# Safety Data Sheet

## Cas12 (LbCpf1, His) Kit

## Cat#: orb1945095

**Revision Date:** 2023-10-16

### Product Description

Cas12 (LbCpf1) enzyme reaction system consisting of His tagged enzyme, buffer, and optional reporter and/or guide RNA.

### Components

| Component Name | 20 µg | 100 µg |
|---|---|---|
| Cas12 (LbCpf1), Active | 20 µg | 100 µg |
| Cas12 Reaction Buffer, 10X | 1ml | 2 x 1ml |
| Cas12 ssDNA Reporter (optional) | 10 nmol | 10 nmol |
| Cas12 Guide RNA (optional, custom) | 1 vial | 1 vial |

### Formulations

| | |
|---|---|
| Enzyme | 50mM sodium phosphate, pH 7.5, 300mM NaCl, 150mM imidazole, 1mM DTT and 10% glycerol |
| Buffer | 100mM Tris-HCl, pH 8.0, 500mM NaCl, 100mM MgCl2, 1mg/mL Prionex® (0.1% w/v) |
| Reporter | Lyophilized powder |
| Guide RNA | Nuclease free water |

### Storage and Stability

Store kit at -70°C. To avoid repeated handling and multiple freeze/thaw cycles aliquot components into smaller quantities. Protect reporter component from light.

### Scientific Background

CRISPR (clustered regularly interspaced short palindromic repeats) and CRISPR-associated (Cas) proteins constitute the adaptive immune system in bacteria (1-2). This system has been leveraged to create an exemplary gene detection and genome editing tool with applications in both basic research and therapeutics development (3). Cas12 has both cis and trans nuclease cleavage activity. Its trans cleavage activity can be exploited for various gene detection applications and its cis nuclease cleavage activity can be applied to gene editing applications like gene deletion (4). Cas12 is recognized as an ideal candidate for future management of diseases such as cancer (5).

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## References

1. Horvath, P., et al. 2010. CRISPR/Cas, the immune system of bacteria and archaea. Science, 327(5962):167-170.
2. Morange, M. 2015. What history tells us XXXVII. CRISPR-Cas: The disconvery of an immune system in prokaryotes. J. Biosci. 40(2):221- 223.
3. Gier, R.A., et al. 2020. High-performance CRISPR-Cas12a genome editing for combinatorial genetic screening. Nat. Commun. 11(1):1-9.
4. Broughton JP, et al: Rapid detection of 2019 novel coronavirus SARSCoV-2 using a CRISPR-based DETECTR lateral flow assay. medRxiv doi: https://doi.org/10.1101/ 2020.03.06.20032334.
5. Singh, M., et al. 2022. The era of Cas12 and Cas13 CRISPR-based disease diagnosis. Critical Reviews in Microbiology, DOI: 10.1080/1040841X.2021.2025041.

## Reaction Protocol

**Other Materials Required**

- Filter pipette tips
- Nuclease free water
- Nuclease free microcentrifuge tubes
- Half-area solid black 96-well plate
- Microplate sealing tape
- Fluorescent microplate reader
- dsDNA substrate

**Step 1**: Thaw the active enzyme on ice. Prepare 1X Reaction Buffer with nuclease free water. Reconstitute reporter in nuclease free water. Equilibrate the buffer, reporter, guide RNA, and dsDNA substrate to ambient temperature.

**Step 2:** Prepare the following working solutions with 1X Reaction Buffer:

- 4X final concentration of Active Cas12 enzyme
- 4X final concentration of guide RNA
- 2X final concentration of substrate/reporter mix

**Step 3:** In a half-area solid black 96-well plate, add the following components and pre-incubate at room temperature for 15 minutes;

**Component 1.** 10 µL of 4X Active Cas12

**Component 2.** 10 µL of 4X guide RNA

*Note: A blank control can be set up as outlined in step 3 by replacing the enzyme working solution with an equal volume of the reaction buffer.*

**Step 4:** To each assay well, add 20 µL of the 2X substrate/reporter mix. Shake the plate for 1 minute on a tabletop orbital shaker. Seal the assay wells with microplate sealing tape and incubate at 37°C for 10-30 minutes.

**Step 5:** Equilibrate the plate to ambient temperature and then remove the microplate sealing tape. Read fluorescence on a microplate reader.

## Article 1 - Product Identification

*This product is sold only for research use by qualified laboratory personnel, and is not to be used as a drug, medical device, food additive, cosmetic, nor household chemical. It is not to be used in diagnostic, therapeutic, consumer, agricultural, nor pesticidal applications.*

**Product Name:** Cas12 (LbCpf1, His) Kit

**Catalog #:** orb1945095

## Article 2 - Hazard Identification

- **Emergency Overview:** The product contains no substances which, at their given concentrations, are considered to be hazardous to health.
- **WHMIS Classification:** Not WHMIS controlled.
- **GHS classification:** Not classified.
- **Hazard Pictograms:** None.
- **Signal words:** None.
- **Hazard statements:** None.
- **Precautionary statements:** None.
- **Other hazards:** None known.

