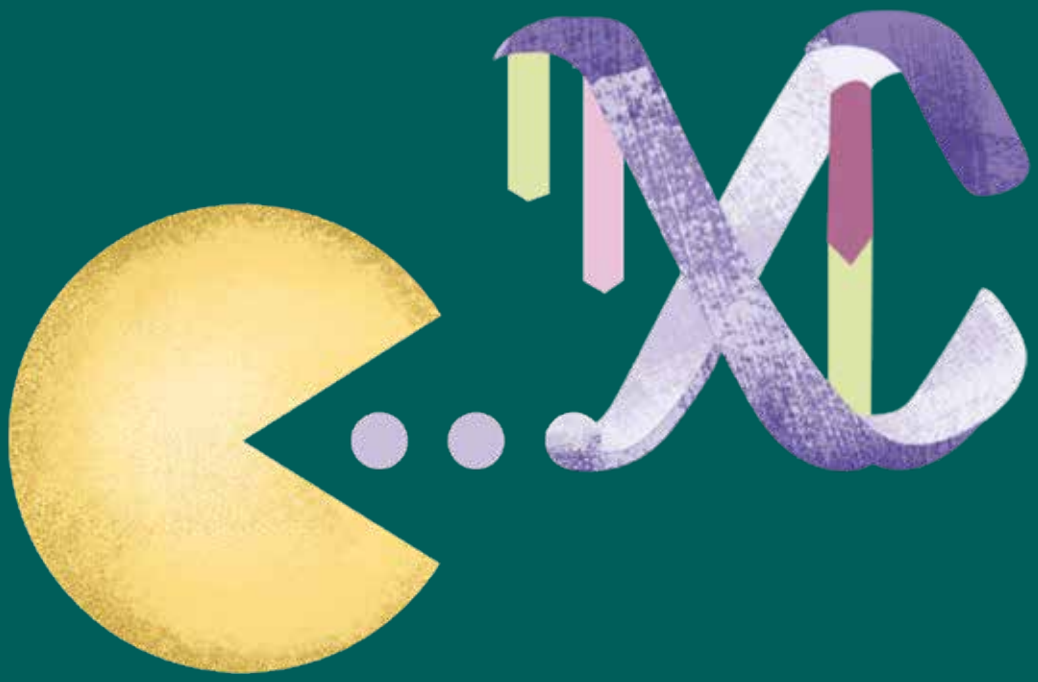
KACTUS

MaxNuclease™, GMP-Grade

DMF #036799

All-Purpose Nuclease



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MaxNuclease™ for Nucleic Acid Degradation

MaxNuclease™ endonuclease identified from *Serratia marcesens* is genetically engineered and expressed in *E. coli* under cGMP manufacturing standards. MaxNuclease™ is a non-specific nuclease with high activity and specificity that degrades all forms of nucleic acids including single- and double-stranded, linear and circular nucleic acids. The enzyme is a homodimer of two 30 kDa subunits containing two disulfide bonds that are essential for activity and stability. It hydrolyzes internal phosphodiester bonds between nucleotides in nucleic acids to produce 5'-monophosphate oligonucleotides of 2-5 bases in length. MaxNuclease™ is ideal for purification of viral vectors and viral vaccines, as well as for protein purification and other applications where removal of contaminating nucleic acids is desired. It can also effectively reduce the viscosity of cell lysates and limit cell aggregation and clumping.

