

Section 2. Hazards identification

Ingredients of unknown toxicity	: T4 DNA Ligase 10x Ligase Buffer	Percentage of the mixture consisting of ingredient (s) of unknown inhalation toxicity: 30 - 60% 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%
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2.2 GHS label elements

Signal word	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No signal word. Warning No signal word.
Hazard statements	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. H320 - Causes eye irritation. No known significant effects or critical hazards.
Precautionary statements		
Prevention	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	Not applicable. P264 - Wash hands thoroughly after handling. Not applicable.
Response	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase	Not applicable. 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.
Storage	: 10x Ligase Buffer 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	Not applicable. Not applicable. Not applicable. Not applicable.
Disposal	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	Not applicable. Not applicable. Not applicable.
Supplemental label elements	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	None known. None known. None known.
2.3 Other hazards		
Hazards not otherwise classified	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	None known. None known. None known.

Section 3. Composition/information on ingredients

Substance/mixture	: 10 mM rATP (pH 7.5) in Sterile Water	Mixture
	T4 DNA Ligase	Mixture
	10x Ligase Buffer	Mixture

Ingredient name	%	CAS number
T4 DNA Ligase Glycerol	≥50 - ≤75	56-81-5
10x Ligase Buffer 2-Amino-2-(hydroxymethyl)propane-1,3-diol hydrochloride	<10	1185-53-1

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	: 10 mM rATP (pH 7.5) in Sterile Water	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.
	T4 DNA Ligase	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.
	10x Ligase Buffer	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.
Inhalation	: 10 mM rATP (pH 7.5) in Sterile Water	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.
	T4 DNA Ligase	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.
	10x Ligase Buffer	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur. 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.

Section 4. First aid measures

Skin contact	: 10 mM rATP (pH 7.5) in Sterile Water	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.
	T4 DNA Ligase	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.
	10x Ligase Buffer	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.
Ingestion	: 10 mM rATP (pH 7.5) in Sterile Water	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.
	T4 DNA Ligase	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.
	10x Ligase Buffer	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.

4.2 Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	: 10 mM rATP (pH 7.5) in Sterile Water	No known significant effects or critical hazards.
	T4 DNA Ligase	Causes eye irritation.
	10x Ligase Buffer	No known significant effects or critical hazards.
Inhalation	: 10 mM rATP (pH 7.5) in Sterile Water	No known significant effects or critical hazards.
	T4 DNA Ligase	No known significant effects or critical hazards.
	10x Ligase Buffer	No known significant effects or critical hazards.
Skin contact	: 10 mM rATP (pH 7.5) in Sterile Water	No known significant effects or critical hazards.
	T4 DNA Ligase	No known significant effects or critical hazards.
	10x Ligase Buffer	No known significant effects or critical hazards.

Section 4. First aid measures

Ingestion	: 10 mM rATP (pH 7.5) in Sterile Water	No known significant effects or critical hazards.
	T4 DNA Ligase	No known significant effects or critical hazards.
	10x Ligase Buffer	No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact	: 10 mM rATP (pH 7.5) in Sterile Water	No specific data.
	T4 DNA Ligase	Adverse symptoms may include the following: irritation watering redness
	10x Ligase Buffer	No specific data.

Inhalation	: 10 mM rATP (pH 7.5) in Sterile Water	No specific data.
	T4 DNA Ligase	No specific data.
	10x Ligase Buffer	No specific data.

Skin contact	: 10 mM rATP (pH 7.5) in Sterile Water	No specific data.
	T4 DNA Ligase	No specific data.
	10x Ligase Buffer	No specific data.

Ingestion	: 10 mM rATP (pH 7.5) in Sterile Water	No specific data.
	T4 DNA Ligase	No specific data.
	10x Ligase Buffer	No specific data.

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

Notes to physician	: 10 mM rATP (pH 7.5) in Sterile Water	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
	T4 DNA Ligase	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
	10x Ligase 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	: 10 mM rATP (pH 7.5) in Sterile Water	No specific treatment.
	T4 DNA Ligase	No specific treatment.
	10x Ligase Buffer	No specific treatment.
Protection of first-aiders	: 10 mM rATP (pH 7.5) in Sterile Water	No action shall be taken involving any personal risk or without suitable training.
	T4 DNA Ligase	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.
	10x Ligase Buffer	No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	Use an extinguishing agent suitable for the surrounding fire. Use an extinguishing agent suitable for the surrounding fire. Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	None known. None known. None known.

