Section 1. Identification

Product identifier : Pfu DNA Ligase, Part Number 600191
Part No. (Chemical Kit) : 600191
Part No. : Pfu DNA Ligase 600191-51
Pfu DNA Ligase 10X Buffer 600191-52

Supplier/Manufacturer : Agilent Technologies Australia Pty Ltd
679 Springvale Road
Mulgrave
Victoria 3170, Australia
1800 802 402

Emergency telephone number (with hours of operation) : CHEMTREC®: +(61)-290372994

Section 2. Hazard(s) identification

Classification of the substance or mixture

Pfu DNA Ligase 10X Buffer
H319
SERIOUS EYE DAMAGE/EYE IRRITATION - Category 2A
Pfu DNA Ligase Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 30 - 60%
Pfu DNA Ligase 10X Buffer Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 1 - 10%

Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 1 - 10%
Percentage of the mixture consisting of ingredient(s) of unknown oral toxicity: 1 - 10%
Percentage of the mixture consisting of ingredient(s) of unknown hazards to the aquatic environment: 3.2%

GHS label elements

Hazard pictograms : Pfu DNA Ligase 10X Buffer

Signal word : Pfu DNA Ligase
Pfu DNA Ligase 10X Buffer No signal word.

Hazard statements : Pfu DNA Ligase
Pfu DNA Ligase 10X Buffer No known significant effects or critical hazards.
H319 - Causes serious eye irritation.

Precautionary statements

Prevention : Pfu DNA Ligase
Pfu DNA Ligase 10X Buffer Not applicable.
P280 - Wear eye or face protection.
P264 - Wash hands thoroughly after handling.

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Section 2. Hazard(s) identification

**Response**

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Not applicable.</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

**Storage**

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage</td>
<td>Not applicable.</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

**Disposal**

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposal</td>
<td>Not applicable.</td>
<td>Not applicable.</td>
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</tbody>
</table>

**Supplemental label elements**

**Additional warning phrases**

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional warning</td>
<td>Not applicable.</td>
<td>Not applicable.</td>
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</table>

**Other hazards which do not result in classification**

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other hazards</td>
<td>None known.</td>
<td>None known.</td>
</tr>
</tbody>
</table>

Section 3. Composition and ingredient information

**Substance/mixture**

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS number/other identifiers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>% (w/w)</th>
<th>CAS number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycerol</td>
<td>≥30 - ≤60</td>
<td>56-81-5</td>
</tr>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>≤2.3</td>
<td>9002-93-1</td>
</tr>
<tr>
<td>Polyoxyethylene octyl phenyl ether</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

**Description of necessary first aid measures**

<table>
<thead>
<tr>
<th>Description of necessary first aid measures</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhilation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Eye contact**

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Inhilation**

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Pfu DNA Ligase</th>
<th>Pfu DNA Ligase 10X Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhilation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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**Section 4. First aid measures**

**Skin contact**
- **Pfu DNA Ligase**: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.
- **Pfu DNA Ligase 10X Buffer**: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

**Ingestion**
- **Pfu DNA Ligase**: Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.
- **Pfu DNA Ligase 10X Buffer**: Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

**Potential acute health effects**

- **Eye contact**
  - **Pfu DNA Ligase**: Causes serious eye irritation.
  - **Pfu DNA Ligase 10X Buffer**: Causes serious eye irritation.

- **Inhalation**
  - **Pfu DNA Ligase**: No known significant effects or critical hazards.
  - **Pfu DNA Ligase 10X Buffer**: No known significant effects or critical hazards.

- **Skin contact**
  - **Pfu DNA Ligase**: No known significant effects or critical hazards.
  - **Pfu DNA Ligase 10X Buffer**: No known significant effects or critical hazards.

- **Ingestion**
  - **Pfu DNA Ligase**: No known significant effects or critical hazards.
  - **Pfu DNA Ligase 10X Buffer**: No known significant effects or critical hazards.

**Over-exposure signs/symptoms**

- **Eye contact**
  - **Pfu DNA Ligase**: Adverse symptoms may include the following:
    - pain or irritation
    - watering
    - redness
  - **Pfu DNA Ligase 10X Buffer**: Adverse symptoms may include the following:
    - pain or irritation
    - watering
    - redness

- **Inhalation**
  - **Pfu DNA Ligase**: No specific data.
  - **Pfu DNA Ligase 10X Buffer**: No specific data.

- **Skin contact**
  - **Pfu DNA Ligase**: No specific data.
  - **Pfu DNA Ligase 10X Buffer**: No specific data.

- **Ingestion**
  - **Pfu DNA Ligase**: No specific data.
  - **Pfu DNA Ligase 10X Buffer**: No specific data.