Thorough & Efficient Removal of Nucleic Acids

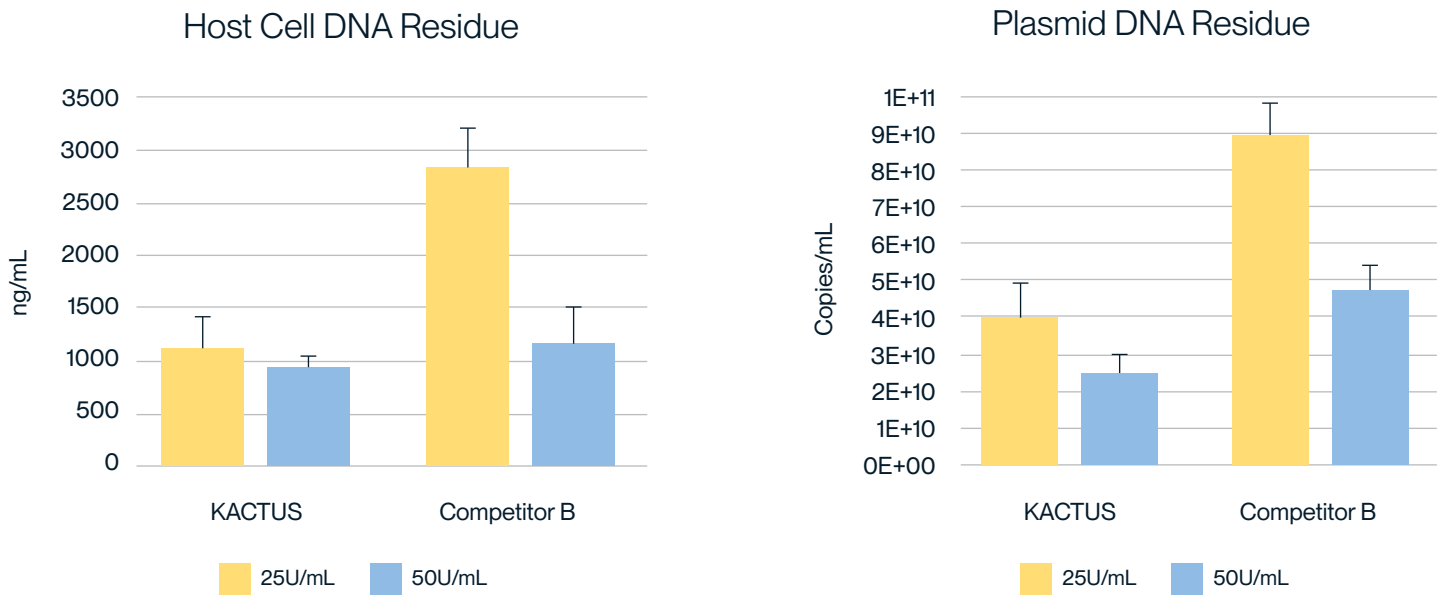


Figure 1. The virus harvest solution was treated with 25U/mL and 50U/mL endonuclease at 37°C for 2h, respectively. Detection of HCD residue (left) and pDNA residue (right) was analyzed. KACTUS has higher degredation activity versus Competitor B in both HCD residue and pDNA residue testing for both 25U/mL and 50U/mL working concentrations.

Ordering Information

Catalog Number	Product Name	Quantities
GMP-NUC-SE101	MaxNuclease™, GMP-Grade	250KU / 5MU
NUC-SE00B	MaxNuclease™ ELISA Kit	96 Tests

For bulk or custom sizes, contact sales@kactusbio.us.

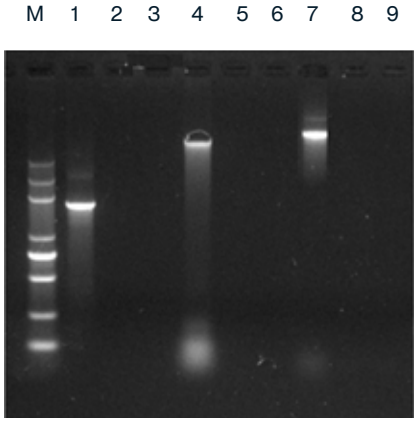
Features

- → Manufactured in a GMP-compliant facility
- → Raw materials free from animal-derived components
- → Strict quality management to meet clinical manufacturing standards
- → FDA Drug Master Files Type II filing (DMF #036799)
- → A complete document package to support your project registration

Applications

- → Purification of viral vaccines and viral vectors (lentivirus, adenovirus, oncolytic virus, etc.)
- → Removal of nucleic acid residues (DNA/RNA) in biological products
- → Reducing the viscosity of cell lysates and cell supernatants
- → Preparing samples in western blot, 2D gel electrophoresis, ELISA, and chromatography to improve resolution and recovery

