# Micrococcal Nuclease (MNase)

Cat. No.: M1518341 | Pack size: 320 KU / 5 x 320 KU | Storage: -20 °C; avoid repeated freeze-thaw

## Overview

Micrococcal Nuclease (MNase) is a Ca2+-dependent endonuclease derived from Staphylococcus aureus and produced recombinantly in Escherichia coli. It cleaves single-stranded, double-stranded, linear, and circular DNA or RNA and generates mono- and oligonucleotides with 3-phosphate ends.

MNase preferentially digests linker DNA while nucleosomal DNA is protected by histones, making it useful for chromatin structure analysis and ChIP workflows. It can also reduce lysate viscosity by digesting nucleic acids.

## Key Features

- Recombinant MNase supplied at 2000 gel units/µL
- Ca2+-dependent digestion of DNA and RNA
- Useful for chromatin fragmentation, ChIP assays, and lysate viscosity reduction
- Supplied with 10x Reaction Buffer and 100x BSA
- Purity ≥95% by SDS-PAGE

## Product Specifications

| Parameter | Specification | Notes |
|---|---|---|
| Product name | Micrococcal Nuclease (MNase) | CAS No. 9013-53-0; EC 3.1.31.1 |
| Cat. No. | M1518341 | Available pack sizes: 320 KU and 5 x 320 KU |
| Source | Recombinant expressed in Escherichia coli | Molecular weight approx. 18.6 kDa |
| Enzyme concentration | 2000 gel units/µL | Bioactivity: 2000 gel units/µL |
| Storage buffer | 5 mM Tris (pH 7.4), 50 mM NaCl, 1 mM EDTA, 50% glycerol | 100x BSA provided for dilution |
| Purity | ≥95% | SDS-PAGE |

## Product Contents & Storage

| Cat. No. | Component | 320 KU | 5 x 320 KU | Storage |
|---|---|---|---|---|
| M1518341A | MNase (2000 gel units/μL) | 160 μL | 5 x 160 μL | -20 ℃; avoid freeze-thaw |
| M1518341B | Reaction Buffer (10x) | 1.6 mL | 5 x 1.6 mL | -20 ℃; avoid freeze-thaw |
| M1518341C | BSA (100x) | 250 μL | 5 x 250 μL | -20 ℃; avoid freeze-thaw |

Shelf life: Stable for 24 months at -20 ℃. Do not store at -80 ℃.

## Materials Required But Not Supplied

| Item | Recommended Specification | Purpose |
|---|---|---|
| DNA/RNA or cell/chromatin sample | Application-specific | MNase digestion substrate |
| Nuclease-free water | DNase/RNase-free | Reaction volume adjustment |
| 0.5 M EDTA, pH 8.0 | User-supplied | Reaction termination |
| Incubator or thermomixer | 37 ℃ capability | Digestion incubation |
| Gel electrophoresis or downstream assay system | Application-specific | Assessment of digestion |

## Preparation Before Use

1. If dilution is required, dilute MNase in 1x Reaction Buffer supplemented with 1x BSA to reduce adsorption to containers.
2. Keep enzyme on ice during setup and mix gently by pipetting. Avoid bubble formation due to viscosity.

## Protocol

### Recommended Reaction Setup

| Reagent | 20 µL System | 50 µL System | Final Concentration |
|---|---|---|---|
| Reaction Buffer (10x) | 2 µL | 5 µL | 1x |
| MNase | 1 µL | 2.5 µL | 1-2000 gel units |
| BSA (100x) | 0.2 µL | 0.5 µL | 1x |
| Sample | x µL | x µL | - |
| Water | 17 - x µL | 42 - x µL | - |
| Total Volume | 20 µL | 50 µL | - |

1. Prepare MNase dilution if needed. For example, add 5 µL MNase (2000 gel units/µL) to 45 µL dilution buffer to obtain 200 gel units/µL, then continue serial dilution as required.
2. Add reagents and sample according to the reaction setup table below.
3. Mix gently and incubate at 37 ℃ for 15-30 min or longer until nucleic acids are completely digested or the desired digestion pattern is achieved.
4. Terminate by adding 0.5 M EDTA (pH 8.0), for example 1 µL to a 20 µL reaction or 2.5 µL to a 50 µL reaction.
5. For chromatin fragmentation in ChIP assays, optimize enzyme amount and incubation time empirically for the desired fragment range.