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Section 4. First aid measures

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Pfu DNA Ligase  
Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.  
Pfu DNA Ligase 10X Buffer  
In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : Pfu DNA Ligase  
No specific treatment.  
Pfu DNA Ligase 10X Buffer  
No specific treatment.

Protection of first-aiders : Pfu DNA Ligase  
No action shall be taken involving any personal risk or without suitable training.  
Pfu DNA Ligase 10X Buffer  
No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Firefighting measures

Extinguishing media : Pfu DNA Ligase  
Use an extinguishing agent suitable for the surrounding fire.  
Pfu DNA Ligase 10X Buffer  
Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : Pfu DNA Ligase  
None known.  
Pfu DNA Ligase 10X Buffer  
None known.

Specific hazards arising from the chemical : Pfu DNA Ligase  
In a fire or if heated, a pressure increase will occur and the container may burst.  
Pfu DNA Ligase 10X Buffer  
In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : Pfu DNA Ligase  
Decomposition products may include the following materials: carbon dioxide carbon monoxide  
Pfu DNA Ligase 10X Buffer  
Decomposition products may include the following materials: carbon dioxide carbon monoxide nitrogen oxides halogenated compounds metal oxide/oxides

Special protective actions for fire-fighters : Pfu DNA Ligase  
Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.  
Pfu DNA Ligase 10X Buffer  
Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
## Section 5. Firefighting measures

**Special protective equipment for fire-fighters**
- **Pfu DNA Ligase**
  - Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

| Pfu DNA Ligase 10X Buffer | Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. |

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

#### For non-emergency personnel
- **Pfu DNA Ligase**
  - No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Put on appropriate personal protective equipment.

| Pfu DNA Ligase 10X Buffer | No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment. |

#### For emergency responders
- **Pfu DNA Ligase**
  - If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

| Pfu DNA Ligase 10X Buffer | If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". |

### Environmental precautions
- **Pfu DNA Ligase**
  - Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

| Pfu DNA Ligase 10X Buffer | Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). |

### Methods and material for containment and cleaning up

#### Methods for cleaning up
- **Pfu DNA Ligase**
  - Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

| Pfu DNA Ligase 10X Buffer | Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor. |
Section 7. Handling and storage

Precautions for safe handling

Protective measures:
- **Pfu DNA Ligase**: Put on appropriate personal protective equipment (see Section 8).
- **Pfu DNA Ligase 10X Buffer**: Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene:
- **Pfu DNA Ligase**: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- **Pfu DNA Ligase 10X Buffer**: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities:
- **Pfu DNA Ligase**: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.
- **Pfu DNA Ligase 10X Buffer**: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls and personal protection

Control parameters

Occupational exposure limits

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Exposure limits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pfu DNA Ligase</strong></td>
<td><strong>Safe Work Australia (Australia, 1/2014).</strong> TWA: 10 mg/m³ 8 hours.</td>
</tr>
<tr>
<td>Glycerol</td>
<td></td>
</tr>
</tbody>
</table>

Appropriate engineering controls:
- Good general ventilation should be sufficient to control worker exposure to airborne contaminants.
Section 8. Exposure controls and personal protection

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Body protection

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection

Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection

Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state

- Pfu DNA Ligase: Liquid.
- Pfu DNA Ligase 10X Buffer: Liquid.

Colour

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.

Odour

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.

Odour threshold

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.

pH

- Pfu DNA Ligase: 7.5
- Pfu DNA Ligase 10X Buffer: 7.5

Melting point

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.

Boiling point

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.

Flash point

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.

Evaporation rate

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.

Flammability (solid, gas)

- Pfu DNA Ligase: Not applicable.
- Pfu DNA Ligase 10X Buffer: Not applicable.

Lower and upper explosive (flammable) limits

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.

Vapour pressure

- Pfu DNA Ligase: Not available.
- Pfu DNA Ligase 10X Buffer: Not available.
Section 9. Physical and chemical properties

Vapour density : Pfu DNA Ligase Not available. 
                Pfu DNA Ligase 10X Buffer Not available.
Relative density : Pfu DNA Ligase Not available. 
                  Pfu DNA Ligase 10X Buffer Not available.
Solubility : Pfu DNA Ligase Soluble in the following materials: cold water and hot water.
             Pfu DNA Ligase 10X Buffer Easily soluble in the following materials: cold water and hot water.
Partition coefficient: n-octanol/water : Pfu DNA Ligase Not available.
                                            Pfu DNA Ligase 10X Buffer Not available.
Auto-ignition temperature : Pfu DNA Ligase Not available.
                            Pfu DNA Ligase 10X Buffer Not available.
Decomposition temperature : Pfu DNA Ligase Not available.
                           Pfu DNA Ligase 10X Buffer Not available.
Viscosity : Pfu DNA Ligase Not available.
            Pfu DNA Ligase 10X Buffer Not available.

