

## SAFETY DATA SHEET

according to Regulation (EC) No. 453/2010

### 10% Formic Acid with Additives

Revision Date: 21-Jul-2016

Revision Number: 1

|  |
|--|
| <b>SECTION 1: Identification of the substance/mixture and of the company/undertaking</b> |
|--|

**1.1. Product Identifier**

**Product Name** 10% Formic Acid with Additives  
**Internal ID Code** HM008399

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

|  |   |
|--|---|
| <b>Recommended Use</b>                     | Acid  |
| <b>Sector of uses</b>                      | Refer to the Annex for a listing of uses.   |
| <b>Product category(ies)</b>               | Not applicable  |
| <b>Process categories</b>                  | PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises<br>PROC15 - Use as a laboratory reagent<br>PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities |
| <b>Article categories</b>                  | Not applicable  |
| <b>Environmental release category(ies)</b> | ERC1 - Manufacture of substances ERC2 - Formulation of preparations (mixtures) ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles  |
| <b>Sector of uses</b>                      | SU2a - Mining, (without offshore industries)<br>SU2b - Offshore industries<br>SU3 - Industrial uses   |
| <b>Process categories</b>                  | PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises  |

**1.3. Details of the supplier of the safety data sheet**

Halliburton Energy Services  
 Halliburton House, Howemoss Place  
 Kirkhill Industrial Estate  
 Dyce  
 Aberdeen, AB21 0GN  
 United Kingdom

[www.halliburton.com](http://www.halliburton.com)

For further information, please contact

**E-mail Address:** [fdunexchem@halliburton.com](mailto:fdunexchem@halliburton.com)

**1.4. Emergency telephone number**

+44 8 08 189 0979 / 1-760-476-3961

Global Incident Response Access Code: 334305

Contract Number: 14012

| Emergency telephone - §45 - (EC)1272/2008 |   |
|---|---|
| <b>Europe</b>                             | 112   |
| <b>Bulgaria</b>                           | Bulgarian poison centre: +359 2 915-44-09 or +359 2 915-43-46   |
| <b>Croatia</b>                            | Centar za kontrolu otrovanja (CKO): (+385 1) 23-48-342 (Poison Control Center (PCC) - Institute for Medical Research and Occupational Health) |
| <b>Cyprus</b>                             | +357 1401   |
| <b>Denmark</b>                            | Poison Control Hotline (DK): +45 82 12 12 12  |
| <b>France</b>                             | ORFILA (FR): + 01 45 42 59 59   |
| <b>Germany</b>                            | Poison Center Berlin (DE): +49 030 30686 790  |
| <b>Italy</b>                              | Poison Center, Milan (IT): +39 02 6610 1029   |
| <b>Netherlands</b>                        | National Poisons Information Center (NL): +31 30 274 88 88 (NB: this service is only available to health professionals)                       |
| <b>Norway</b>                             | Poisons Information (NO): + 47 22 591300  |
| <b>Poland</b>                             | Poison Control and Information Centre, Warsaw (PL): +48 22 619 66 54; +48 22 619 08   |

|                       |   |
|-----------------------|---|
|                       | 97  |
| <b>Portugal</b>       | ClAV - Centro de Informação Antivenenos (Portuguese Poison Centre): + 351 213 303 271 |
| <b>Romania</b>        | +40 21 318 36 06  |
| <b>Spain</b>          | Poison Information Service (ES): +34 91 562 04 20                                     |
| <b>United Kingdom</b> | NHS Direct (UK): +44 0845 46 47   |

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

#### Regulation (EC) No 1272/2008

|  |                     |
|--|---------------------|
| Skin Corrosion/Irritation              | Category 1 B - H314 |
| Serious Eye Damage/Irritation          | Category 1 - H318   |
| Substances/mixtures corrosive to metal | Category 1 - H290   |

### 2.2. Label Elements

#### Hazard Pictograms



**Signal Word:**

**Danger**

#### Hazard Statements:

H290 - May be corrosive to metals

H314 - Causes severe skin burns and eye damage

#### Precautionary Statements:

P280 - Wear protective gloves/eye protection/face protection

P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting

P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing

P310 - Immediately call a POISON CENTER or doctor/physician

P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

#### Contains

##### Substances

Formic acid

Ethylene glycol monobutyl ether

Acetic acid

Aldol

Orange, sweet, extract

Methyl formate

##### CAS Number

64-18-6

111-76-2

64-19-7

107-89-1

8028-48-6

107-31-3

### 2.3. Other Hazards

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).

This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

## SECTION 3: Composition/information on ingredients

### 3.2. Mixtures

Mixture

| Substances                      | EINECS    | CAS Number | PERCENT (w/w) | EU - CLP Substance Classification  | REACH Reg. No    |
|---------------------------------|-----------|------------|---------------|--|------------------|
| Formic acid                     | 200-579-1 | 64-18-6    | 10 - 30%      | Acute Tox. 4 (H302)<br>Acute Tox. 3 (H331)<br>Skin Corr. 1A (H314)<br>Eye Corr. 1 (H318)<br>STOT SE 3 (H335)<br>Flam. Liq. 3 (H226)<br>Met. Corr. 1 (H290) | 01-2119491174-37 |
| Ethylene glycol monobutyl ether | 203-905-0 | 111-76-2   | 5 - 10%       | Acute Tox. 4 (H302)<br>Acute Tox. 4 (H312)   | 01-2119475108-36 |

|                        |           |           |          |  |                   |
|------------------------|-----------|-----------|----------|--|-------------------|
|                        |           |           |          | Acute Tox. 4 (H332)<br>Skin Irrit. 2 (H315)<br>Eye Irrit. 2A (H319)  |                   |
| Acetic acid            | 200-580-7 | 64-19-7   | 1 - 5%   | Skin Corr. 1A (H314)<br>Eye Corr. 1 (H318)<br>STOT SE 3 (H335)<br>Flam. Liq. 3 (H226)  | 01-2119475328-30  |
| Aldol                  | 203-530-2 | 107-89-1  | 0.1 - 1% | Acute Tox. 2 (H310)<br>Eye Irrit. 2A (H319)  | No data available |
| Orange, sweet, extract | 232-433-8 | 8028-48-6 | 0.1 - 1% | Skin Irrit. 2 (H315)<br>Skin Sens. 1 (H317)<br>Asp. Tox. 1 (H304)<br>Aquatic Acute 1 (H400)<br>Aquatic Chronic 1 (H410)<br>Flam. Liq. 3 (H226) | No data available |
| Methyl formate         | 203-481-7 | 107-31-3  | < 0.1%   | Acute Tox. 4 (H302)<br>Acute Tox. 4 (H332)<br>Eye Irrit. 2A (H319)<br>STOT SE 3 (H335)<br>Flam. Liq. 1 (H224)                                  | No data available |

**For the full text of the H-phrases mentioned in this Section, see Section 16**

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

#### **Inhalation**

If inhaled, move victim to fresh air and seek medical attention.

#### **Eyes**

In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

#### **Skin**

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

#### **Ingestion**

Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

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

Causes severe skin burns and eye damage.

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

#### **Notes to Physician**

Treat symptomatically

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

#### **Suitable Extinguishing Media**

Water fog, carbon dioxide, foam, dry chemical.

#### **Extinguishing media which must not be used for safety reasons**

None known.

### 5.2. Special hazards arising from the substance or mixture

#### **Special exposure hazards in a fire**

Decomposition in fire may produce harmful gases. Do not allow runoff to enter waterways.

### 5.3. Advice for firefighters

#### **Special protective equipment for firefighters**

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

Remove sources of ignition. Use appropriate protective equipment. Avoid breathing vapors. Avoid creating and breathing dust. Ensure adequate ventilation. Evacuate all persons from the area.

See Section 8 for additional information

### 6.2. Environmental precautions

Prevent from entering sewers, waterways, or low areas.

### 6.3. Methods and material for containment and cleaning up

Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

### 6.4. Reference to other sections

See Section 8 and 13 for additional information.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Remove sources of ignition. Avoid breathing vapors. Ensure adequate ventilation. Avoid contact with eyes, skin, or clothing. Wash hands after use. Launder contaminated clothing before reuse. Use appropriate protective equipment.

#### Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

### 7.2. Conditions for safe storage, including any incompatibilities

Store away from alkalis. Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 12 months.

### 7.3. Specific end use(s)

#### Exposure scenario

Please refer to the attached Annex for a listing of exposure scenarios.

#### Other Guidelines

No information available

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

#### Exposure Limits

| Substances                      | CAS Number | EU  | UK   | Netherlands   | France         |
|---------------------------------|------------|---|--|---|----------------|
| Formic acid                     | 64-18-6    | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup>  | TWA: 5 ppm<br>TWA: 9.6 mg/m <sup>3</sup><br>STEL: 15 ppm<br>STEL: 28.8 mg/m <sup>3</sup> | STEL: 5 mg/m <sup>3</sup>                                 | 5 ppm          |
| Ethylene glycol monobutyl ether | 111-76-2   | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 246 mg/m <sup>3</sup> | TWA: 25 ppm<br>TWA: 123 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 246 mg/m <sup>3</sup> | TWA: 100 mg/m <sup>3</sup><br>STEL: 246 mg/m <sup>3</sup> | 2 ppm          |
| Acetic acid                     | 64-19-7    | 10 ppm  | Not applicable   | TWA: 25 mg/m <sup>3</sup>                                 | 10 ppm         |
| Aldol                           | 107-89-1   | Not applicable  | Not applicable   | Not applicable  | Not applicable |
| Orange, sweet, extract          | 8028-48-6  | Not applicable  | Not applicable   | Not applicable  | Not applicable |
| Methyl formate                  | 107-31-3   | Not applicable  | 100 ppm  | 100 ppm   | 100 ppm        |

| Substances                      | CAS Number | Germany   | Spain  | Portugal  | Finland   |
|---------------------------------|------------|---|--|---|---|
| Formic acid                     | 64-18-6    | TWA: 5 ppm<br>TWA: 9.5 mg/m <sup>3</sup><br><br>Peak: 10 ppm<br>Peak: 19 mg/m <sup>3</sup>    | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup>   | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup><br>STEL: 10 ppm                                  | TWA: 3 ppm<br>TWA: 5 mg/m <sup>3</sup><br>STEL: 10 ppm<br>STEL: 19 mg/m <sup>3</sup>      |
| Ethylene glycol monobutyl ether | 111-76-2   | TWA: 10 ppm<br>TWA: 49 mg/m <sup>3</sup><br><br>Peak: 20 ppm<br>Peak: 98 mg/m <sup>3</sup>    | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>50 ppm STEL<br>[VLA-EC]; 245 mg/m <sup>3</sup><br>STEL [VLA-EC]    | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 246 mg/m <sup>3</sup> | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 250 mg/m <sup>3</sup>   |
| Acetic acid                     | 64-19-7    | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup><br><br>Peak: 20 ppm<br>Peak: 50 mg/m <sup>3</sup>    | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup><br>15 ppm STEL<br>[VLA-EC]; 37 mg/m <sup>3</sup><br>STEL [VLA-EC]     | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup><br>STEL: 15 ppm                                | TWA: 5 ppm<br>TWA: 13 mg/m <sup>3</sup><br>STEL: 10 ppm<br>STEL: 25 mg/m <sup>3</sup>     |
| Aldol                           | 107-89-1   | Not applicable  | Not applicable   | Not applicable  | Not applicable  |
| Orange, sweet, extract          | 8028-48-6  | Not applicable  | Not applicable   | Not applicable  | Not applicable  |
| Methyl formate                  | 107-31-3   | TWA: 50 ppm<br>TWA: 120 mg/m <sup>3</sup><br><br>Peak: 200 ppm<br>Peak: 480 mg/m <sup>3</sup> | TWA: 100 ppm<br>TWA: 270 mg/m <sup>3</sup><br>150 ppm STEL<br>[VLA-EC]; 406 mg/m <sup>3</sup><br>STEL [VLA-EC] | TWA: 100 ppm<br>STEL: 150 ppm   | TWA: 50 ppm<br>TWA: 125 mg/m <sup>3</sup><br>STEL: 150 ppm<br>STEL: 370 mg/m <sup>3</sup> |

| Substances  | CAS Number | Austria                                | Ireland                               | Switzerland                              | Norway                                 |
|-------------|------------|--|---------------------------------------|--|--|
| Formic acid | 64-18-6    | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup> | 5 ppm TWA; 9 mg/m <sup>3</sup><br>TWA | TWA: 5 ppm<br>TWA: 9.5 mg/m <sup>3</sup> | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup> |

|                                 |           |   |  |   |   |
|---------------------------------|-----------|---|--|---|---|
|                                 |           | STEL" 5 ppm<br>STEL" 9 mg/m <sup>3</sup><br>Ceiling: 5 ppm<br>Ceiling: 9 mg/m <sup>3</sup>  | 15 ppm STEL<br>(calculated); 27<br>mg/m <sup>3</sup> STEL<br>(calculated)                | STEL: 10 ppm<br>STEL: 19 mg/m <sup>3</sup>  | STEL: 10 ppm<br>STEL: 18 mg/m <sup>3</sup>  |
| Ethylene glycol monobutyl ether | 111-76-2  | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL" 40 ppm<br>STEL" 200 mg/m <sup>3</sup>   | 20 ppm TWA; 98<br>mg/m <sup>3</sup> TWA<br>50 ppm STEL; 246<br>mg/m <sup>3</sup> STEL    | TWA: 10 ppm<br>TWA: 49 mg/m <sup>3</sup><br>STEL: 20 ppm<br>STEL: 98 mg/m <sup>3</sup>    | TWA: 10 ppm<br>TWA: 50 mg/m <sup>3</sup><br>STEL: 20 ppm<br>STEL: 75 mg/m <sup>3</sup>      |
| Acetic acid                     | 64-19-7   | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup><br>STEL" 20 ppm<br>STEL" 50 mg/m <sup>3</sup>  | 10 ppm TWA; 25<br>mg/m <sup>3</sup> TWA<br>15 ppm STEL; 37<br>mg/m <sup>3</sup> STEL     | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup><br>STEL: 20 ppm<br>STEL: 50 mg/m <sup>3</sup>    | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup><br>STEL: 20 ppm<br>STEL: 37.5 mg/m <sup>3</sup>    |
| Aldol                           | 107-89-1  | Not applicable  | Not applicable   | Not applicable  | Not applicable  |
| Orange, sweet, extract          | 8028-48-6 | Not applicable  | Not applicable   | Not applicable  | Not applicable  |
| Methyl formate                  | 107-31-3  | TWA: 50 ppm<br>TWA: 120 mg/m <sup>3</sup><br>STEL" 50 ppm<br>STEL" 120 mg/m <sup>3</sup><br>Ceiling: 50 ppm<br>Ceiling: 120 mg/m <sup>3</sup> | 100 ppm TWA; 250<br>mg/m <sup>3</sup> TWA<br>375 mg/m <sup>3</sup> STEL; 150<br>ppm STEL | TWA: 50 ppm<br>TWA: 125 mg/m <sup>3</sup><br>STEL: 200 ppm<br>STEL: 500 mg/m <sup>3</sup> | TWA: 50 ppm<br>TWA: 125 mg/m <sup>3</sup><br>STEL: 20 ppm<br>STEL: 156.25 mg/m <sup>3</sup> |