## Expected Results

| Expected Outcome | Description |
|---|---|
| Nucleic acid digestion | Low molecular weight DNA/RNA fragments or desired chromatin fragmentation pattern depending on conditions |

## Safety & Precautions

- This product contains 50% glycerol and may not freeze at -20 ℃; do not store at -80 ℃.
- Ca2+ is required for MNase activity. EDTA, EGTA, or other chelators inhibit the reaction.
- Salt concentration in the reaction should be lower than 100 mM; high salt reduces activity.

- If the sample contains no protein, add BSA to a final concentration of 1x.
- Wear a lab coat and disposable gloves during operation.

Read the current SDS before use. Wear lab coat, gloves, and eye protection. Handle reagents according to local laboratory safety and EHS procedures.

## Quality Control

| QC Item | Method | Acceptable Range |
|---|---|---|
| Component completeness | Visual inspection on receipt | All enzyme, buffer, and accessory components match the Product Contents & Storage table. |
| Functional activity | Application-specific ligation, digestion, or amplification assay | Product performs at the expected unit concentration and produces the expected reaction product. |
| Nuclease contamination | Control incubation followed by gel or fluorometric analysis | No detectable contaminating nuclease activity for the intended application. |

## Troubleshooting

| Issue | Possible Causes | Corrective Action |
|---|---|---|
| Low or no product formation | • Enzyme inactive due to improper storage<br>• Missing required cofactor or buffer component<br>• Reaction temperature/time not optimized | • Keep enzyme on ice during setup and store at -20 °C<br>• Use the supplied buffer and verify ATP/NAD/Mg2+ requirements<br>• Optimize enzyme amount, incubation time, and temperature |
| Poor downstream transformation or assay signal | • Excess salt, EDTA, PEG, or enzyme carried into downstream assay<br>• Substrate quality or molar ratio not optimized | • Purify products when required, especially before electroporation<br>• Use clean substrate and optimize vector:insert or donor:acceptor ratios |
| Non-specific or unexpected products | • Substrate impurities or incomplete digestion<br>• Reaction over-incubation | • Purify substrates and confirm digestion/annealing quality<br>• Shorten incubation or reduce enzyme amount |

## Recommended Applications

Chromatin structure analysis, ChIP chromatin fragmentation, nucleic acid removal from protein preparations, in vitro translation workflows, lysate viscosity reduction, and rapid RNA sequencing sample preparation.

## Contact & Global Offices

Whether you have a technical question, need help with a quotation, or want to inquire about an order, our regional teams are ready to assist. Please contact the office for your region; for general inquiries, use the North American sales and customer service contacts below.

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## Limitations & Disclaimer

For Research Use Only (RUO). Not for use in human or animal diagnostics, therapeutics, or in vivo applications. Not for food, cosmetic, household, or other unauthorized uses.

This product is not a CE-marked in vitro diagnostic device under IVDR (EU) 2017/746 and is not an FDA-cleared device under 21 CFR. Use is restricted to verified businesses, institutions, and qualified professionals.

Where any reagent or component is classified as hazardous under CLP (EC) 1272/2008 or OSHA HCS (29 CFR 1910.1200), the product Safety Data Sheet (SDS), product label, and approved specifications take precedence over this document for handling, storage, transport, and disposal.

Performance depends on sample type, sample condition, handling, storage, and operator technique. Users are responsible for validating this product for their specific application.