Section 10. Stability and reactivity

Reactivity : Pfu DNA Ligase No specific test data related to reactivity available for this product or its ingredients.
             Pfu DNA Ligase 10X Buffer No specific test data related to reactivity available for this product or its ingredients.
Chemical stability : Pfu DNA Ligase The product is stable.
                     Pfu DNA Ligase 10X Buffer The product is stable.
Possibility of hazardous reactions : Pfu DNA Ligase Under normal conditions of storage and use, hazardous reactions will not occur.
                                  Pfu DNA Ligase 10X Buffer Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid : Pfu DNA Ligase No specific data.
                    Pfu DNA Ligase 10X Buffer No specific data.
Incompatible materials : Pfu DNA Ligase May react or be incompatible with oxidising materials.
                        Pfu DNA Ligase 10X Buffer May react or be incompatible with oxidising materials.
Hazardous decomposition products : Pfu DNA Ligase Under normal conditions of storage and use, hazardous decomposition products should not be produced.
                                  Pfu DNA Ligase 10X Buffer Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase Glycerol</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>12600 mg/kg</td>
<td>-</td>
</tr>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>1800 mg/kg</td>
<td>-</td>
</tr>
</tbody>
</table>

Irritation/Corrosion

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# Section 11. Toxicological information

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Score</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase Glycerol</td>
<td>Eyes - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 milligrams</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Skin - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 milligrams</td>
<td>-</td>
</tr>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>Eyes - Moderate irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 10 microliters</td>
<td>-</td>
</tr>
<tr>
<td>Polyoxyethylene octyl phenyl ether</td>
<td>Skin - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 microliters</td>
<td>-</td>
</tr>
</tbody>
</table>

**Sensitisation**
Not available.

**Mutagenicity**
Not available.

**Carcinogenicity**
Not available.

**Reproductive toxicity**
Not available.

**Teratogenicity**
Not available.

**Specific target organ toxicity (single exposure)**
Not available.

**Specific target organ toxicity (repeated exposure)**
Not available.

**Aspiration hazard**
Not available.

**Information on likely routes of exposure**
- Pfu DNA Ligase
  - Routes of entry anticipated: Oral, Dermal, Inhalation.
- Pfu DNA Ligase 10X Buffer
  - Routes of entry anticipated: Oral, Dermal, Inhalation.

**Potential acute health effects**

<table>
<thead>
<tr>
<th>Route</th>
<th>Product/ingredient name</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye contact</td>
<td>Pfu DNA Ligase</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>Causes serious eye irritation.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td>Inhalation</td>
<td>Pfu DNA Ligase</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td>Skin contact</td>
<td>Pfu DNA Ligase</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Pfu DNA Ligase</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>No known significant effects or critical hazards.</td>
</tr>
</tbody>
</table>

**Symptoms related to the physical, chemical and toxicological characteristics**

<table>
<thead>
<tr>
<th>Route</th>
<th>Product/ingredient name</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye contact</td>
<td>Pfu DNA Ligase</td>
<td>No specific data.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>Adverse symptoms may include the following: pain or irritation, watering, redness</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase</td>
<td>No specific data.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>No specific data.</td>
</tr>
<tr>
<td>Inhalation</td>
<td>Pfu DNA Ligase</td>
<td>No specific data.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>No specific data.</td>
</tr>
<tr>
<td>Skin contact</td>
<td>Pfu DNA Ligase</td>
<td>No specific data.</td>
</tr>
<tr>
<td></td>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>No specific data.</td>
</tr>
</tbody>
</table>

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**9/13**
Section 11. Toxicological information

Ingestion:
Pfu DNA Ligase: No specific data.
Pfu DNA Ligase 10X Buffer: No specific data.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Short term exposure
Potential immediate effects: Not available.
Potential delayed effects: Not available.

Long term exposure
Potential immediate effects: Not available.
Potential delayed effects: Not available.

Potential chronic health effects
Not available.

General:
Pfu DNA Ligase: No known significant effects or critical hazards.
Pfu DNA Ligase 10X Buffer: No known significant effects or critical hazards.

Carcinogenicity:
Pfu DNA Ligase: No known significant effects or critical hazards.
Pfu DNA Ligase 10X Buffer: No known significant effects or critical hazards.

Mutagenicity:
Pfu DNA Ligase: No known significant effects or critical hazards.
Pfu DNA Ligase 10X Buffer: No known significant effects or critical hazards.

