Section 1. Identification

1.1 Product identifier

Product name: ArcticExpress Competent Cells, Product Name 230191
Part No. (Chemical Kit): 230191
Part No.: ArcticExpress competent cells 230191-41
pUC 18 DNA Control Plasmid 200231-42
XL10-Gold 2-Mercaptoethanol 200314-43

Validation date: 10/18/2016

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

Material uses:
- ArcticExpress competent cells: 1 ml (10x0.1 ml)
- pUC 18 DNA Control Plasmid: 0.01 mL
- XL10-Gold 2-Mercaptoethanol: 0.05 mL

1.3 Details of the supplier of the safety data sheet

Supplier/Manufacturer: Agilent Technologies, Inc.
5301 Stevens Creek Blvd
Santa Clara, CA 95051, USA
800-227-9770

1.4 Emergency telephone number

In case of emergency: CHEMTREC®: 1-800-424-9300

Section 2. Hazards identification

2.1 Classification of the substance or mixture

OSHA/HCS status:
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture:

- ArcticExpress competent cells
  H320 EYE IRRITATION - Category 2B

- XL10-Gold 2-Mercaptoethanol
  H318 SERIOUS EYE DAMAGE - Category 1
  H317 SKIN SENSITIZATION - Category 1

2.2 GHS label elements

Date of issue: 10/18/2016
Section 2. Hazards identification

Signal word:
- ArcticExpress competent cells: Warning
- pUC 18 DNA Control Plasmid: No signal word.
- XL10-Gold 2-Mercaptoethanol: Danger

Hazard statements:
- ArcticExpress competent cells: H320 - Causes eye irritation.
- pUC 18 DNA Control Plasmid: No known significant effects or critical hazards.
  H317 - May cause an allergic skin reaction.

Precautionary statements

Prevention:
- ArcticExpress competent cells: P264 - Wash hands thoroughly after handling.
- pUC 18 DNA Control Plasmid: Not applicable.
- XL10-Gold 2-Mercaptoethanol: P260 - Wear protective gloves. Wear eye or face protection.
  P261 - Avoid breathing vapor.
  P272 (OSHA) - Contaminated work clothing must not be allowed out of the workplace.

Response:
- ArcticExpress competent cells: P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  P337 + P313 - If eye irritation persists: Get medical attention.
- pUC 18 DNA Control Plasmid: Not applicable.
- XL10-Gold 2-Mercaptoethanol: P302 + P352 + P363 - IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse.
  P333 + P313 - If skin irritation or rash occurs: Get medical attention.
  P305 + P351 + P338 + P310 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Storage:
- ArcticExpress competent cells: Not applicable.
- pUC 18 DNA Control Plasmid: Not applicable.
- XL10-Gold 2-Mercaptoethanol: Not applicable.

Disposal:
- ArcticExpress competent cells: Not applicable.
- pUC 18 DNA Control Plasmid: Not applicable.
- XL10-Gold 2-Mercaptoethanol: P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements:
- ArcticExpress competent cells: None known.
- pUC 18 DNA Control Plasmid: None known.
- XL10-Gold 2-Mercaptoethanol: None known.

2.3 Other hazards:
- ArcticExpress competent cells: None known.
- pUC 18 DNA Control Plasmid: None known.
- XL10-Gold 2-Mercaptoethanol: None known.

Date of issue: 10/18/2016
Section 3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Ingredient name</th>
<th>%</th>
<th>CAS number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcticExpress competent cells</td>
<td>Glycerol</td>
<td>≥10 - ≤25</td>
<td>56-81-5</td>
</tr>
<tr>
<td></td>
<td>Dimethyl sulfoxide</td>
<td>≤10</td>
<td>67-68-5</td>
</tr>
<tr>
<td></td>
<td>Potassium chloride</td>
<td>≤3</td>
<td>7447-40-7</td>
</tr>
<tr>
<td>XL10-Gold 2-Mercaptoethanol</td>
<td>Sodium chloride</td>
<td>≥10 - ≤25</td>
<td>7647-14-5</td>
</tr>
<tr>
<td></td>
<td>2-Mercaptoethanol</td>
<td>≤5</td>
<td>60-24-2</td>
</tr>
</tbody>
</table>

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

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

4.1 Description of necessary first aid measures

**Eye contact**

- **ArcticExpress competent cells**: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. If irritation persists, get medical attention.

