	Data lacking		
General Properties		-	-
Boiling Point	> 400 °F(> 204.4444 °C)	Melting Point/Freezing Point	Data lacking
Decomposition Temperature	Data lacking	рН	Data lacking
Specific Gravity/Relative Density	= 0.86 Water=1	Water Solubility	Data lacking
Viscosity	Data lacking		
Volatility		-	•
Vapor Pressure	< 1 mmHg (torr)	Vapor Density	< 1 Air=1
Evaporation Rate	< 70 n-Butyl Acetate = 1		
Flammability		•	•
Flash Point	145 °F(62.7778 °C)	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Data lacking		
Environmental		-	•
Octanol/Water Partition coefficient	Data lacking		

## 9.2 Other Information

· No data available

## **Section 10: Stability and Reactivity**

## 10.1 Reactivity

No dangerous reaction known under conditions of normal use.

## 10.2 Chemical stability

· Stable under normal temperatures and pressures.

## 10.3 Possibility of hazardous reactions

· Hazardous polymerization will not occur.

## 10.4 Conditions to avoid

 Avoid contamination, excessive heat, contamination, sparks, open flames, or other sources of ignition.

## 10.5 Incompatible materials

· Strong oxidizing agents.

## 10.6 Hazardous decomposition products

• May form toxic substances such as carbon dioxide, and carbon monoxide.

## **Section 11 - Toxicological Information**

## 11.1 Information on toxicological effects

	Components					
1,2,4- Trimethylbenzene (< 40%)	95-63-6	Acute Toxicity: Ingestion/Oral-Rat LD50 • 5 g/kg; Inhalation-Rat LC50 • 18000 mg/m³ 4 Hour(s);  Multi-dose Toxicity: Inhalation-Rat TCLo • 20 mg/m³ 16 Week(s)-Continuous; Kidney, Ureter, and  Bladder:Other changes in urine composition; Inhalation-Rat TCLo • 100 ppm 6 Hour(s) 20 Day(s)- Intermittent; Behavioral:Changes in motor activity (specific assay); Behavioral:Analgesia;  Behavioral:Alteration of operant conditioning				
Mineral oil, white (< 60%)	8042-47-5	Acute Toxicity: Ingestion/Oral-Rat LD50 • >5000 mg/kg;  Multi-dose Toxicity: Ingestion/Oral-Rat TDLo • 92 g/kg 92 Day(s)-Continuous; Liver:Changes in liver weight; Blood:Changes in leucocyte (WBC) count; Nutritional and Gross Metabolic:Gross Metabolite Changes:Weight loss or decreased weight gain; Inhalation-Rat TCLo • 1000 mg/m³ 4 Week(s)-Intermittent; Lungs, Thorax, or Respiration:Changes in lung weight				
Proprietary (< 7%)	Proprietary	Acute Toxicity: Ingestion/Oral-Rat LD50 • 490 mg/kg; Ingestion/Oral-Mouse TDLo • 158 mg/kg; Brain and Coverings:Other degenerative changes; Liver.Other changes; Biochemical:Metabolism (intermediary):Lipids, including transport; Inhalation-Human TCLo • 250 mg/m³; Sense Organs and Special Senses:Eye:Lacrimation; Behavioral:Headache; Skin-Rabbit LD50 • >20 g/kg; Unreported-Guinea Pig LD50 • 1200 mg/kg; Behavioral:Somnolence (general depressed activity); Irritation: Skin-Rabbit • 0.05 mL 24 Hour(s) • Severe irritation; Multi-dose Toxicity: Ingestion/Oral-Rat TDLo • 4500 mg/kg 10 Day(s)-Intermittent; Brain and Coverings:Other degenerative changes; Ingestion/Oral-Rat TDLo • 1500 mg/kg 10 Day(s)-Intermittent; Nutritional and Gross Metabolic:Gross Metabolite Changes:Weight loss or decreased weight gain; Ingestion/Oral-Rat TDLo • 500 mg/kg 10 Day(s)-Intermittent; Behavioral:Sleep; Lungs, Thorax, or Respiration:Dyspnea; Mutagen: Specific locus test • Inhalation-Rat • 30 ppm 13 Week(s)-Intermittent; Micronucleus test • Unreported Route-Human • Lymphocyte (Somatic cell) • 30 mg/L; Reproductive: Ingestion/Oral-Mouse TDLo • 2400 mg/kg (7-14D preg); Reproductive Effects:Effects on Newborn:Live birth index; Reproductive Effects:Effects on Newborn:Viability index (e.g., # alive at day 4 per # born alive); Ingestion/Oral-Rat TDLo • 4500 mg/kg (6-15D preg); Reproductive Effects:Effects on Embryo or Fetus:Fetotoxicity (except death, e.g., stunted fetus); Reproductive Effects:Specific Developmental Abnormalities:Other developmental abnormalities; Tumorigen / Carcinogen: Inhalation-Mouse TCLo • 30 ppm 6 Hour(s) 2 Year(s)-Intermittent; Tumorigenic:Neoplastic by RTECS criteria; Lungs, Thorax, or Respiration:Tumors; Inhalation-Rat TCLo • 60 ppm 6 Hour(s) 105 Week(s)-Intermittent; Tumorigenic:Carcinogenic by RTECS criteria; Sense Organs and Special Senses:Olfaction:Tumors				