| Substances                      | CAS Number | Italy   | Poland  | Hungary  | Czech Republic             |
|---------------------------------|------------|---|---|--|----------------------------|
| Formic acid                     | 64-18-6    | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup>  | TWA: 5 mg/m <sup>3</sup><br>STEL: 15 mg/m <sup>3</sup>    | TWA: 9 mg/m <sup>3</sup>                                 | TWA: 9 mg/m <sup>3</sup>   |
| Ethylene glycol monobutyl ether | 111-76-2   | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 246 mg/m <sup>3</sup> | TWA: 98 mg/m <sup>3</sup><br>STEL: 200 mg/m <sup>3</sup>  | TWA: 98 mg/m <sup>3</sup><br>STEL: 246 mg/m <sup>3</sup> | TWA: 100 mg/m <sup>3</sup> |
| Acetic acid                     | 64-19-7    | 10 ppm  | TWA: 25 mg/m <sup>3</sup><br>STEL: 50 mg/m <sup>3</sup>   | TWA: 25 mg/m <sup>3</sup><br>STEL: 25 mg/m <sup>3</sup>  | TWA: 25 mg/m <sup>3</sup>  |
| Aldol                           | 107-89-1   | Not applicable  | Not applicable  | Not applicable   | Not applicable             |
| Orange, sweet, extract          | 8028-48-6  | Not applicable  | Not applicable  | Not applicable   | Not applicable             |
| Methyl formate                  | 107-31-3   | Not applicable  | TWA: 100 mg/m <sup>3</sup><br>STEL: 200 mg/m <sup>3</sup> | Not applicable   | Not applicable             |

| Substances                      | CAS Number | Denmark                                   | Romania   | Croatia   | Cyprus  | Bulgaria  |
|---------------------------------|------------|---|---|---|---|---|
| Formic acid                     | 64-18-6    | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup>    | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup>  | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup>  | TWA: 5 ppm<br>TWA: 9 mg/m <sup>3</sup>  | TWA: 5 ppm<br>TWA: 9.0 mg/m <sup>3</sup>  |
| Ethylene glycol monobutyl ether | 111-76-2   | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup>  | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 246 mg/m <sup>3</sup>   | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 246 mg/m <sup>3</sup> | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 246 mg/m <sup>3</sup> | TWA: 20 ppm<br>TWA: 98 mg/m <sup>3</sup><br>STEL: 50 ppm<br>STEL: 246 mg/m <sup>3</sup> |
| Acetic acid                     | 64-19-7    | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup>  | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup>  | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup>  | TWA: 10 ppm<br>TWA: 25 mg/m <sup>3</sup>  | TWA: 25.0 mg/m <sup>3</sup><br>STEL: 37.0 mg/m <sup>3</sup>                             |
| Aldol                           | 107-89-1   | Not applicable                            | Not applicable  | Not applicable  | Not applicable  | Not applicable  |
| Orange, sweet, extract          | 8028-48-6  | Not applicable                            | Not applicable  | Not applicable  | Not applicable  | Not applicable  |
| Methyl formate                  | 107-31-3   | TWA: 50 ppm<br>TWA: 123 mg/m <sup>3</sup> | TWA: 60 ppm<br>TWA: 150 mg/m <sup>3</sup><br>STEL: 100 ppm<br>STEL: 250 mg/m <sup>3</sup> | Not applicable  | Not applicable  | Not applicable  |

**Derived No Effect Level (DNEL)****Worker**

| Substances                      | Long-term exposure - systemic effects, Inhalation | Acute / short term exposure - systemic effects, Inhalation | Long-term exposure - local effects, Inhalation | Acute / short term exposure - local effects, Inhalation | Long-term exposure - systemic effects, Dermal | Acute / short term exposure - systemic effects, Dermal | Long-term exposure - local effects, Dermal | Acute / short term exposure - local effects, Dermal | Hazards for the eyes - local effects |
|---------------------------------|---|--|--|---|---|--|--|---|--------------------------------------|
| Formic acid                     | Not available                                     | Not available  | 9.5 mg/m <sup>3</sup>                          | 19 mg/m <sup>3</sup>                                    | Not available                                 | Not available  | Not available                              | Not available                                       | Not available                        |
| Ethylene glycol monobutyl ether | 98 mg/m <sup>3</sup>                              | 663 mg/m <sup>3</sup>                                      | Not available                                  | 246 mg/m <sup>3</sup>                                   | 75 mg/kg bw/day                               | 89 mg/kg bw/day  | Not available                              | Not available                                       | Not available                        |
| Acetic acid                     | Not available                                     | Not available  | 25 mg/m <sup>3</sup>                           | 25 mg/m <sup>3</sup>                                    | Not available                                 | Not available  | Not available                              | Not available                                       | Not available                        |

**General Population**

| Substances                      | Long-term exposure - systemic effects, Inhalation | Acute / short term exposure - systemic effects, Inhalation | Long-term exposure - local effects, Inhalation | Acute / short term exposure - local effects, Inhalation | Long-term exposure - systemic effects, Dermal | Acute / short term exposure - systemic effects, Dermal | Long-term exposure - local effects, Dermal | Acute / short term exposure - local effects, Dermal | Long-term exposure - systemic effects, Oral | Acute / short term exposure - local effects, Oral | Hazards for the eyes - local effects |
|---------------------------------|---|--|--|---|---|--|--|---|---|---|--------------------------------------|
| Formic acid                     | Not available                                     | Not available  | 3 mg/m <sup>3</sup>                            | 9.5 mg/m <sup>3</sup>                                   | Not available                                 | Not available  | Not available                              | Not available                                       | Not available                               | Not available                                     | Not available                        |
| Ethylene glycol monobutyl ether | 49 mg/m <sup>3</sup>                              | 426 mg/m <sup>3</sup>                                      | Not available                                  | 123 mg/m <sup>3</sup>                                   | 38 mg/kg bw/day                               | 44.5 mg/kg bw/day                                      | Not available                              | Not available                                       | 3.2 mg/kg bw/day                            | 13.4 mg/kg bw/day                                 | Not available                        |

|             |               |               |                      |                      |               |               |               |               |               |               |               |               |
|-------------|---------------|---------------|----------------------|----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|             |               |               |                      |                      |               | bw/day        |               |               |               |               | bw/day        |               |
| Acetic acid | Not available | Not available | 25 mg/m <sup>3</sup> | 25 mg/m <sup>3</sup> | Not available | Not available | Not available | Not available | Not available | Not available | Not available | Not available |

**Predicted No Effect Concentration (PNEC)**

| Substances                      | Freshwater | Marine water | Intermittent release | Sewage treatment plant | Sediment (freshwater)  | Sediment (marine water) | Air           | Soil               | Secondary poisoning |
|---------------------------------|------------|--------------|----------------------|------------------------|------------------------|-------------------------|---------------|--------------------|---------------------|
| Formic acid                     | 2 mg/L     | 0.2 mg/L     | 1 mg/L               | 7.2 mg/L               | 13.4 mg/kg sediment dw | 1.34 mg/kg sediment dw  | Not available | 1.5 mg/kg soil dw  | Not available       |
| Ethylene glycol monobutyl ether | 8.8 mg/L   | 0.88 kg/L    | 9.1 mg/L             | 463 mg/L               | 34.6 mg/kg             | 3.46 mg/kg              | Not available | 3.13 mg/kg soil dw | 0.02 g/kg food      |
| Acetic acid                     | 3.06 mg/l  | 0.306 mg/l   | 30.58 mg/l           | 85 mg/l                | 11.4 mg/kg             | 1.14 mg/kg              | Not available | 0.478 mg/kg        | Not available       |

**8.2. Exposure controls****Engineering Controls**

Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

**Personal protective equipment**

If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

**Respiratory Protection**

If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, AS/NZS 1715:2009, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional. Acid gas respirator.

**Hand Protection**

Chemical-resistant protective gloves (EN 374) Suitable materials for longer, direct contact (recommended: protection index 6, corresponding to > 480 minutes permeation time as per EN 374): Neoprene gloves. (>= 0.65 mm thickness)  
This information is based on literature references and on information provided by glove manufacturers, or is derived by analogy with similar substances. Please note that in practice the working life of chemical-resistant protective gloves may be considerably shorter than the permeation time determined in accordance with EN 374 as a result of the many influencing factors (e.g. temperature). If signs of wear and tear are noticed then the gloves should be replaced. Manufacturer's directions for use should be observed because of great diversity of types.

**Skin Protection**

Full protective chemical resistant clothing.

**Eye Protection**

Chemical goggles; also wear a face shield if splashing hazard exists.

**Other Precautions**

Eyewash fountains and safety showers must be easily accessible.