Teratogenicity:
Pfu DNA Ligase: No known significant effects or critical hazards.
Pfu DNA Ligase 10X Buffer: No known significant effects or critical hazards.

Developmental effects:
Pfu DNA Ligase: No known significant effects or critical hazards.
Pfu DNA Ligase 10X Buffer: No known significant effects or critical hazards.

Fertility effects:
Pfu DNA Ligase: No known significant effects or critical hazards.
Pfu DNA Ligase 10X Buffer: No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

<table>
<thead>
<tr>
<th>Route</th>
<th>ATE value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>181602 mg/kg</td>
</tr>
<tr>
<td>Oral</td>
<td></td>
</tr>
</tbody>
</table>

Section 12. Ecological information

Toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase</td>
<td>Acute LC50 54000 mg/l Fresh water</td>
<td>Fish - Oncorhynchus mykiss</td>
<td>96 hours</td>
</tr>
<tr>
<td>Glycerol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>Acute LC50 5.85 mg/l Fresh water</td>
<td>Crustaceans - Ceriodaphnia rigaudi - Neonate</td>
<td>48 hours</td>
</tr>
<tr>
<td>Polyoxyethylene octyl phenyl ether</td>
<td>Acute LC50 11.2 mg/l Fresh water</td>
<td>Daphnia - Daphnia magna - Neonate</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 4500 μg/l Fresh water</td>
<td>Fish - Pimephales promelas</td>
<td>96 hours</td>
</tr>
</tbody>
</table>

Persistency and degradability

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Version: 5
Section 12. Ecological information

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Test</th>
<th>Result</th>
<th>Dose</th>
<th>Inoculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycerol</td>
<td>301D Ready Biodegradability - Closed Bottle Test</td>
<td>93 % - 30 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyoxyethylene octyl phenyl ether</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Aquatic half-life</th>
<th>Photolysis</th>
<th>Biodegradability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td>-</td>
<td>-</td>
<td>Readily</td>
</tr>
<tr>
<td>Polyoxyethylene octyl phenyl ether</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bioaccumulative potential

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>LogP&lt;sub&gt;ow&lt;/sub&gt;</th>
<th>BCF</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycerol</td>
<td>-1.76</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyoxyethylene octyl phenyl ether</td>
<td>4.86</td>
<td>-</td>
<td>high</td>
</tr>
</tbody>
</table>

Mobility in soil

Soil/water partition coefficient (K<sub>OC</sub>) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

ADG / IMDG / IATA : Not regulated as Dangerous Goods according to the ADG Code.

Special precautions for user : Transport within user’s premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of Marpol and the IBC Code : Not available.
Section 15. Regulatory information

**Standard Uniform Schedule of Medicine and Poisons**
Not regulated.

**Model Work Health and Safety Regulations - Scheduled Substances**
No listed substance

**International regulations**

- **Chemical Weapon Convention List Schedules I, II & III Chemicals**
  Not listed.

- **Montreal Protocol (Annexes A, B, C, E)**
  Not listed.

- **Stockholm Convention on Persistent Organic Pollutants**
  Not listed.

- **Rotterdam Convention on Prior Informed Consent (PIC)**
  Not listed.

- **UNECE Aarhus Protocol on POPs and Heavy Metals**
  Not listed.

**Inventory list**

- **Australia**: Not determined.
- **Canada**: Not determined.
- **China**: All components are listed or exempted.
- **Europe**: All components are listed or exempted.
- **Japan**
  - Japan inventory (ENCS): Not determined.
  - Japan inventory (ISHL): Not determined.
- **Malaysia**: Not determined.
- **New Zealand**: Not determined.
- **Philippines**: Not determined.
- **Republic of Korea**: Not determined.
- **Taiwan**: All components are listed or exempted.
- **Thailand**: Not determined.
- **Turkey**: Not determined.
- **United States**: All components are listed or exempted.
- **Viet Nam**: Not determined.

Section 16. Any other relevant information

**History**

- **Date of issue/Date of revision**: 23/01/2018
- **Date of previous issue**: 25/10/2017.
- **Version**: 5

**Key to abbreviations**

ADG = Australian Dangerous Goods
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
NOHSC = National Occupational Health and Safety Commission
Section 16. Any other relevant information

Pfu DNA Ligase, Part Number 600191

SUSMP = Standard Uniform Schedule of Medicine and Poisons
UN = United Nations

Procedure used to derive the classification

<table>
<thead>
<tr>
<th>Classification</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfu DNA Ligase 10X Buffer</td>
<td></td>
</tr>
<tr>
<td>Eye Irrit. 2A, H319</td>
<td>Calculation method</td>
</tr>
</tbody>
</table>

References
Not available.

Notice to reader

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