GHS Properties	Classification
	EU/CLP • Data lacking

Acute toxicity	OSHA HCS 2012 • Data lacking WHMIS 2015 • Data lacking
Skin corrosion/Irritation	EU/CLP • Skin Irritation 2 OSHA HCS 2012 • Skin Irritation 2 WHMIS 2015 • Skin Irritation 2
Serious eye damage/Irritation	EU/CLP • Eye Irritation 2 OSHA HCS 2012 • Eye Irritation 2 WHMIS 2015 • Eye Irritation 2
Skin sensitization	EU/CLP • Data lacking OSHA HCS 2012 • Data lacking WHMIS 2015 • Data lacking
Respiratory sensitization	EU/CLP • Data lacking OSHA HCS 2012 • Data lacking WHMIS 2015 • Data lacking
Aspiration Hazard	EU/CLP • Data lacking OSHA HCS 2012 • Data lacking WHMIS 2015 • Data lacking
Carcinogenicity	EU/CLP • Carcinogenicity 2; Suspected of causing cancer OSHA HCS 2012 • Carcinogenicity 2 WHMIS 2015 • Carcinogenicity 2
Germ Cell Mutagenicity	EU/CLP • Data lacking OSHA HCS 2012 • Germ Cell Mutagenicity 2 WHMIS 2015 • Germ Cell Mutagenicity 2
Toxicity for Reproduction	EU/CLP • Data lacking OSHA HCS 2012 • Toxic to Reproduction 2 WHMIS 2015 • Toxic to Reproduction 2
STOT-SE	EU/CLP • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation OSHA HCS 2012 • Specific Target Organ Toxicity Single Exposure 3: Narcotic Effects; Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation WHMIS 2015 • Specific Target Organ Toxicity Single Exposure 3: Narcotic Effects; Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
STOT-RE	EU/CLP • Data lacking OSHA HCS 2012 • Specific Target Organ Toxicity Repeated Exposure 1 WHMIS 2015 • Specific Target Organ Toxicity Repeated Exposure 1

## **Potential Health Effects** Inhalation

Acute (Immediate)

May cause respiratory irritation. May affect the central nervous system. Symptoms may include dizziness, drowsiness, lethargy, coma and death.

**Chronic (Delayed)** 

No data available.

Skin

Acute (Immediate) · Causes skin irritation. **Chronic (Delayed)** 

· No data available.

Eye

Acute (Immediate)

· Causes serious eye irritation.

**Chronic (Delayed)** 

No data available.

Ingestion

Acute (Immediate) No data available **Chronic (Delayed)** 

Other

No data available.