**Environmental Exposure Controls** Do not allow material to contaminate ground water system

**SECTION 9: Physical and chemical properties****9.1. Information on basic physical and chemical properties**

**Physical State:** Liquid

**Color:** Not determined

**Odor:** Sharp

**Odor Threshold:** No information available

PropertyValues

Remarks/ - Method

**pH:**

No data available

**Freezing Point / Range**

No data available

**Melting Point / Range**

No data available

**Boiling Point / Range**

No data available

**Flash Point**

> 61 °C

**Flammability (solid, gas)**

No data available

Upper flammability limit

No data available

Lower flammability limit

No data available

**Evaporation rate**

No data available

**Vapor Pressure**

No data available

**Vapor Density**

No data available

**Specific Gravity**

1.065

**Water Solubility**

Miscible with water

**Solubility in other solvents**

No data available

**Partition coefficient: n-octanol/water**

No data available

**Autoignition Temperature**

No data available

**Decomposition Temperature**

No data available

|                             |                          |
|-----------------------------|--------------------------|
| <b>Viscosity</b>            | No data available        |
| <b>Explosive Properties</b> | No information available |
| <b>Oxidizing Properties</b> | No information available |

**9.2. Other information**

|                        |                   |
|------------------------|-------------------|
| <b>VOC Content (%)</b> | No data available |
|------------------------|-------------------|

|   |
|---|
| <b>SECTION 10: Stability and reactivity</b> |
|---|

**10.1. Reactivity**

Not expected to be reactive.

**10.2. Chemical stability**

Stable

**10.3. Possibility of hazardous reactions**

Will Not Occur

**10.4. Conditions to avoid**

None anticipated

**10.5. Incompatible materials**

Strong alkalis. Strong oxidizers.

**10.6. Hazardous decomposition products**

Carbon monoxide and carbon dioxide.

|  |
|--|
| <b>SECTION 11: Toxicological information</b> |
|--|

**11.1. Information on toxicological effects****Acute Toxicity**

|                     |  |
|---------------------|--|
| <b>Inhalation</b>   | Causes severe respiratory burns.               |
| <b>Eye Contact</b>  | Causes severe eye burns.                       |
| <b>Skin Contact</b> | Causes severe burns.                           |
| <b>Ingestion</b>    | Causes burns of the mouth, throat and stomach. |

**Chronic Effects/Carcinogenicity** Prolonged, excessive exposure may cause erosion of the teeth.

**Toxicology data for the components**

| Substances                      | CAS Number | LD50 Oral                           | LD50 Dermal                                 | LC50 Inhalation              |
|---------------------------------|------------|-------------------------------------|---|------------------------------|
| Formic acid                     | 64-18-6    | 730 mg/kg (rat)                     | >2000 mg/kg (similar substance)             | 7.4 mg/L (rat, 4 hr, vapour) |
| Ethylene glycol monobutyl ether | 111-76-2   | 1414 mg/kg-bw (guinea pig)          | >2000 mg/kg (Rabbit)                        | No data available            |
| Acetic acid                     | 64-19-7    | No data available                   | 1060 mg/kg-bw (rabbit)                      | 11.4 mg/L (rat, 4 h, vapor)  |
| Aldol                           | 107-89-1   | 2180 mg/kg (Rat)                    | 140 mg/kg (Rabbit)                          | No data available            |
| Orange, sweet, extract          | 8028-48-6  | > 5000 mg/kg (Rat)                  | > 5000 mg/kg (Rabbit)                       | No data available            |
| Methyl formate                  | 107-31-3   | 475 mg/kg (Rat)<br>1500 mg/kg (Rat) | > 5000 mg/kg (Rabbit)<br>> 4000 mg/kg (Rat) | > 5.2 mg/L (Rat) 4 h vapour  |

| Substances                      | CAS Number | Skin corrosion/irritation   |
|---------------------------------|------------|---|
| Formic acid                     | 64-18-6    | Corrosive to skin (Rabbit)  |
| Ethylene glycol monobutyl ether | 111-76-2   | Causes moderate skin irritation. (Rabbit)                                     |
| Acetic acid                     | 64-19-7    | Corrosive to skin Extremely corrosive and destructive to tissue Skin, rabbit: |
| Aldol                           | 107-89-1   | May cause mild skin irritation. (Rabbit)                                      |
| Orange, sweet, extract          | 8028-48-6  | Skin, rabbit: Causes moderate skin irritation.                                |
| Methyl formate                  | 107-31-3   | Non-irritating to the skin (Rabbit)   |

| Substances                      | CAS Number | Serious eye damage/irritation                            |
|---------------------------------|------------|--|
| Formic acid                     | 64-18-6    | Corrosive to eyes (Rabbit)                               |
| Ethylene glycol monobutyl ether | 111-76-2   | Causes moderate eye irritation (Rabbit)                  |
| Acetic acid                     | 64-19-7    | Corrosive to eyes Eye, rabbit: Causes serious eye damage |
| Aldol                           | 107-89-1   | Causes moderate eye irritation (Rabbit)                  |
| Orange, sweet, extract          | 8028-48-6  | Non-irritating to rabbit's eye                           |
| Methyl formate                  | 107-31-3   | Irritating to eyes (Rabbit)                              |

| Substances                | CAS Number | Skin Sensitization   |
|---------------------------|------------|--|
| Formic acid               | 64-18-6    | Did not cause sensitization on laboratory animals (guinea pig) |
| Ethylene glycol monobutyl | 111-76-2   | Did not cause sensitization on laboratory animals (guinea pig) |

|                        |           |   |
|------------------------|-----------|---|
| ether                  |           |   |
| Acetic acid            | 64-19-7   | Not regarded as a sensitizer.                                       |
| Aldol                  | 107-89-1  | No information available  |
| Orange, sweet, extract | 8028-48-6 | May cause sensitization of susceptible persons (similar substances) |
| Methyl formate         | 107-31-3  | Did not cause sensitization on laboratory animals (guinea pig)      |

| Substances                      | CAS Number | Respiratory Sensitization |
|---------------------------------|------------|---------------------------|
| Formic acid                     | 64-18-6    | No information available  |
| Ethylene glycol monobutyl ether | 111-76-2   | No information available  |
| Acetic acid                     | 64-19-7    | No information available  |
| Aldol                           | 107-89-1   | No information available  |
| Orange, sweet, extract          | 8028-48-6  | No information available  |
| Methyl formate                  | 107-31-3   | No information available  |

| Substances                      | CAS Number | Mutagenic Effects   |
|---------------------------------|------------|---|
| Formic acid                     | 64-18-6    | In vitro tests did not show mutagenic effects. In vivo tests did not show mutagenic effects.                      |
| Ethylene glycol monobutyl ether | 111-76-2   | In vivo tests did not show mutagenic effects.   |
| Acetic acid                     | 64-19-7    | In vivo tests did not show mutagenic effects. In vitro tests did not show mutagenic effects.                      |
| Aldol                           | 107-89-1   | No information available  |
| Orange, sweet, extract          | 8028-48-6  | In vitro tests did not show mutagenic effects. In vivo tests did not show mutagenic effects. (similar substances) |
| Methyl formate                  | 107-31-3   | In vitro tests did not show mutagenic effects.  |

| Substances                      | CAS Number | Carcinogenic Effects   |
|---------------------------------|------------|--|
| Formic acid                     | 64-18-6    | Did not show carcinogenic effects in animal experiments (similar substances) |
| Ethylene glycol monobutyl ether | 111-76-2   | Not regarded as carcinogenic.  |
| Acetic acid                     | 64-19-7    | Did not show carcinogenic effects in animal experiments                      |
| Aldol                           | 107-89-1   | No information available   |
| Orange, sweet, extract          | 8028-48-6  | Did not show carcinogenic effects in animal experiments (similar substances) |
| Methyl formate                  | 107-31-3   | Did not show carcinogenic effects in animal experiments (similar substances) |

| Substances                      | CAS Number | Reproductive toxicity  |
|---------------------------------|------------|--|
| Formic acid                     | 64-18-6    | Did not show teratogenic effects in animal experiments. (similar substances) Animal testing did not show any effects on fertility. |
| Ethylene glycol monobutyl ether | 111-76-2   | Animal testing did not show any effects on fertility. Did not show teratogenic effects in animal experiments.                      |
| Acetic acid                     | 64-19-7    | Did not show teratogenic effects in animal experiments. Animal testing did not show any effects on fertility.                      |
| Aldol                           | 107-89-1   | No information available   |
| Orange, sweet, extract          | 8028-48-6  | Did not show teratogenic effects in animal experiments. (similar substances)   |
| Methyl formate                  | 107-31-3   | Animal testing did not show any effects on fertility. Did not show teratogenic effects in animal experiments. (similar substances) |