- **pUC 18 DNA Control Plasmid**: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

- **XL10-Gold 2-Mercaptoethanol**: Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

**Inhalation**

- **ArcticExpress competent cells**: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. 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.

- **pUC 18 DNA Control Plasmid**: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

- **XL10-Gold 2-Mercaptoethanol**: Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for
Section 4. First aid measures

**Skin contact**
- *ArcticExpress competent cells*: 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.
- *pUC 18 DNA Control Plasmid*: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.
- *XL10-Gold 2-Mercaptoethanol*: Get medical attention immediately. Call a poison center or physician. Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

**Ingestion**
- *ArcticExpress competent cells*: 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.
- *pUC 18 DNA Control Plasmid*: 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.
- *XL10-Gold 2-Mercaptoethanol*: Get medical attention immediately. Call a poison center or physician. 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. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.
Section 4. First aid measures

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. Chemical burns must be treated promptly by a physician. 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.

4.2 Most important symptoms/effects, acute and delayed

Potential acute health effects

| Eye contact | ArcticExpress competent cells | Causes eye irritation. |
| pUC 18 DNA Control Plasmid | No known significant effects or critical hazards. |
| XL10-Gold 2-Mercaptoethanol | Causes serious eye damage. |

| Inhalation | ArcticExpress competent cells | No known significant effects or critical hazards. |
| pUC 18 DNA Control Plasmid | No known significant effects or critical hazards. |
| XL10-Gold 2-Mercaptoethanol | No known significant effects or critical hazards. |

| Skin contact | ArcticExpress competent cells | No known significant effects or critical hazards. |
| pUC 18 DNA Control Plasmid | No known significant effects or critical hazards. |
| XL10-Gold 2-Mercaptoethanol | May cause an allergic skin reaction. |

| Ingestion | ArcticExpress competent cells | No known significant effects or critical hazards. |
| pUC 18 DNA Control Plasmid | No known significant effects or critical hazards. |
| XL10-Gold 2-Mercaptoethanol | No known significant effects or critical hazards. |

Over-exposure signs/symptoms

| Eye contact | ArcticExpress competent cells | Adverse symptoms may include the following: irritation |
| pUC 18 DNA Control Plasmid | watering |
| XL10-Gold 2-Mercaptoethanol | redness |

| Inhalation | ArcticExpress competent cells | No specific data. |
| pUC 18 DNA Control Plasmid | No specific data. |
| XL10-Gold 2-Mercaptoethanol | No specific data. |

| Skin contact | ArcticExpress competent cells | No specific data. |
| pUC 18 DNA Control Plasmid | No specific data. |
| XL10-Gold 2-Mercaptoethanol | Adverse symptoms may include the following: pain or irritation |
| | redness |
| | blistering may occur |

| Ingestion | ArcticExpress competent cells | No specific data. |
| pUC 18 DNA Control Plasmid | No specific data. |
| XL10-Gold 2-Mercaptoethanol | Adverse symptoms may include the following: stomach pains |

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

Date of issue: 10/18/2016
Section 4. First aid measures

Notes to physician:
- ArcticExpress competent cells: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- pUC 18 DNA Control Plasmid: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- XL10-Gold 2-Mercaptoethanol: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Protection of first-aiders:
- ArcticExpress competent cells: 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.
- pUC 18 DNA Control Plasmid: No action shall be taken involving any personal risk or without suitable training.
- XL10-Gold 2-Mercaptoethanol: If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Specific treatments:
- ArcticExpress competent cells: No specific treatment.
- pUC 18 DNA Control Plasmid: No specific treatment.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media:
- ArcticExpress competent cells: Use an extinguishing agent suitable for the surrounding fire.
- pUC 18 DNA Control Plasmid: Use an extinguishing agent suitable for the surrounding fire.
- XL10-Gold 2-Mercaptoethanol: Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media:
- ArcticExpress competent cells: None known.
- pUC 18 DNA Control Plasmid: None known.
- XL10-Gold 2-Mercaptoethanol: None known.