Chronic (Delayed)

• Chronic exposure of workers to a component of this product has been reported to cause cataracts and retinal hemorrhage, and damage to the blood.

**Mutagenic Effects** 

• Repeated and prolonged exposure may cause mutagenic effects.

**Carcinogenic Effects** 

· Repeated and prolonged exposure may cause cancer.

Carcinogenic Effects				
CAS IARC NTP				
Proprietary	Proprietary	Group 2B-Possible Carcinogen	Reasonably Anticipated to be Human Carcinogen	

#### **Reproductive Effects**

Repeated and prolonged exposure may cause reproductive effects.

Key to abbreviations

LC = Lethal Concentration

LD = Lethal Dose

TC = Toxic Concentration

TD = Toxic Dose

## Section 12 - Ecological Information

## 12.1 Toxicity

Components				
1,2,4-Trimethylbenzene (< 40%)	95-63-6	Aquatic Toxicity-Fish: 96 Hour(s) LC50 Pimephales promelas (Fathead Minnow) 7.72 mg/L Aquatic Toxicity-Crustacea: 48 Hour(s) EC50 Daphnia magna (Water Flea) 3.6063 mg/L		
Proprietary (< 7%)	Proprietary	Aquatic Toxicity-Fish: 96 Hour(s) LC50 Melanotaenia fluviatilis (Crimson-Spotted Rainbowfish) 0.213 mg/L Aquatic Toxicity-Crustacea: 48 Hour(s) EC50 Daphnia magna (Water Flea) 136 mg/L 48 Hour(s) NOEC Daphnia magna (Water Flea) 0.1 mg/L Aquatic Toxicity-Algae and Other Aquatic Plant(s): 7 Day(s) NOEC Scenedesmus subspicatus (Green Algae) 4.15 mg/L		

Toxic to aquatic life with long lasting effects.

## 12.2 Persistence and degradability

Material data lacking.

## 12.3 Bioaccumulative potential

· Material data lacking.

## **12.4 Mobility in Soil**

· Material data lacking.

#### 12.5 Results of PBT and vPvB assessment

· No PBT and vPvB assessment has been conducted.

### 12.6 Other adverse effects

· No studies have been found.

## **Section 13 - Disposal Considerations**

## 13.1 Waste treatment methods

**Product waste** 

 Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

### Packaging waste

• Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

## **Section 14 - Transport Information**

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	UN1993	FLAMMABLE LIQUID, n.o.s.	3	II	NDA
TDG	UN1993	FLAMMABLE LIQUID, n.o.s.	3	II	NDA
IMO/IMDG	UN1993	FLAMMABLE LIQUID, n.o.s.	3	II	NDA
IATA/ICAO	UN1993	FLAMMABLE LIQUID, n.o.s.	3	II	NDA

14.6 Special precautions for

· None specified.

user

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

· Data lacking.

14.8 Other information

**DOT** • Non bulk shipments exempt per 49 CFR 173.150 (f)(2)

## Section 15 - Regulatory Information

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

SARA Hazard Classifications • Acute, Chronic, Fire

		State Right To Know
Component	CAS	PA
1,2,4- Trimethylbenzene	95-63-6	Yes
Mineral oil, white	8042-47-5	No
Proprietary	Proprietary	Yes
Other Aromatics	Proprietary	No

			Inventory			
Component	CAS	Canada DSL	Canada NDSL	China	EU EINECS	EU ELNICS
1,2,4- Trimethylbenzene	95-63-6	Yes	No	Yes	Yes	No
Mineral oil, white	8042-47-5	Yes	No	Yes	Yes	No
Proprietary	Proprietary	Yes	No	Yes	Yes	No
Other Aromatics	Proprietary	Yes	No	Yes	Yes	No
			Inventory (Cor	ո't.)		
Compo	onent	CAS	Ko	orea KECL	T	SCA
1,2,4-Trimethylbenz	zene	95-63-6		Yes		Yes
Mineral oil, white		8042-47-5		Yes		Yes
Proprietary		Proprietary		Yes		Yes
Other Aromatics		Proprietary		Yes		Yes