5.2 Special hazards arising from the substance or mixture

Specific hazards arising from the chemical	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	In a fire or if heated, a pressure increase will occur and the container may burst. In a fire or if heated, a pressure increase will occur and the container may burst. In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No specific data. Decomposition products may include the following materials: carbon dioxide carbon monoxide Decomposition products may include the following materials: carbon dioxide carbon monoxide nitrogen oxides halogenated compounds metal oxide/oxides

5.3 Advice for firefighters

Special protective actions for fire-fighters	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase 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. 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. 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	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus

Section 5. Fire-fighting measures

(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	: 10 mM rATP (pH 7.5) in Sterile Water	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. 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.
	T4 DNA Ligase	
	10x Ligase Buffer	
For emergency responders	: 10 mM rATP (pH 7.5) in Sterile Water	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". 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". 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".
	T4 DNA Ligase	
	10x Ligase Buffer	

6.2 Environmental precautions	: 10 mM rATP (pH 7.5) in Sterile Water	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).
	T4 DNA Ligase	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).
	10x Ligase Buffer	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

Section 6. Accidental release measures

Methods for cleaning up	: 10 mM rATP (pH 7.5) in Sterile Water	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.
	T4 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.
	10x Ligase 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

7.1 Precautions for safe handling

Protective measures	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase	Put on appropriate personal protective equipment (see Section 8). 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.
	10x Ligase Buffer	Put on appropriate personal protective equipment (see Section 8).
Advice on general occupational hygiene	: 10 mM rATP (pH 7.5) in Sterile Water	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.
	T4 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.
	10x Ligase 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.

Section 7. Handling and storage

7.2 Conditions for safe storage, including any incompatibilities

: 10 mM rATP (pH 7.5) in Sterile Water

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. See Section 10 for incompatible materials before handling or use.

T4 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 unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

10x Ligase 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 unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

7.3 Specific end use(s)

Recommendations

: 10 mM rATP (pH 7.5) in Sterile Water
T4 DNA Ligase
10x Ligase Buffer

Industrial applications, Professional applications.

Industrial applications, Professional applications.
Industrial applications, Professional applications.

Industrial sector specific solutions

: 10 mM rATP (pH 7.5) in Sterile Water
T4 DNA Ligase
10x Ligase Buffer

Not applicable.

Not applicable.
Not applicable.

Section 8. Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
T4 DNA Ligase Glycerol	OSHA PEL 1989 (United States, 3/1989). TWA: 5 mg/m ³ 8 hours. Form: Respirable fraction TWA: 10 mg/m ³ 8 hours. Form: Total dust OSHA PEL (United States, 6/2016). TWA: 5 mg/m ³ 8 hours. Form: Respirable fraction

Section 8. Exposure controls/personal protection

10x Ligase Buffer

2-Amino-2-(hydroxymethyl)propane-1,3-diol hydrochloride

TWA: 15 mg/m³ 8 hours. Form: Total dust

None.

8.2 Exposure controls

Appropriate engineering controls

: Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

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

9.1 Information on basic physical and chemical properties

Appearance

Physical state

10 mM rATP (pH 7.5) in Sterile Water	Liquid.
T4 DNA Ligase	Liquid.
10x Ligase Buffer	Liquid.

Color

10 mM rATP (pH 7.5) in Sterile Water	Not available.
T4 DNA Ligase	Not available.
10x Ligase Buffer	Not available.

Section 9. Physical and chemical properties

Odor	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Odor threshold	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
pH	: 10 mM rATP (pH 7.5) in Sterile Water	7
	T4 DNA Ligase	7.5
	10x Ligase Buffer	7.5
Melting point	: 10 mM rATP (pH 7.5) in Sterile Water	0°C (32°F)
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Boiling point	: 10 mM rATP (pH 7.5) in Sterile Water	100°C (212°F)
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Flash point	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Evaporation rate	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Flammability (solid, gas)	: 10 mM rATP (pH 7.5) in Sterile Water	Not applicable.
	T4 DNA Ligase	Not applicable.
	10x Ligase Buffer	Not applicable.
Lower and upper explosive (flammable) limits	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Vapor pressure	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Vapor density	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Relative density	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Solubility	: 10 mM rATP (pH 7.5) in Sterile Water	Easily soluble in the following materials: cold water and hot water.
	T4 DNA Ligase	Soluble in the following materials: cold water and hot water.
	10x Ligase Buffer	Easily soluble in the following materials: cold water and hot water.

Section 9. Physical and chemical properties

Partition coefficient: n-octanol/water	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Auto-ignition temperature	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Decomposition temperature	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.
Viscosity	: 10 mM rATP (pH 7.5) in Sterile Water	Not available.
	T4 DNA Ligase	Not available.
	10x Ligase Buffer	Not available.