5.2 Special hazards arising from the substance or mixture

Specific hazards arising from the chemical:
- ArcticExpress competent cells: In a fire or if heated, a pressure increase will occur and the container may burst.
- pUC 18 DNA Control Plasmid: In a fire or if heated, a pressure increase will occur and the container may burst.
- XL10-Gold 2-Mercaptoethanol: In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products:
- ArcticExpress competent cells: Decomposition products may include the following materials: carbon dioxide, carbon monoxide, sulfur oxides, halogenated compounds, metal oxide/oxides.
- pUC 18 DNA Control Plasmid: No specific data.
Section 5. Fire-fighting measures

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Decomposition products may include the following materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>XL10-Gold 2-Mercaptoethanol</td>
<td>carbon dioxide, carbon monoxide, sulfur oxides, halogenated compounds, metal oxide/oxides</td>
</tr>
</tbody>
</table>

5.3 Advice for firefighters

**Special protective actions for fire-fighters**
- ArcticExpress competent cells: 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.
- pUC 18 DNA Control Plasmid: 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.
- XL10-Gold 2-Mercaptoethanol: 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.

**Special protective equipment for fire-fighters**
- ArcticExpress competent cells: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
- pUC 18 DNA Control Plasmid: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
- XL10-Gold 2-Mercaptoethanol: 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

6.1 Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel**
- ArcticExpress competent cells: 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 spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- pUC 18 DNA Control Plasmid: 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 spilled material. Put on appropriate personal protective equipment.
- XL10-Gold 2-Mercaptoethanol: 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 spilled material. Do not breathe vapor or mist. Provide adequate...
Section 6. Accidental release measures

For emergency responders: ArcticExpress competent cells

If specialized 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".

Methods for cleaning up

Methods for cleaning up: ArcticExpress competent cells

ArcticExpress competent cells

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.

pUC 18 DNA Control Plasmid

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.

XL10-Gold 2-Mercaptoethanol

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.

6.2 Environmental precautions

ArcticExpress competent cells

Avoid dispersal of spilled 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).

pUC 18 DNA Control Plasmid

Avoid dispersal of spilled 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).

XL10-Gold 2-Mercaptoethanol

Avoid dispersal of spilled 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).

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up: ArcticExpress competent cells

ArcticExpress competent cells

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

7.1 Precautions for safe handling

**Protective measures**: ArcticExpress competent cells

Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor 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.

- pUC 18 DNA Control Plasmid
  - Put on appropriate personal protective equipment (see Section 8).

- XL10-Gold 2-Mercaptoethanol
  - Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. 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**: ArcticExpress competent cells

Potentially biohazardous material. 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.

- pUC 18 DNA Control Plasmid
  - 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.

- XL10-Gold 2-Mercaptoethanol
  - 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.

7.2 Conditions for safe storage, including any incompatibilities

- ArcticExpress competent cells

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 unlabeled containers. Use appropriate containment to avoid environmental contamination.
Section 7. Handling and storage

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Storage requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>pUC 18 DNA Control Plasmid</td>
<td>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 unlabeled containers. Use appropriate containment to avoid environmental contamination.</td>
</tr>
<tr>
<td>XL10-Gold 2-Mercaptoethanol</td>
<td>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. Store locked up. 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 unlabeled containers. Use appropriate containment to avoid environmental contamination.</td>
</tr>
</tbody>
</table>

7.3 Specific end use(s)

Recommendations: ArcticExpress competent cells, pUC 18 DNA Control Plasmid, XL10-Gold 2-Mercaptoethanol

Industrial sector specific solutions: ArcticExpress competent cells, pUC 18 DNA Control Plasmid, XL10-Gold 2-Mercaptoethanol