## Canada

Janaua		
Labor Canada - WHMIS 1988 - Classifications of Substances		
	Proprietary	B4, D2A
<ul><li> Proprietary</li><li>1,2,4-Trimethylbenzene</li></ul>	Proprietary 95-63-6	B3
• 1,2,4-11iiiletriyiberizerie	95-03-0	Uncontrolled product
Mineral oil, white	8042-47-5	according to WHMIS
William Oil, Write	0042 47 0	classification criteria
Other Aromatics	Proprietary	Not Listed
		. 101 = .010 0
Canada - WHMIS 1988 - Ingredient Disclosure List		
• Proprietary	Proprietary	1 %
• 1,2,4-Trimethylbenzene	95-63-6	0.1 %
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
Environment		
Canada - CEPA - Priority Substances List		
Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
China		
Environment		
China - Ozone Depleting Substances - First Schedule	Duanujatan	Not Listed
• Proprietary	Proprietary	Not Listed
1,2,4-Trimethylbenzene  Min and all subits	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
China - Ozone Depleting Substances - Second Schedule		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
China - Ozone Depleting Substances - Third Schedule		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
Other		
China - Annex I & II - Controlled Chemicals Lists		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
China - Dangerous Goods List		
• Proprietary	Proprietary	(crude or molten)
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed

· Other Aromatics Proprietary Not Listed Germany Labor Germany - Immission Control - Qualifying Quantities for Major Accident Prevention · Proprietary Proprietary Not Listed 95-63-6 • 1,2,4-Trimethylbenzene Not Listed · Mineral oil, white 8042-47-5 Not Listed Other Aromatics Proprietary Not Listed Germany - Immission Control - Qualifying Quantities for Safety Reporting Proprietary Proprietary Not Listed • 1,2,4-Trimethylbenzene 95-63-6 Not Listed · Mineral oil, white 8042-47-5 Not Listed · Other Aromatics Proprietary Not Listed Germany - TRGS 505 - Specific Lead Regulations Proprietary Not Listed Proprietary • 1,2,4-Trimethylbenzene 95-63-6 Not Listed · Mineral oil, white 8042-47-5 Not Listed Other Aromatics Not Listed Proprietary Germany - TRGS 511 - Specific Ammonium Nitrate Regulations Proprietary Proprietary Not Listed • 1,2,4-Trimethylbenzene 95-63-6 Not Listed · Mineral oil, white 8042-47-5 Not Listed · Other Aromatics Proprietary Not Listed Environment-Germany - TA Luft - Types and Classes Proprietary Not Listed Proprietary 95-63-6 Not Listed • 1,2,4-Trimethylbenzene 8042-47-5 · Mineral oil, white Not Listed Other Aromatics Not Listed Proprietary Germany - TA Luft - Emission Limits for Carcinogenic Substances Proprietary Proprietary Not Listed • 1,2,4-Trimethylbenzene 95-63-6 Not Listed · Mineral oil, white 8042-47-5 Not Listed Other Aromatics Not Listed Proprietary Germany - TA Luft - Emission Limits for Fibers Proprietary Proprietary Not Listed • 1,2,4-Trimethylbenzene 95-63-6 Not Listed · Mineral oil. white 8042-47-5 Not Listed Other Aromatics Proprietary Not Listed Germany - TA Luft - Emission Limits for Inorganic Dusts Proprietary Proprietary Not Listed • 1,2,4-Trimethylbenzene 95-63-6 Not Listed · Mineral oil, white 8042-47-5 Not Listed