| Substances                      | CAS Number | STOT - single exposure  |
|---------------------------------|------------|---|
| Formic acid                     | 64-18-6    | May cause respiratory irritation. No significant toxicity observed in animal studies at concentration requiring classification. |
| Ethylene glycol monobutyl ether | 111-76-2   | No data of sufficient quality are available.  |
| Acetic acid                     | 64-19-7    | May cause respiratory irritation.   |
| Aldol                           | 107-89-1   | No information available  |
| Orange, sweet, extract          | 8028-48-6  | No significant toxicity observed in animal studies at concentration requiring classification.                                   |
| Methyl formate                  | 107-31-3   | May cause respiratory irritation.   |

| Substances                      | CAS Number | STOT - repeated exposure  |
|---------------------------------|------------|---|
| Formic acid                     | 64-18-6    | No significant toxicity observed in animal studies at concentration requiring classification. |
| Ethylene glycol monobutyl ether | 111-76-2   | No data of sufficient quality are available.  |
| Acetic acid                     | 64-19-7    | Not applicable due to corrosivity of the substance.   |
| Aldol                           | 107-89-1   | No information available  |
| Orange, sweet, extract          | 8028-48-6  | No significant toxicity observed in animal studies at concentration requiring classification. |
| Methyl formate                  | 107-31-3   | No significant toxicity observed in animal studies at concentration requiring classification. |

| Substances                      | CAS Number | Aspiration hazard |
|---------------------------------|------------|-------------------|
| Formic acid                     | 64-18-6    | Not applicable    |
| Ethylene glycol monobutyl ether | 111-76-2   | Not applicable    |



|                        |           |   |
|------------------------|-----------|---|
| ether                  |           |   |
| Acetic acid            | 64-19-7   | Not applicable  |
| Aldol                  | 107-89-1  | No information available  |
| Orange, sweet, extract | 8028-48-6 | Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. |
| Methyl formate         | 107-31-3  | Not applicable  |

## SECTION 12: Ecological information

### 12.1. Toxicity

| Substances                      | CAS Number | Toxicity to Algae   | Toxicity to Fish  | Toxicity to Microorganisms                       | Toxicity to Invertebrates   |
|---------------------------------|------------|---|---|--|---|
| Formic acid                     | 64-18-6    | EC50 (72 h) 1240 mg/L (Pseudokirchneriella subcapitata)   | LC50 (96 h) 130 mg/L (Danio rerio)  | NOEC (13 d) 72 mg/L (Activated sludge, domestic) | EC50 (48 h) 365 mg/L (Daphnia magna)<br>NOEC (21 d) 100 mg/L (Daphnia magna)  |
| Ethylene glycol monobutyl ether | 111-76-2   | EC50 (72 h) =1840 mg/L (Pseudokirchneriella subcapitata)<br>EC50 (72h) 839.56 mg/L (Skeletonema costatum)                       | LC50 (96 h) =1474 mg/L (Oncorhynchus mykiss)<br>LC50 (95h) > 1000 mg/L (Scophthalmus maximus)<br>NOAEC (21 d) >100 mg/L (Danio rerio)   | No information available                         | EC50 (48 h) =1800 mg/L (Daphnia magna)<br>EC50 (21 d) =297 mg/L (Daphnia magna)<br>EC50 (48 h) 2051.75 mg/L (Acartia tonsa)       |
| Acetic acid                     | 64-19-7    | EC50 (72 h) =55.22 mg/L (Anabaena) (Effect concentrations in the aquatic environment are attributable to a change in pH value.) | LC50 (96 h) =75 mg/L (Lepomis macrochirus)<br>LC50 (96 h) =251 mg/L (Gambusia affinis) (Effect concentrations in the aquatic environment are attributable to a change in pH value.) | NOAEC (16 h) =1150 mg/L (Pseudomonas putida)     | EC50 (48 h) =65 mg/L (Daphnia magna) (Effect concentrations in the aquatic environment are attributable to a change in pH value.) |
| Aldol                           | 107-89-1   | EC50 (5d) >237 mg/L (Nitzscheria linearis)  | No information available  | No information available                         | No information available  |
| Orange, sweet, extract          | 8028-48-6  | No information available  | LL50 (96h) 0.702 mg/L (Pimephales promelas) (similar substance)   | No information available                         | EC50 (48h) 0.36 mg/L (Daphnia magna)<br>LC50 (48h) 0.577 mg/L (Daphnia magna)<br>NOEC (16d) 0.115 mg/L (Daphnia magna)            |
| Methyl formate                  | 107-31-3   | EC50(72h): 1079 mg/L (growth rate) (Scenedesmus subspicatus)<br>EC50 (72h) 1010 mg/L (Skeletonema costatum)                     | LC50(96h): 103 mg/L (Danio rerio)<br>LC50(96h): ca. 115 mg/L (Leuciscus idus)<br>LC50 (96h) 66 mg/L (Cyprinodon variegatus)   | EC50(17h) > 10000 mg/L (Pseudomonas putida)      | EC50(48 h) > 500 mg/L (Daphnia magna)<br>EC50 (48h) 4851 mg/L (Acartia tonsa)   |

### 12.2. Persistence and degradability

| Substances                      | CAS Number | Persistence and Degradability       |
|---------------------------------|------------|-------------------------------------|
| Formic acid                     | 64-18-6    | Readily biodegradable (100% @ 14d)  |
| Ethylene glycol monobutyl ether | 111-76-2   | Readily biodegradable (90.4% @ 28d) |
| Acetic acid                     | 64-19-7    | Readily biodegradable (99% @ 7d)    |
| Aldol                           | 107-89-1   | No information available            |
| Orange, sweet, extract          | 8028-48-6  | Readily biodegradable (72% @ 28d)   |
| Methyl formate                  | 107-31-3   | Readily biodegradable (93% @ 28d)   |

### 12.3. Bioaccumulative potential

| Substances                      | CAS Number | Log Pow            |
|---------------------------------|------------|--------------------|
| Formic acid                     | 64-18-6    | LogKow -2.1        |
| Ethylene glycol monobutyl ether | 111-76-2   | 0.8                |
| Acetic acid                     | 64-19-7    | Log Kow =-0.17     |
| Aldol                           | 107-89-1   | -0.72              |
| Orange, sweet, extract          | 8028-48-6  | 2.78 - 4.88        |
| Methyl formate                  | 107-31-3   | -0.17 (calculated) |

### 12.4. Mobility in soil

| Substances  | CAS Number | Mobility |
|-------------|------------|----------|
| Formic acid | 64-18-6    | KOC = 31 |

|                                 |           |                          |
|---------------------------------|-----------|--------------------------|
| Ethylene glycol monobutyl ether | 111-76-2  | No information available |
| Acetic acid                     | 64-19-7   | No information available |
| Aldol                           | 107-89-1  | No information available |
| Orange, sweet, extract          | 8028-48-6 | No information available |
| Methyl formate                  | 107-31-3  | KOC = 2.15               |

**12.5. Results of PBT and vPvB assessment**

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT). This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

| Substances                      | PBT and vPvB assessment |
|---------------------------------|-------------------------|
| Formic acid                     | Not PBT/vPvB            |
| Ethylene glycol monobutyl ether | Not PBT/vPvB            |
| Acetic acid                     | Not PBT/vPvB            |
| Aldol                           | Not PBT/vPvB            |
| Orange, sweet, extract          | Not PBT/vPvB            |
| Methyl formate                  | Not PBT/vPvB            |

**12.6. Other adverse effects****Endocrine Disruptor Information**

This product does not contain any known or suspected endocrine disruptors

**SECTION 13: Disposal considerations****13.1. Waste treatment methods****Disposal methods**

Disposal should be made in accordance with federal, state, and local regulations.

**Contaminated Packaging**

Follow all applicable national or local regulations.