Section 8. Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Exposure limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcticExpress competent cells</td>
<td><strong>OSHA PEL 1989 (United States, 3/1989).</strong> TWA: 5 mg/m³ 8 hours. Form: Respirable fraction</td>
</tr>
<tr>
<td>Glycerol</td>
<td><strong>OSHA PEL (United States, 2/2013).</strong> TWA: 10 mg/m³ 8 hours. Form: Total dust</td>
</tr>
<tr>
<td>Dimethyl sulfoxide</td>
<td><strong>AIHA WEEL (United States, 10/2011).</strong> TWA: 250 ppm 8 hours. No limits specified.</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td></td>
</tr>
<tr>
<td>XL10-Gold 2-Mercaptoethanol</td>
<td><strong>AIHA WEEL (United States, 10/2011). Absorbed through skin.</strong> TWA: 0.2 ppm 8 hours.</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td></td>
</tr>
<tr>
<td>2-Mercaptoethanol</td>
<td></td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Date of issue: 10/18/2016
Section 8. Exposure controls/personal protection

**Appropriate engineering controls**: If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

**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**: Handle as biohazard material (Biosafety level 1). 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. Contaminated work clothing should not be allowed out of the workplace. 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: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

**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. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**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

9.1 Information on basic physical and chemical properties

**Appearance**

<table>
<thead>
<tr>
<th>Physical state</th>
<th>ArcticExpress competent cells</th>
<th>pUC 18 DNA Control Plasmid</th>
<th>XL10-Gold 2-Mercaptoethanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor</td>
<td>ArcticExpress competent cells</td>
<td>pUC 18 DNA Control Plasmid</td>
<td>XL10-Gold 2-Mercaptoethanol</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>ArcticExpress competent cells</td>
<td>pUC 18 DNA Control Plasmid</td>
<td>XL10-Gold 2-Mercaptoethanol</td>
</tr>
</tbody>
</table>

**Physical state**: Liquid.

**Color**: Not available.

**Odor**: Not available.

**Odor threshold**: Not available.

Date of issue: 10/18/2016
### Section 9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>ArcticExpress competent cells</th>
<th>pUC 18 DNA Control Plasmid</th>
<th>XL10-Gold 2-Mercaptoethanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point</td>
<td>Not available.</td>
<td>0°C (32°F)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Boiling point</td>
<td>Not available.</td>
<td>100°C (212°F)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable.</td>
<td></td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Lower and upper explosive</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td>(flammable) limits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td>Relative density</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td>Solubility</td>
<td>Easily soluble in the following materials: cold water and hot water.</td>
<td>Easily soluble in the following materials: cold water and hot water.</td>
<td>Easily soluble in the following materials: cold water and hot water.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not available.</td>
<td></td>
<td>Not available.</td>
</tr>
</tbody>
</table>

*Date of issue: 10/18/2016*
Section 10. Stability and reactivity

10.1 Reactivity
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol

No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol

The product is stable.

10.3 Possibility of hazardous reactions
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol

Under normal conditions of storage and use, hazardous reactions will not occur.

10.4 Conditions to avoid
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol

No specific data.

10.5 Incompatible materials
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol

May react or be incompatible with oxidizing materials.

10.6 Hazardous decomposition products
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

11.1 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>ArcticExpress competent cells</td>
<td>Glycerol</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>12600 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Dimethyl sulfoxide</td>
<td>LD50 Dermal</td>
<td>Rat</td>
<td>40000 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Potassium chloride</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>14500 mg/kg</td>
</tr>
<tr>
<td>XL10-Gold 2-Mercaptoethanol</td>
<td>Sodium chloride</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>3000 mg/kg</td>
</tr>
<tr>
<td></td>
<td>2-Mercaptoethanol</td>
<td>LD50 Dermal</td>
<td>Rabbit</td>
<td>200 mg/kg</td>
</tr>
</tbody>
</table>

Date of issue: 10/18/2016
## Section 11. Toxicological information

### LD50 Oral

<table>
<thead>
<tr>
<th>Species</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rat</td>
<td>244 mg/kg</td>
<td>-</td>
</tr>
</tbody>
</table>

### Irritation/Corrosion

<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>ArcticExpress competent cells</td>
<td>Eyes - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 milligrams</td>
<td>-</td>
</tr>
<tr>
<td>Glycerol</td>
<td>Skin - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 milligrams</td>
<td>-</td>
</tr>
<tr>
<td>Dimethyl sulfoxide</td>
<td>Eyes - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 milligrams</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Eyes - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>100 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></td>
<td>Skin - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>100 milligrams</td>
<td>-</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>Eyes - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 milligrams</td>
<td>-</td>
</tr>
<tr>
<td>XL10-Gold</td>
<td>Eyes - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 milligrams</td>
<td>-</td>
</tr>
<tr>
<td>2-Mercaptoethanol</td>
<td>Eyes - Moderate irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 100 milligrams</td>
<td>-</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>Eyes - Moderate irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>10 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>2-Mercaptoethanol</td>
<td>Eyes - Severe irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>2 milligrams</td>
<td>-</td>
</tr>
</tbody>
</table>

### Sensitization

Not available.