Preparation Date: 08/June/2017 Revision Date: 27/July/2023

Germany - TA Luft - Emission Limits for Inorganic Gases

Other Aromatics

Proprietary

Not Listed

Not Listed

Proprietary

Proprietary

• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
Germany - TA Luft - Emission Limits for Organic Substances		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
Germany - Water Classification (VwVwS) - Annex 1		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	ID Number 434, hazard class - low hazard to waters
Other Aromatics	Proprietary	Not Listed
Germany - Water Classification (VwVwS) - Annex 3		
• Proprietary	Proprietary	ID Number 269, hazard class a severe hazard to waters
• 1,2,4-Trimethylbenzene	95-63-6	ID Number 3925, hazard class 2 - hazard to waters
		ID Number 0434, hazard class
Mineral oil, white	8042-47-5	1 - low hazard to waters

## **United States**

Labor		
U.S OSHA - Process Safety Management - Highly Hazard	dous Chemicals	
Proprietary	Proprietary	Not Listed
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
U.S OSHA - Specifically Regulated Chemicals		
Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed

Proprietary	Proprietary	
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary 1	Not Listed

• Proprietary	Proprietary	100 lb final RQ; 45.4 kg final RQ
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
U.S CERCLA/SARA - Radionuclides and Their Reportable Quantities		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
U.S CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
U.S CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
U.S CERCLA/SARA - Section 313 - Emission Reporting		
• Proprietary	Proprietary	0.1 % de minimis concentration
• 1,2,4-Trimethylbenzene	95-63-6	1.0 % de minimis concentration
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
U.S CERCLA/SARA - Section 313 - PBT Chemical Listing		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed

## **United States - California**

• Proprietary	Proprietary	carcinogen, 4/19/2002
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
J.S California - Proposition 65 - Developmental Toxicity		
Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed
Mineral oil, white	8042-47-5	Not Listed
Other Aromatics	Proprietary	Not Listed
J.S California - Proposition 65 - Maximum Allowable Dose Levels (MADL)		
• Proprietary	Proprietary	Not Listed
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed

Mineral oil, white	8042-47-5	Not Listed	
Other Aromatics	Proprietary	Not Listed	
U.S California - Proposition 65 - No Significant Risk Levels (NSRL)			
• Proprietary	Proprietary	5.8 μg/day NSRL	
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed	
Mineral oil, white	8042-47-5	Not Listed	
Other Aromatics	Proprietary	Not Listed	
U.S California - Proposition 65 - Reproductive Toxicity - Female			
• Proprietary	Proprietary	Not Listed	
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed	
Mineral oil, white	8042-47-5	Not Listed	
Other Aromatics	Proprietary	Not Listed	
U.S California - Proposition 65 - Reproductive Toxicity - Male			
• Proprietary	Proprietary	Not Listed	
• 1,2,4-Trimethylbenzene	95-63-6	Not Listed	
Mineral oil, white	8042-47-5	Not Listed	
Other Aromatics	Proprietary	Not Listed	

## **United States - Pennsylvania**

• Proprietary	Proprietary
1,2,4-Trimethylbenzene	95-63-6
Mineral oil, white	8042-47-5 Not Listed
Other Aromatics	Proprietary Not Listed
S Pennsylvania - RTK (Right to Know) - Special Haza	rdous Substances
Proprietary	Proprietary Not Listed
1,2,4-Trimethylbenzene	95-63-6 Not Listed
1,2,4 1111161191861126116	
Mineral oil, white	8042-47-5 Not Listed

## 15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out.

#### 15.3 Other Information

 WARNING: This product contains a chemical known to the State of California to cause cancer.

### **Section 16 - Other Information**

#### Relevant Phrases (code & full text)

H226 - Flammable liquid and vapour

H302 - Harmful if swallowed H332 - Harmful if inhaled

H400 - Very toxic to aquatic life

H410 - Very toxic to aquatic life with long lasting effects

Revision Date • 27/July/2023
Preparation Date • 08/June/2017

• Reasonable care has been taken in the preparation of this information, but the supplier

### Liability

**Key to abbreviations** NDA = No Data Available gives no warranty of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser will make his own tests to determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental and/or consequential property damage arising out of the use of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. Read the Safety Data Sheet before handling product.