Degradation of PCR Product, Genomic DNA, and Plasmid DNA



Lane M	DNA marker
Lane 1	PCR product
Lane 2	PCR product +1U MaxNuclease™
Lane 3	PCR product +1U competitor
Lane 4	genomic DNA
Lane 5	genomic DNA +1U MaxNuclease™
Lane 6	genomic DNA +1U competitor
Lane 7	plasmid DNA
Lane 8	plasmid DNA +1U MaxNuclease™
Lane 9	plasmid DNA +1U competitor

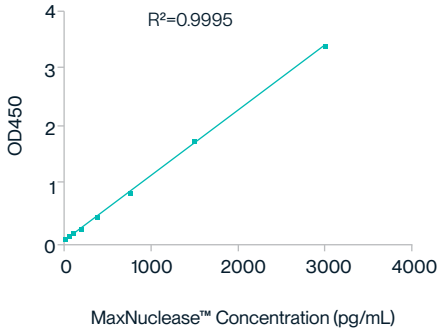
Figure 1. MaxNuclease™ can degrade any form of nucleic acid such as PCR products, gDNA, plasmids, and RNA.

MaxNuclease™ ELISA Kit

MaxNuclease™ ELISA Kit can detect and quantitatively analyze the MaxNuclease™ residues in viral vectors and viral vaccines with high sensitivity and specificity.

The kit uses sandwich ELISA to determine the concentration of MaxNuclease™ in the test sample.

Example Standard Curve



Detection Range	Sensitivity	Precision
46.88 pg/mL - 3000.00 pg/mL	23.44 pg/mL	CV < 10%

Customizable GMP Documentation Package

- → Datasheet
- → CoA
- → CoO
- → MSDS
- → Melamine Statement
- → TSE/BSE Statement
- → Nitrosamine Statement
- → DMF Filing

Product Specifications

Parameter	Specification
Source	*E. coli* with endonuclease gene from *Serratia marcesens*
Molecular Weight	Approximately 27.8 kDa
Purity	>99% by SEC-HPLC
Activity	≥250 U/μL, tested by degradation of Herring Sperm DNA
Formulation	20mM Tris-HCl, 20mM NaCl, 2mM $MgCl_2$, 50% Glycerol, pH 8.0
Endotoxin	Less than 0.01EU/kU, determined by LAL method
Sterility	Negative
Mycoplasma	Negative, tested by qPCR
Storage	Store at -20±5°C. Avoid repeated freeze-thaw.
Unit Definition	One unit corresponds to the amount of enzyme required to produce a change in absorbance at 260 nm of 1.0 in 30 minutes, at 37°C and pH 8.0.

Reaction Conditions

Condition	Optimal*	Effective**
Mg^{2+}	1-2mM	1-10mM
Na^+, K^+	0-100mM	0-300mM
pH	8-10	4-10
Temperature	37°C	0-50°C
PO_4^{3-}	0-10mM	0-80mM

**Optimal is defined as the condition under which MaxNuclease™ retains >90% of its activity*

**Effective is defined as the condition under which MaxNuclease™ retains >15% of its activity*

Effect of cations on enzyme activity

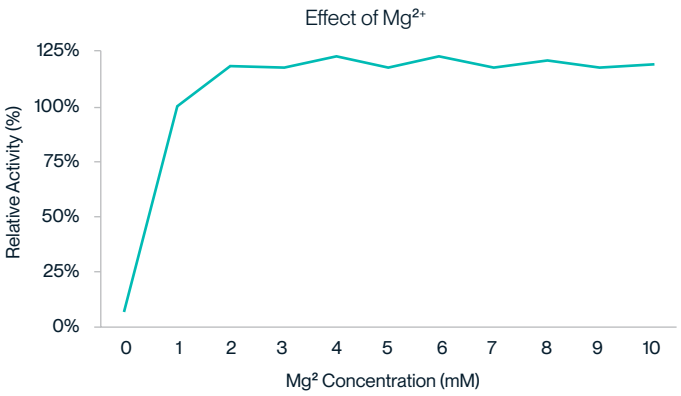


Figure 2. A minimum concentration of 1 to 2 mM Mg^{2+} is essential for activity of MaxNuclease™.