## Article 3 – Composition/Information on Ingredients

**Description:** This product consists of the components listed below

**Component:** Cas12 (LbCpf1), Active

**Chemical Characterization:** Mixture.

| Common name | Chemical name | CAS-No. | Concentration |
|---|---|---|---|
| Glycerol | Glycerol | 56-81-5 | 10% |
| NaCl | Sodium chloride | 7647-14-5 | 1.753% |
| Imidazole | 1,3-Diaza-2,4-cyclopentadiene | 288-32-4 | 1.02% |
| Sodium Phosphate, Dibasic | Sodium Phosphate, Dibasic | 7782-85-6 | 1.34% |
| Protein | N/A | N/A | ≤0.10% |
| DTT; Dithiothreitol | (R*,R*)-1,4-Dimercaptobutane-2,3-diol | 3483-12-3 | 0.0154% |

**Component:** Cas12 Reaction Buffer, 10X

**Chemical Characterization:** Mixture.

| Common name | Chemical name | CAS-No. | Concentration |
|---|---|---|---|
| NaCl | Sodium chloride | 7647-14-5 | 2.9% |
| MgCl2 | Magnesium Chloride Hexahydrate | 7791-18-6 | 2% |
| Tris-HCL | 2-Amino-2-(hydroxymethyl)propane-1,3-diol hydrochloride | 1185-53-1 | 1.2% |
| Prionex® | Prionex® Reagent | N/A | 0.1% |

**Component:** Cas12 ssDNA Reporter (optional) Not a hazardous substance or mixture

**Component:** Guide RNA (optional, custom) Not a hazardous substance or mixture

## Article 4 – First-aid Measures

- **General information:** Consult a physician by providing the SDS.
- **After inhalation:** Breath in fresh air. If casualty cannot breathe, give artificial respiration and consult a physician.
- **After skin contact:** Immediately wash with soap and plenty of water and rinse thoroughly. Consult a physician.
- **After eye contact:** Rinse opened eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do so. Consult a physician.
- **After swallowing:** Not expected to present a significant ingestion hazard under anticipated conditions of normal use. If you feel unwell, seek medical advice.

## Article 5 - Fire-fighting Measures

- **Suitable extinguishing media:** Use water spray, extinguishing powder, carbon dioxide, or other appropriate measure that is suitable to the environment.
- **Specific hazards arising from the substance or mixture:** None known.
- **Special protective equipment and precautions for fire-fighters:** Self-contained breathing apparatus if necessary.

## Article 6 – Accidental Release Measures

- **Personal precautions, protective equipment and emergency procedures:** Apply standard laboratory practices and personal protective equipment. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation.
- **Environmental precautions:** Do not allow to enter drains.
- **Methods and materials for containment and cleaning up:** Absorb on sand or vermiculite and place in closed containers for disposal.

## Article 7 - Handling and Storage

- **Precautions for safe handling:** Wear chemical safety goggles and compatible chemical-resistant gloves. Avoid inhalation, contact with eyes, skin or clothing.

- **Conditions for safe storage:** Store according to product label instructions. Keep container upright and tightly closed.

## Article 8 - Exposure Controls/Personal Protection

**• Components with limit monitoring values at workplace:**

NA

**• Appropriate engineering controls:**

Apply adequate ventilation including mechanical exhaust or laboratory fume hood. Follow standard laboratory practices.

**• Individual protection measures:**

**Respiratory protection:**

Use appropriate respirator if there is inadequate ventilation by following the government standards.

**Hand protection:**

Wear gloves and use proper glove removal technique to avoid skin contact. Discard gloves after use by following the applicable laboratory regulations. Wash and dry hands.

**Eye/face protection:**

Safety goggles with side-shields approved under appropriate government standards.

**Skin/body protection:**

Use appropriate clothing, footwear and any additional protection measures to protect from splashing or contamination.