Section 10. Stability and reactivity

10.1 Reactivity	: 10 mM rATP (pH 7.5) in Sterile Water	No specific test data related to reactivity available for this product or its ingredients.
	T4 DNA Ligase	No specific test data related to reactivity available for this product or its ingredients.
	10x Ligase Buffer	No specific test data related to reactivity available for this product or its ingredients.
10.2 Chemical stability	: 10 mM rATP (pH 7.5) in Sterile Water	The product is stable.
	T4 DNA Ligase	The product is stable.
	10x Ligase Buffer	The product is stable.
10.3 Possibility of hazardous reactions	: 10 mM rATP (pH 7.5) in Sterile Water	Under normal conditions of storage and use, hazardous reactions will not occur.
	T4 DNA Ligase	Under normal conditions of storage and use, hazardous reactions will not occur.
	10x Ligase Buffer	Under normal conditions of storage and use, hazardous reactions will not occur.
10.4 Conditions to avoid	: 10 mM rATP (pH 7.5) in Sterile Water	No specific data.
	T4 DNA Ligase	No specific data.
	10x Ligase Buffer	No specific data.
10.5 Incompatible materials	: 10 mM rATP (pH 7.5) in Sterile Water	May react or be incompatible with oxidizing materials.
	T4 DNA Ligase	May react or be incompatible with oxidizing materials.
	10x Ligase Buffer	May react or be incompatible with oxidizing materials.

Section 10. Stability and reactivity

10.6 Hazardous decomposition products	: 10 mM rATP (pH 7.5) in Sterile Water	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
	T4 DNA Ligase	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
	10x Ligase Buffer	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

Product/ingredient name	Result	Species	Dose	Exposure
T4 DNA Ligase Glycerol	LD50 Oral	Rat	12600 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
T4 DNA Ligase Glycerol	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
10x Ligase Buffer 2-Amino-2-(hydroxymethyl)propane-1,3-diol hydrochloride	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Section 11. Toxicological information

Information on the likely routes of exposure	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	Not available. Routes of entry anticipated: Oral, Dermal, Inhalation. Routes of entry anticipated: Oral, Dermal, Inhalation.
<u>Potential acute health effects</u>		
Eye contact	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. Causes eye irritation. No known significant effects or critical hazards.
Inhalation	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.
Skin contact	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.
Ingestion	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No specific data. Adverse symptoms may include the following: irritation watering redness No specific data.
Inhalation	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No specific data. No specific data. No specific data.
Skin contact	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No specific data. No specific data. No specific data.
Ingestion	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No specific data. No specific data. No specific data.

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	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.
Carcinogenicity	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.
Mutagenicity	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.
Teratogenicity	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.
Developmental effects	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.
Fertility effects	: 10 mM rATP (pH 7.5) in Sterile Water T4 DNA Ligase 10x Ligase Buffer	No known significant effects or critical hazards. No known significant effects or critical hazards. No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
T4 DNA Ligase Glycerol	Acute LC50 54000 mg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours

12.2 Persistence and degradability

Not available.

12.3 Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
T4 DNA Ligase Glycerol	-1.76	-	low

12.4 Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Section 12. Ecological information

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. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

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

DOT / TDG / Mexico / IMDG / IATA : Not regulated.

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

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

U.S. Federal regulations : TSCA 8(a) CDR Exempt/Partial exemption: Not determined

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not 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

Section 15. Regulatory information

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 : 10 mM rATP (pH 7.5) in Sterile Water Not applicable.
 T4 DNA Ligase Immediate (acute) health hazard
 10x Ligase Buffer Not applicable.

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
T4 DNA Ligase Glycerol	≥50 - ≤75	No.	No.	No.	Yes.	No.
10x Ligase Buffer 2-Amino-2-(hydroxymethyl)propane-1, 3-diol hydrochloride	<10	No.	No.	No.	Yes.	No.

State regulations

Massachusetts : The following components are listed: GLYCERINE MIST
New York : None of the components are listed.
New Jersey : The following components are listed: GLYCERIN; 1,2,3-PROPANETRIOL
Pennsylvania : The following components are listed: 1,2,3-PROPANETRIOL

California Prop. 65

Not available.

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 : All components are listed or exempted.
China : All components are listed or exempted.
Europe : All components are listed or exempted.

Section 15. Regulatory information

Japan	: Japan inventory (ENCS): Not determined. Japan inventory (ISHL): Not determined.
Malaysia	: Not determined.
New Zealand	: All components are listed or exempted.
Philippines	: Not determined.
Republic of Korea	: Not determined.
Taiwan	: All components are listed or exempted.
Thailand	: <input checked="" type="checkbox"/> Not determined.
Turkey	: Not determined.
United States	: All components are listed or exempted.
Viet Nam	: <input checked="" type="checkbox"/> Not determined.

Section 16. Other information

History

Date of issue	: 05/25/2017
Date of previous issue	: 03/30/2016.
Version	: 4

Indicates information that has changed from previously issued version.

Notice to reader

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