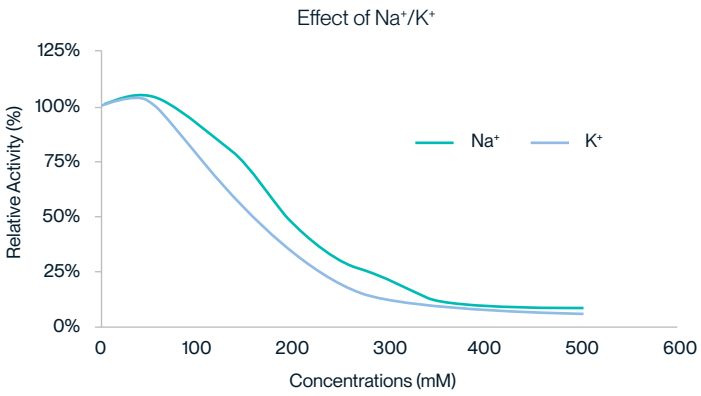


Figure 3. Na^+ and K^+ strongly inhibit the endonuclease activity. Activity is lost when the concentrations reach 500 mM.

Effect of Reaction Temperature and pH on Enzyme Activity

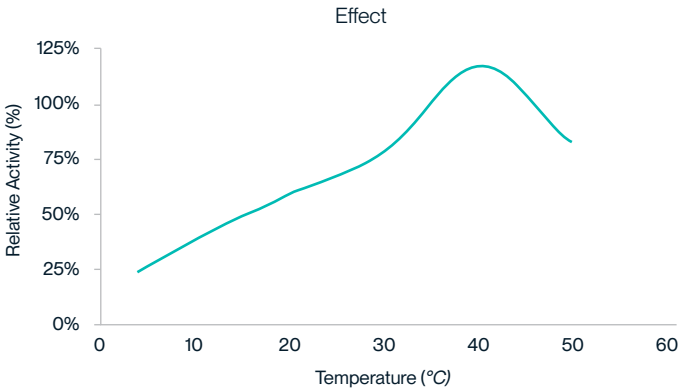


Figure 4. Effect of temperature on MaxNuclease™ endonuclease activity. The relative activity rises with increasing temperature. The optimum temperature is 37 °C.

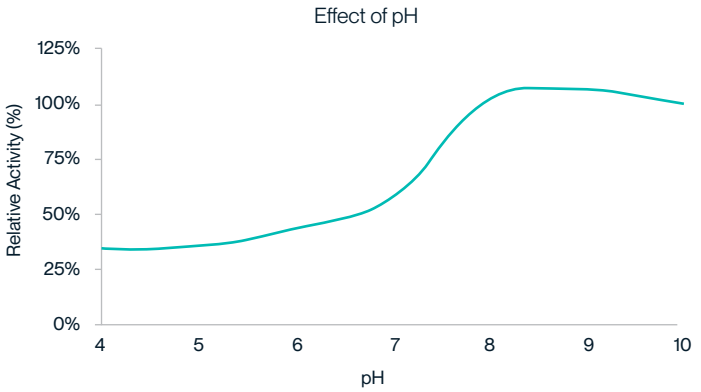


Figure 5. Effect of pH on MaxNuclease™ endonuclease activity. The optimum pH is between 8 and 10.