**SECTION 14: Transport information****IMDG/IMO**

**UN Number** UN3412  
**UN proper shipping name:** Formic Acid Solution  
**Transport Hazard Class(es):** 8  
**Packing Group:** II  
**Environmental Hazards:** Not applicable

**RID**

**UN Number** UN3412  
**UN proper shipping name:** Formic Acid Solution  
**Transport Hazard Class(es):** 8  
**Packing Group** II  
**Environmental Hazards:** Not applicable

**ADR**

**UN Number** UN3412  
**UN proper shipping name:** Formic Acid Solution  
**Transport Hazard Class(es):** 8  
**Packing Group** II  
**Environmental Hazards:** Not applicable

**IATA/ICAO**

**UN Number** UN3412  
**UN proper shipping name:** Formic Acid Solution  
**Transport Hazard Class(es):** 8  
**Packing Group:** II  
**Environmental Hazards:** Not applicable

**14.1. UN Number** UN3412

**14.2. UN proper shipping name:** Formic Acid Solution

**14.3. Transport Hazard Class(es):** 8

**14.4. Packing Group** II

**14.5. Environmental Hazards:** Not applicable

**14.6. Special Precautions for User** None

**14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not applicable

## SECTION 15: Regulatory information

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

#### International Inventories

**EINECS (European Inventory of Existing Chemical Substances)** This product, and all its components, complies with EINECS

**US TSCA Inventory** All components listed on inventory or are exempt.

**Canadian Domestic Substances List (DSL)** All components listed on inventory or are exempt.

#### Legend

**TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory

**EINECS/ELINCS** - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

**DSL/NDSL** - Canadian Domestic Substances List/Non-Domestic Substances List

**Germany, Water Endangering Classes (WGK)** WGK 1: Low hazard to waters.

### 15.2. Chemical safety assessment

Yes

## SECTION 16: Other information

#### **Full text of H-Statements referred to under sections 2 and 3**

H226 - Flammable liquid and vapor

H290 - May be corrosive to metals

H302 - Harmful if swallowed

H312 - Harmful in contact with skin

H314 - Causes severe skin burns and eye damage

H315 - Causes skin irritation

H318 - Causes serious eye damage

H319 - Causes serious eye irritation

H331 - Toxic if inhaled

H332 - Harmful if inhaled

H335 - May cause respiratory irritation

#### **Key or legend to abbreviations and acronyms used in the safety data sheet**

bw – body weight

CAS – Chemical Abstracts Service

CLP – REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Classification, Labelling and Packaging of substances and mixtures

EC – European Commission

EC10 – Effective Concentration 10%

EC50 – Effective Concentration 50%

EEC – European Economic Community

ErC50 – Effective Concentration growth rate 50%

IBC Code – International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk

LC50 – Lethal Concentration 50%

LD50 – Lethal Dose 50%

LL0 – Lethal Loading 0%

LL50 – Lethal Loading 50%

MARPOL – International Convention for the Prevention of Pollution from Ships

mg/kg – milligram/kilogram

mg/L – milligram/liter

NIOSH – National Institute for Occupational Safety and Health

NOEC – No Observed Effect Concentration

NTP – National Toxicology Program

OEL – Occupational Exposure Limit

PBT – Persistent Bioaccumulative and Toxic

PC – Chemical Product category

PEL – Permissible Exposure Limit

ppm – parts per million

PROC – Process category

REACH – REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals  
STEL – Short Term Exposure Limit  
SU – Sector of Use category

**Key literature references and sources for data**

[www.ChemADVISOR.com/](http://www.ChemADVISOR.com/)

**Revision Date:** 21-Sep-2015

**Revision Note**

Not applicable

**This safety data sheet complies with the requirements of Regulation (EC) No. 453/2010**

**Disclaimer Statement**

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

**End of Safety Data Sheet**

10% Formic Acid with Additives

| Annex to SDS                    |            |                       |                                |                       |                 |
|---------------------------------|------------|-----------------------|--------------------------------|-----------------------|-----------------|
| Substances                      | CAS Number | Process categories    | Environmental release category | Product category(ies) | Sector of uses  |
| Formic acid                     | 64-18-6    | PROC4; PROC8b; PROC15 | ERC2; ERC4                     | -                     | SU2a; SU2b; SU3 |
| Ethylene glycol monobutyl ether | 111-76-2   | PROC4; PROC8b; PROC15 | ERC2                           | -                     | SU2a; SU2b; SU3 |
| Acetic acid                     | 64-19-7    | PROC4; PROC8b; PROC15 | ERC1                           | -                     | SU2a; SU2b; SU3 |
| Methanol                        | 67-56-1    | PROC4; PROC8b; PROC15 | ERC2; ERC4                     | -                     | SU2a; SU2b; SU3 |

**Exposure Scenario**

Application of bulk onshore/offshore oilfield liquid or solid/powder.

**1. Title Section**

**Use** Use in batch process where opportunities for exposure arise.  
 Transfer from support vessel to installation.  
 Transfer from bulk/ IBC/ drum to on-site storage, transfer to process.  
 Transfer from pot/tin/tube to process. On-site sampling and testing e.g. QC

**Sector of uses** SU2a - Mining, (without offshore industries)  
 SU2b - Offshore industries  
 SU3 - Industrial uses

**Worker**

**Process categories** PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises  
 PROC15 - Use as a laboratory reagent  
 PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

**Product category(ies)** Not applicable  
**Article categories** Not applicable

**Environmental**

**Environmental release category(ies)** ERC1 - Manufacture of substances  
 ERC2 - Formulation of preparations (mixtures)  
 ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles

**2. Conditions of use affecting exposure**

**Control of environmental exposure**

| Substances | Control of environmental exposure   |
|------------|---|
| Methanol   | As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed. |

Amount used, frequency and duration of use (or from service life)

| Substances                      | Daily Amount Per Site | Annual site tonnage | Frequency           | Duration of use |
|---------------------------------|-----------------------|---------------------|---------------------|-----------------|
| Formic acid                     | -                     | -                   | -                   | -               |
| Ethylene glycol monobutyl ether | 83000 kg              | 25000               | Continuous release. | 300 d/y         |
| Acetic acid                     | -                     | -                   | -                   | -               |
| Methanol                        | -                     | -                   | -                   | -               |

**Technical and organisational conditions and measures**

| Substances                      | Technical and organisational conditions and measures  |
|---------------------------------|---|
| Formic acid                     | Prevent entry into waterways, sewers, basements or confined areas.  |
| Ethylene glycol monobutyl ether | Remove sludge regularly from process/cleaning water in reservoir. Prevent entry into waterways, sewers, basements or confined areas. Bund storage facilities to prevent soil and water pollution in the event of spillage. Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. A leak prevention plan is needed to prevent low level continual releases. |
| Acetic acid                     | Prevent entry into waterways, sewers, basements or confined areas.  |

**Substances**

Formic acid  
Ethylene glycol monobutyl ether  
Acetic acid  
Methanol

**CAS Number**

64-18-6  
111-76-2  
64-19-7  
67-56-1

Revision Number: 1

Revision Date: 21-Sep-2015

|          |  |
|----------|--|
| Methanol | Prevent entry into waterways, sewers, basements or confined areas. |
|----------|--|

**Conditions and measures related to sewage treatment plant**

| Substances                      | Conditions and measures related to sewage treatment plant  |
|---------------------------------|--|
| Formic acid                     | No information available   |
| Ethylene glycol monobutyl ether | Onsite sewage treatment plant, or, Domestic sewage treatment plant. Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed. |
| Acetic acid                     | No information available   |
| Methanol                        | Not Applicable.  |

| Substances                      | Assumed municipal sewage treatment plant flow m3/d | Wastewater Emission Removal Efficiency | Estimated product removal from wastewater via municipal sewage treatment |
|---------------------------------|--|--|--|
| Ethylene glycol monobutyl ether | 2000   | -                                      | -  |