## Article 9 – Physical and Chemical Properties

Component: Cas12 (LbCpf1), Active

| | |
|---|---|
| **Appearance:** Colorless fluid. | **Danger of explosion:** Product does not present an explosion hazard. |
| **Odour/Odour Threshold:** Not determined. | **Explosion limits:** Not available. |
| **pH:** Not available. | **Decomposition temperature:** Not available. |
| **Melting point/freezing point:** Not determined. | **Vapor pressure at 20 °C:** Not available. |
| **Boiling point/Boiling range:** >100 °C. | **Density:** Not determined. |
| **Flash point:** > 100 °C. | **Relative density:** Not determined. |
| **Flammability (solid, gaseous):** Not determined. | **Vapor density:** Not determined. |
| **Ignition temperature:** Not determined. | **Evaporation rate:** Not determined. |
| **Auto-igniting:** Product is not self-igniting. | **Solubility in / Miscibility with Water:** Fully miscible. |

Component: Cas12 Reaction Buffer, 10X

| | |
|---|---|
| **Appearance:** Colorless fluid. | **Danger of explosion:** Not determined. |
| **Odour/Odour Threshold:** Not determined. | **Explosion limits:** Not available. |
| **pH:** Not available. | **Decomposition temperature:** Not available. |
| **Melting point/freezing point:** Not determined. | **Vapor pressure at 20 °C:** Not available. |

| | |
|---|---|
| **Boiling point/Boiling range:** Not determined. | **Density:** Not determined. |
| **Flash point:** Not determined. | **Relative density:** Not determined. |
| **Flammability (solid, gaseous):** Not determined. | **Vapor density:** Not determined. |
| **Ignition temperature:** Not determined. | **Evaporation rate:** Not determined. |
| **Auto-igniting:** Not determined. | **Solubility in / Miscibility with Water:** Fully miscible. |

**Component:** Cas12 ssDNA Reporter (optional)

| | |
|---|---|
| **Appearance:** Translucent or opaque flakes, film or powder-like substance | **Danger of explosion:** Not determined. |
| **Odour/Odour Threshold:** Not determined. | **Explosion limits:** Not available. |
| **pH:** Not available. | **Decomposition temperature:** Not available. |
| **Melting point/freezing point:** Not determined. | **Vapor pressure at 20 °C:** Not available. |
| **Boiling point/Boiling range:** Not determined. | **Density:** Not determined. |
| **Flash point:** Not determined. | **Relative density:** Not determined. |
| **Flammability (solid, gaseous):** Not determined. | **Vapor density:** Not determined. |
| **Ignition temperature:** Not determined. | **Evaporation rate:** Not determined. |
| **Auto-igniting:** Not determined. | **Solubility in / Miscibility with Water:** Fully soluble. |

## Article 10 - Stability and Reactivity

- **Reactivity:** Stable under recommended transport and storage conditions.
- **Chemical stability:** Stable under recommended transport and storage conditions.
- **Possible hazardous reactions:** No dangerous reactions known.
- **Conditions to avoid:** Heat and moisture.
- **Incompatible materials:** Not determined.
- **Hazardous decomposition products:** Not determined.

## Article 11 - Toxicological Information

- **Acute toxicity:** Not available.
- **LD/LC50:** Not available.
- **Skin corrosion/irritation:** Not available.
- **Serious eye damage/eye irritation:** Not available.
- **Respiratory or skin sensitization:** Not available.
- **Germ cell mutagenicity:** Not available.
- **Carcinogenicity:** No components are listed in IARC, or NTP, or OSHA, or ACGIH.
- **Reproductive toxicity:** Not available.
- **Teratogenicity:** Not available.
- **Specific target organ toxicity - single exposure/ - repeated exposure (GHS):** Not available.
- **Aspiration hazard:** Not available.
- **Potential health effects:**

**Inhalation:** No data available

**Ingestion:** No data available

**Skin:** No data available

**Eyes:** No data available

- **Signs and Symptoms of Exposure:** No data available
- **Synergistic effects:** Not available.

## Article 12 - Ecological Information

- **Eco-toxicity:** No data available.
- **Biodegradability:** Not applicable.
- **Bio-accumulative potential:** Not applicable.
- **Mobility in soil:** Not applicable.
- **PBT and vPvB assessment:** Not applicable.
- **Other adverse effects:** Not applicable.

## Article 13 - Disposal Considerations

- **Disposal methods:** In accordance to applicable national, regional, or local laws and regulations. For additional handling information and protection of employees please refer to Article 7 and 8.
- **Contaminated packaging:** Disposal should be made in accordance to official regulations. Use water or cleansing agents to clean the area.

## Article 14 - Transport Information

- **DOT:** Not dangerous goods.
- **IMDG:** Not dangerous goods.
- **IATA:** Not dangerous goods.

## Article 15 – Regulatory Information

- **WHMIS Classification:** Non-hazardous.
- **GHS label elements:** Not applicable.
- **Signal word:** Not applicable.
- **Hazard statements:** Not applicable.

## Article 16 - Other Information

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guide. Biorbyt shall not be held liable for any damage resulting from handling or from contact with the above product. See the Technical Specification, Packing Slip, Invoice, and Product Catalog for additional terms and conditions of sale.