### Mutagenicity

Not available.

### Carcinogenicity

Not available.

### Reproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

<table>
<thead>
<tr>
<th>Name</th>
<th>Category</th>
<th>Route of exposure</th>
<th>Target organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>XL10-Gold 2-Mercaptoethanol</td>
<td>Category 3</td>
<td>Not applicable.</td>
<td>Respiratory tract irritation</td>
</tr>
<tr>
<td>2-Mercaptoethanol</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Specific target organ toxicity (repeated exposure)

Not available.

### Aspiration hazard

Not available.

Date of issue: 10/18/2016
Section 11. Toxicological information

Information on the likely routes of exposure
- **Inhalation**: ArcticExpress competent cells, No known significant effects or critical hazards.
- **pUC 18 DNA Control Plasmid**: No known significant effects or critical hazards.
- **XL10-Gold 2-Mercaptoethanol**: Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects
- **Eye contact**: ArcticExpress competent cells, Causes eye irritation.
- **pUC 18 DNA Control Plasmid**: No known significant effects or critical hazards.
- **XL10-Gold 2-Mercaptoethanol**: Causes serious eye damage.

Symptoms related to the physical, chemical and toxicological characteristics
- **Eye contact**: Adverse symptoms may include the following: irritation, watering, redness.
- **pUC 18 DNA Control Plasmid**: No specific data.
- **XL10-Gold 2-Mercaptoethanol**: Adverse symptoms may include the following: pain, watering, redness.

Delayed and immediate effects and also 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.
Section 11. Toxicological information

Potential chronic health effects

**General**
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol
  - No known significant effects or critical hazards.
  - Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

**Carcinogenicity**
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol
  - No known significant effects or critical hazards.

**Mutagenicity**
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol
  - No known significant effects or critical hazards.

**Teratogenicity**
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol
  - No known significant effects or critical hazards.

**Developmental effects**
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol
  - No known significant effects or critical hazards.

**Fertility effects**
- ArcticExpress competent cells
- pUC 18 DNA Control Plasmid
- XL10-Gold 2-Mercaptoethanol
  - 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>ArcticExpress competent cells</td>
<td>136842.1 mg/kg</td>
</tr>
<tr>
<td>Oral</td>
<td></td>
</tr>
<tr>
<td>XL10-Gold 2-Mercaptoethanol</td>
<td>4615.5 mg/kg</td>
</tr>
<tr>
<td>Oral</td>
<td></td>
</tr>
<tr>
<td>Dermal</td>
<td>4545.5 mg/kg</td>
</tr>
<tr>
<td>Inhalation (vapors)</td>
<td>45.45 mg/l</td>
</tr>
</tbody>
</table>

Section 12. Ecological information

**12.1 Toxicity**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcticExpress competent cells</td>
<td>Acute LC50 54000 mg/l Fresh water</td>
<td>Fish - Oncorhynchus mykiss</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 25000 ppm Fresh water</td>
<td>Daphnia - Daphnia magna - Neonate</td>
<td>48 hours</td>
</tr>
<tr>
<td>Glycerol</td>
<td>Acute LC50 34000000 µg/l Fresh water</td>
<td>Daphnia - Pimephales promelas</td>
<td>96 hours</td>
</tr>
<tr>
<td>Dimethyl sulfoxide</td>
<td>Chronic NOEC 100 µ/L Marine water</td>
<td>Algae - Ulva lactuca</td>
<td>72 hours</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>Acute EC50 1337000 µg/l Fresh water</td>
<td>Algae - Navicula seminulum</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Acute EC50 9.24 g/L Fresh water</td>
<td>Algae - Desmodesmus subspicatus</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 12.77 mg/l Fresh water</td>
<td>Daphnia - Daphnia magna Neomate</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 880000 µg/l Fresh water</td>
<td>Crustaceans - Pseudosida ramosa</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fish - Pimephales promelas</td>
<td>96 hours</td>
</tr>
</tbody>
</table>

Date of issue: 10/18/2016
Section 12. Ecological information

### 12.2 Persistence and degradability

Not available.