**Conditions and measures related to treatment of waste (including article waste)**

| Substances                      | Conditions and measures related to treatment of waste (including article waste)                     |
|---------------------------------|---|
| Formic acid                     | Dispose of contents/container in accordance with local/regional/national/international regulations. |
| Ethylene glycol monobutyl ether | Dispose of contents/container in accordance with local/regional/national/international regulations. |
| Acetic acid                     | Dispose of contents/container in accordance with local/regional/national/international regulations. |
| Methanol                        | Dispose of contents/container in accordance with local/regional/national/international regulations. |

**Other conditions affecting environmental exposure**

| Substances                      | Receiving surface water flow m3/d | Degradation   |
|---------------------------------|-----------------------------------|---------------|
| Formic acid                     | -                                 | 100 @ 14d     |
| Ethylene glycol monobutyl ether | -                                 | 87.4%         |
| Acetic acid                     | -                                 | 99% @ 7d      |
| Methanol                        | -                                 | 95-97% @ 20 C |

**Control of Worker Exposure****Product (article) characteristics**

Physical State: Liquid  
Vapor Pressure: No information available  
Dustiness: Not applicable

| Substances                      | Limit the substance content in the product to |
|---------------------------------|---|
| Formic acid                     | 100%  |
| Ethylene glycol monobutyl ether | 100%  |
| Acetic acid                     | 25%   |
| Methanol                        | 100%  |

**Amount used (or contained in articles), frequency and duration of use/exposure**

| Substances                      | Amounts used (daily) | Covers daily exposures up to (hours/day) | Frequency (days/year) |
|---------------------------------|----------------------|--|-----------------------|
| Formic acid                     | -                    | >4                                       | =<240                 |
| Ethylene glycol monobutyl ether | -                    | <8                                       | -                     |
| Acetic acid                     | -                    | 8  | 260                   |
| Methanol                        | -                    | =< 8                                     | =< 240                |

**Technical and organisational conditions and measures**

| Substances                      | Technical and organisational conditions and measures   |
|---------------------------------|--|
| Formic acid                     | Use with local exhaust ventilation. Local exhaust ventilation - efficiency of at least 95 %.   |
| Ethylene glycol monobutyl ether | Use in closed batch process (synthesis or formulation). Provide a basic standard of general ventilation (5 to 15 air changes per hour).<br>PROC4 + PROC8b: Retain drain downs in sealed storage pending disposal or for subsequent recycle.  |
| Acetic acid                     | Use in closed batch process (synthesis or formulation). Provide a basic standard of general ventilation (3 to 5 air changes per hour). General exposure (open systems): Avoid carrying out activities involving exposure for more than 4 hours. Ensure operation is undertaken outdoors. Sample via a closed loop or other system to avoid exposure. |

**Substances**

Formic acid  
Ethylene glycol monobutyl ether  
Acetic acid  
Methanol

**CAS Number**

64-18-6  
111-76-2  
64-19-7  
67-56-1

Revision Number: 1

Revision Date: 21-Sep-2015

|          |  |
|----------|--|
|          | PROC8b: Ensure material transfers are under containment or extract ventilation. Transfer via enclosed lines. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Locate bulk storage outdoors.<br>PROC15: Provide a basic standard of general ventilation (10 to 15 air changes per hour). Avoid carrying out activities involving exposure for more than 1 hour. Handle in a fume cupboard or under extract ventilation. |
| Methanol | PROC4: Provide extract ventilation to points where emissions occur.<br>PROC8b: Handle only at a place with local exhaust system (or another appropriate exhaust). Provide a basic standard of general ventilation (1 to 3 air changes per hour).<br>PROC15: Use with local exhaust ventilation.  |

**Conditions and measures related to personal protection, hygiene and health evaluation**

| Substances                      | Conditions and measures related to personal protection, hygiene and health evaluation             |
|---------------------------------|---|
| Formic acid                     | Use suitable eye protection. Wear suitable gloves tested to EN374. Refer to section 8 of the SDS. |
| Ethylene glycol monobutyl ether | Use suitable eye protection. Wear suitable gloves tested to EN374. Refer to section 8 of the SDS. |
| Acetic acid                     | Use suitable eye protection. Wear suitable gloves tested to EN374. Refer to section 8 of the SDS. |
| Methanol                        | Use suitable eye protection. Wear suitable gloves tested to EN374. Refer to section 8 of the SDS. |

**Other conditions affecting workers exposure**

| Substances                      | Other conditions affecting workers exposure   |
|---------------------------------|---|
| Formic acid                     | Indoor use. Exposed skin area: Palms of both hands (480 cm <sup>2</sup> ) <sup>2</sup> .  |
| Ethylene glycol monobutyl ether | PROC4 + PROC8b: Indoor and outdoor use. Assumes process temperature up to 20 °C. Provide basic employee training to prevent/minimize exposures.<br>PROC15: Indoor use. Provide basic employee training to prevent/minimize exposures. |
| Acetic acid                     | PROC4 + PROC8b: Indoor and outdoor use. Assumes process temperature up to 25 °C.<br>PROC15: Indoor use.   |
| Methanol                        | Provide basic employee training to prevent/minimize exposures.<br>PROC8b: Local exhaust ventilation - efficiency of at least 30 %.<br>PROC15: Indoor use.   |

**Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply**

| Substances                      | Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply  |
|---------------------------------|--|
| Formic acid                     | Wash hands after use. Launder contaminated clothing before reuse. Personal measures have to be applied in case of potential exposure only. |
| Ethylene glycol monobutyl ether | Wash hands after use. Launder contaminated clothing before reuse. Personal measures have to be applied in case of potential exposure only. |
| Acetic acid                     | Wash hands after use. Launder contaminated clothing before reuse.  |
| Methanol                        | Wash hands after use. Launder contaminated clothing before reuse. Personal measures have to be applied in case of potential exposure only. |

**3. Exposure estimation and reference to its source****Environmental release and exposure**

| Substances  | Environmental release and exposure  |
|-------------|---|
| Formic acid | No information available  |
| Acetic acid | When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1. |
| Methanol    | No exposure assessment presented for the environment.   |

| Substances                      | Release to Water | Release to Air | Release to Soil | Release estimation method | Local freshwater dilution factor | Local marine water dilution factor |
|---------------------------------|------------------|----------------|-----------------|---------------------------|----------------------------------|------------------------------------|
| Ethylene glycol monobutyl ether | 0.5%             | 1%             | 0.01%           | ECETOC TRA                | 10                               | 100                                |

| Substances                      | Protection Target       | Exposure estimate (based on: EUSES 2.1.2) | Unit     | RCR |
|---------------------------------|-------------------------|---|----------|-----|
| Ethylene glycol monobutyl ether | Freshwater              | 0.264                                     | mg/L     | -   |
|                                 | Sediment (freshwater)   | 1.03                                      | mg/kg dw | -   |
|                                 | Marine water            | 0.0265                                    | mg/L     | -   |
|                                 | Sediment (marine water) | 0.103                                     | mg/kg dw | -   |
|                                 | Sewage treatment plant  | 2.64                                      | mg/L     | -   |
|                                 | Agricultural soil       | 0.0201                                    | mg/kg dw | -   |

**Substances**

Formic acid  
Ethylene glycol monobutyl ether  
Acetic acid  
Methanol

**CAS Number**

64-18-6  
111-76-2  
64-19-7  
67-56-1

Revision Number: 1

Revision Date: 21-Sep-2015

|  |                                  |   |                   |   |
|--|----------------------------------|---|-------------------|---|
|  | Man via Environment - Inhalation | - | mg/m <sup>3</sup> | - |
|  | Man via Environment – Oral       | - | mg/kg bw/day      | - |