### 12.3 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>ArcticExpress competent cells</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycerol</td>
<td>-1.76</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>Dimethyl sulfoxide</td>
<td>-1.35</td>
<td>3.16</td>
<td>low</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>-0.46</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>XL10-Gold</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Mercaptoethanol</td>
<td>-0.056</td>
<td>-</td>
<td>low</td>
</tr>
</tbody>
</table>

### 12.4 Mobility in soil

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

### 12.5 Other adverse effects

No known significant effects or critical hazards.

Section 13. Disposal considerations

### 13.1 Waste treatment methods

Disposal methods: The generation of waste should be avoided or minimized 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. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Date of issue: 10/18/2016
Section 13. Disposal considerations

Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

The information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

Section 14. Transport information

Regulatory information

DOT / IMDG / IATA : Not regulated.

Section 15. Regulatory information

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

U.S. Federal regulations

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>%</th>
<th>Fire hazard</th>
<th>Sudden release of pressure</th>
<th>Reactive</th>
<th>Immediate (acute) health hazard</th>
<th>Delayed (chronic) health hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcticExpress competent cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimethyl sulfoxide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium chloride</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium chloride</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date of issue : 10/18/2016
Section 15. Regulatory information

| State regulations | Massachusetts: The following components are listed: SUCROSE DUST; GLYCERINE MIST; 2-MERCAPTOETHANOL | New York: None of the components are listed. | New Jersey: The following components are listed: DIMETHYL SULFOXIDE; METHANE, SULFINYL BIS-; GLYCERIN; 1,2,3-PROPANETRIOL; THIOGLYCOL; 2-MERCAPTOETHANOL | Pennsylvania: The following components are listed: ALPHA-D-GLUCOPYRANOSIDE, BETA-D-FRUCTOFURANOSYL; 1,2,3-PROPANETRIOL; ETHANOL, 2-MERCAPTO-

| State regulations | Massachusetts: The following components are listed: SUCROSE DUST; GLYCERINE MIST; 2-MERCAPTOETHANOL | New York: None of the components are listed. | New Jersey: The following components are listed: DIMETHYL SULFOXIDE; METHANE, SULFINYL BIS-; GLYCERIN; 1,2,3-PROPANETRIOL; THIOGLYCOL; 2-MERCAPTOETHANOL | Pennsylvania: The following components are listed: .ALPHA.-D-GLUCOPYRANOSIDE, .BETA.-D-FRUCTOFURANOSYL; 1,2,3-PROPANETRIOL; ETHANOL, 2-MERCAPTO-

| State regulations | Massachusetts: The following components are listed: SUCROSE DUST; GLYCERINE MIST; 2-MERCAPTOETHANOL | New York: None of the components are listed. | New Jersey: The following components are listed: DIMETHYL SULFOXIDE; METHANE, SULFINYL BIS-; GLYCERIN; 1,2,3-PROPANETRIOL; THIOGLYCOL; 2-MERCAPTOETHANOL | Pennsylvania: The following components are listed: .ALPHA.-D-GLUCOPYRANOSIDE, .BETA.-D-FRUCTOFURANOSYL; 1,2,3-PROPANETRIOL; ETHANOL, 2-MERCAPTO-

| California Prop. 65 | No products were found. |

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: All components are listed or exempted.
Canada inventory: All components are listed or exempted.
China: Not determined.
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: All components are listed or exempted.
Taiwan: All components are listed or exempted.
Turkey: Not determined.

Section 16. Other information

History

Date of issue: 10/18/2016
Date of previous issue: 08/24/2015.
Version: 5

Indicates information that has changed from previously issued version.

Notice to reader

Date of issue: 10/18/2016
Section 16. Other information

Disclaimer: The information contained in this document is based on Agilent’s state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.