**Worker exposure**

| Substances                      | Route of exposure and type of effects                                     | Exposure estimate PROC4 | Assessment Method      | RCR   |
|---------------------------------|---|-------------------------|------------------------|-------|
| Formic acid                     | Long-term exposure - Local effects, Inhalation mg/m <sup>3</sup>          | 3.858                   | Used ECETOC TRA model. | 0.406 |
|                                 | Long-term exposure - systemic effects, Dermal mg/kg bw/day                | 1.371                   |                        | -     |
|                                 | Combined routes, systemic, long-term mg/kg bw/day                         | 1.923                   |                        | -     |
|                                 | Long-term, short-term exposure - local effects, Dermal mg/cm <sup>2</sup> | 0.200                   |                        | -     |
|                                 | Short-term exposure - local effects, Inhalation mg/m <sup>3</sup>         | 7.717                   |                        | 0.406 |
|                                 | Short-term exposure - systemic effects, Dermal mg/kg bw/day               | 1.371                   |                        | -     |
|                                 | Combined routes, systemic, short-term mg/kg bw/day                        | 1.406                   |                        | -     |
| Ethylene glycol monobutyl ether | Long-term exposure - systemic effects, Inhalation mg/m <sup>3</sup>       | 5                       | ESIG GES worker tool   | 0.3   |
|                                 | Long-term exposure - systemic effects, Dermal mg/kg bw/day                | 6.86                    |                        | 0.1   |
| Acetic acid                     | Long-term exposure - Local effects, Inhalation mg/m <sup>3</sup>          | 8.40                    | Used ECETOC TRA model. | 0.84  |
|                                 | Long-term exposure - local effects, Dermal mg/kg bw/day                   | 1.37                    |                        | 0.14  |
|                                 | Combined routes, systemic, long-term mg/kg bw/day                         | 9.77                    |                        | 0.98  |
| Methanol                        | Long-term exposure - systemic effects, Inhalation mg/m <sup>3</sup>       | -                       | EasyTRA Version 3.0    | 0.513 |
|                                 | Long-term exposure - systemic effects, Dermal mg/kg bw/day                | -                       |                        | 0.034 |
|                                 | Combined routes, systemic, long-term mg/kg bw/day                         | -                       |                        | 0.477 |

| Substances                      | Route of exposure and type of effects                                     | Exposure estimate PROC8b | Assessment Method      | RCR   |
|---------------------------------|---|--------------------------|------------------------|-------|
| Formic acid                     | Long-term exposure - Local effects, Inhalation mg/m <sup>3</sup>          | 2.893                    | Used ECETOC TRA model. | 0.304 |
|                                 | Long-term exposure - systemic effects, Dermal mg/kg bw/day                | 1.371                    |                        | -     |
|                                 | Combined routes, systemic, long-term mg/kg bw/day                         | 1.785                    |                        | -     |
|                                 | Long-term, short-term exposure - local effects, Dermal mg/cm <sup>2</sup> | 0.200                    |                        | -     |
|                                 | Short-term exposure - local effects, Inhalation mg/m <sup>3</sup>         | 5.788                    |                        | 0.304 |
|                                 | Short-term exposure - systemic effects, Dermal mg/kg bw/day               | 1.371                    |                        | -     |
|                                 | Combined routes, systemic, short-term mg/kg bw/day                        | 1.397                    |                        | -     |
| Ethylene glycol monobutyl ether | Long-term exposure - systemic effects, Inhalation mg/m <sup>3</sup>       | 5                        | ESIG GES worker tool   | 0.3   |
|                                 | Long-term exposure - systemic effects, Dermal mg/kg bw/day                | 6.86                     |                        | 0.1   |
| Acetic acid                     | Long-term exposure - Local effects, Inhalation mg/m <sup>3</sup>          | 7.00                     | Used ECETOC TRA model. | 0.70  |
|                                 | Long-term exposure - local effects, Dermal mg/kg bw/day                   | 1.37                     |                        | 0.14  |
|                                 | Combined routes, systemic, long-term mg/kg bw/day                         | 8.37                     |                        | 0.81  |
| Methanol                        | Long-term exposure - systemic effects, Inhalation mg/m <sup>3</sup>       | -                        | EasyTRA Version 3.0    | 0.539 |
|                                 | Long-term exposure - systemic effects, Dermal mg/kg bw/day                | -                        |                        | 0.068 |



**Substances**

Formic acid  
Ethylene glycol monobutyl ether  
Acetic acid  
Methanol

**CAS Number**

64-18-6  
111-76-2  
64-19-7  
67-56-1

Revision Number: 1

Revision Date: 21-Sep-2015

|  |   |   |  |       |
|--|---|---|--|-------|
|  | Combined routes, systemic, long-term mg/kg bw/day | - |  | 0.607 |
|--|---|---|--|-------|

| Substances   | Route of exposure and type of effects                                     | Exposure estimate PROC15  | Assessment Method      | RCR   |
|--|---|---|------------------------|-------|
| Formic acid  | Long-term exposure - Local effects, Inhalation mg/m <sup>3</sup>          | 1.929   | Used ECETOC TRA model. | 0.203 |
|  | Long-term exposure - systemic effects, Dermal mg/kg bw/day                | 0.069   |                        | -     |
|  | Combined routes, systemic, long-term mg/kg bw/day                         | 0.344   |                        | -     |
|  | Long-term, short-term exposure - local effects, Dermal mg/cm <sup>2</sup> | 0.020   |                        | -     |
|  | Short-term exposure - local effects, Inhalation mg/m <sup>3</sup>         | 3.858   |                        | 0.203 |
|  | Short-term exposure - systemic effects, Dermal mg/kg bw/day               | 0.069   |                        | -     |
|  | Combined routes, systemic, short-term mg/kg bw/day                        | 0.086   |                        | -     |
|  | Ethylene glycol monobutyl ether   | Long-term exposure - systemic effects, Inhalation mg/m <sup>3</sup> |                        | 5     |
| Long-term exposure - systemic effects, Dermal mg/kg bw/day |   | 0.34  | 0.0                    |       |
| Acetic acid  | Long-term exposure - Local effects, Inhalation mg/m <sup>3</sup>          | 1.00  | Used ECETOC TRA model. | 0.10  |
|  | Long-term exposure - local effects, Dermal mg/kg bw/day                   | 0.03  |                        | 0.0   |
|  | Combined routes, systemic, long-term mg/kg bw/day                         | 1.03  |                        | 0.10  |
| Methanol   | Long-term exposure - systemic effects, Inhalation mg/m <sup>3</sup>       | -   | EasyTRA Version 3.0    | 0.256 |
|  | Long-term exposure - systemic effects, Dermal mg/kg bw/day                | -   |                        | 0.002 |
|  | Combined routes, systemic, long-term mg/kg bw/day                         | -   |                        | 0.258 |

**4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

Scaling method

For scaling see: <http://www.ecetoc.org/tra>, ECETOC TRA worker v2.3, modified version.

Scaling parameters

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.

| Substances | Boundaries of scaling  |
|------------|--|
| Methanol   | <p>If the type of ventilation at the use site of a downstream user (DU) differs from the instructions in the ES, a linear correlation between the RCR (Inhalation) and the type of ventilation exists. Following scaling factors (f) apply: General ventilation (&lt; 3 air changes per hour) =1. Good general ventilation (3 to 5 air changes per hour, corresponds to outdoor use) = 0.7. Enhanced general ventilation (&gt; 5 air changes per hour) = 0.3. RCR (DU) = f(DU) * RCR (as stated in ES) / f (type of ventilation stated in ES). In the same manner a scaling for the efficiency of the local extract ventilation (LEV) can be applied.</p> <p>If the duration of the use by a worker at a downstream user (DU) site differs from the instructions in the ES, a linear correlation between the RCR (Inhalation) and the duration of use exist. Following scaling factors (f) apply: Duration &gt; 4 hours/day = 1. Duration: 1-4 hours/day = 0.6. Duration: 15 min/day – 1 hour/day = 0,2. Duration &lt; 15 min/day = 0.1. RCR (DU) = f(DU) * RCR (as stated in ES) / f (duration in ES).</p> <p>If the downstream user (DU) uses the substance in a different concentration than the one stated in the ES, a linear correlation between the RCR (Inhalation) and the RCR (dermal) and the concentration exists. Following scaling factors (f) apply: Concentration &gt;25% =1. Concentration &gt;= 5% = 0.6. Concentration &gt;= 1% = 0.2. Concentration &lt; 1% = 0.1. If the parameters used in the MEASE model outlined above do not reflect conditions at the DU facility, the DU can use MEASE and input the parameters that do reflect conditions at the DU facility to check whether the DU works inside the boundaries set by the ES. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14.R16). RCR (DU) = f(DU) * RCR (as stated in ES) / f (concentration in ES).</p> |