Effect of Common Buffers on Enzyme Activity

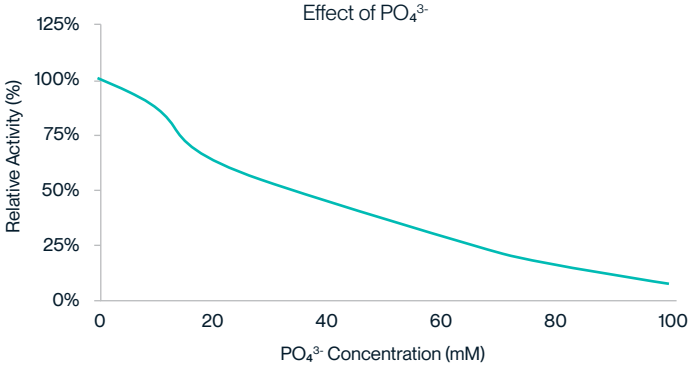


Figure 6. Effect of PO_4^{3-} on MaxNuclease™ endonuclease activity. PO_4^{3-} strongly inhibits the Maxcluease endonuclease activity. The optimum PO_4^{3-} concentration is between 0 and 10mM.

Effect of Denaturant on Enzyme Activity

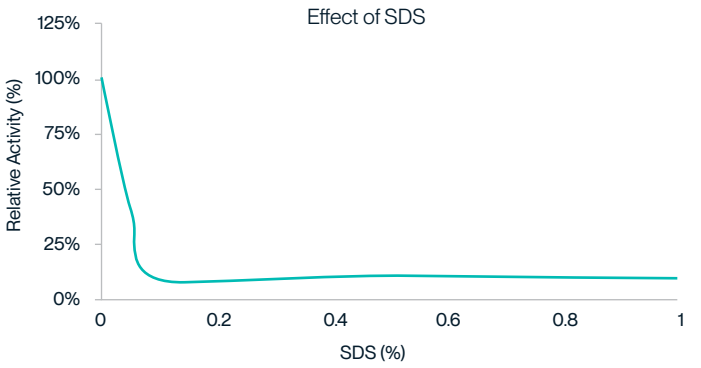


Figure 7. Effect of SDS on MaxNuclease™ endonuclease activity. SDS strongly inhibits the Maxcluease endonuclease activity. 0.1% SDS inhibits nearly 90% of the activity.

Effect of Protein Precipitant Ammonium Sulfate on Enzyme Activity

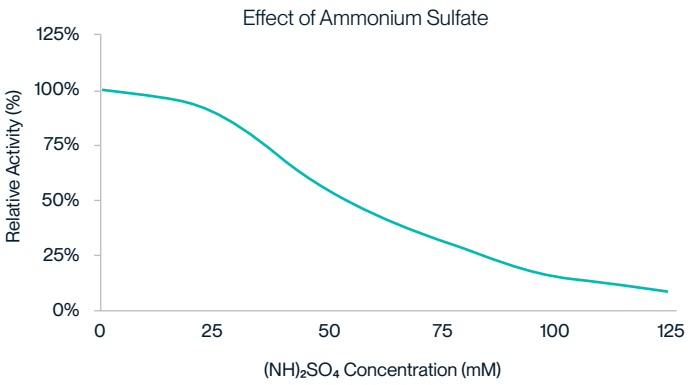


Figure 8. Ammonium sulfate strongly inhibits MaxNuclease™ activity. Concentrations above 100 mM fully inhibit enzyme activity.

Effect of Surfactant (Tween 20) on Enzyme Activity

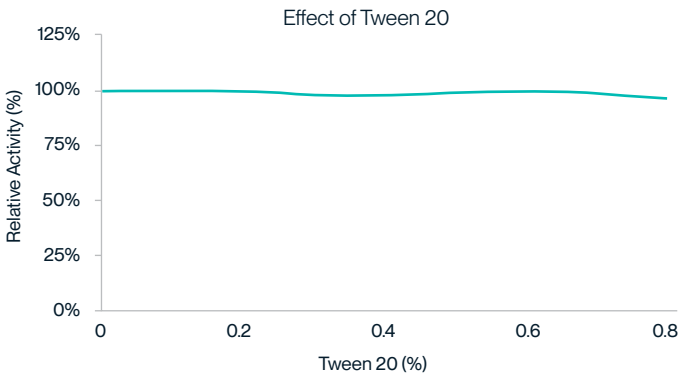


Figure 9. The effect of detergents on MaxNuclease™ endonuclease activity. The concentration of Tween 20 under 0.8% has no significant effect on MaxNuclease™ activity.

Temperature & Freeze/Thaw Stability

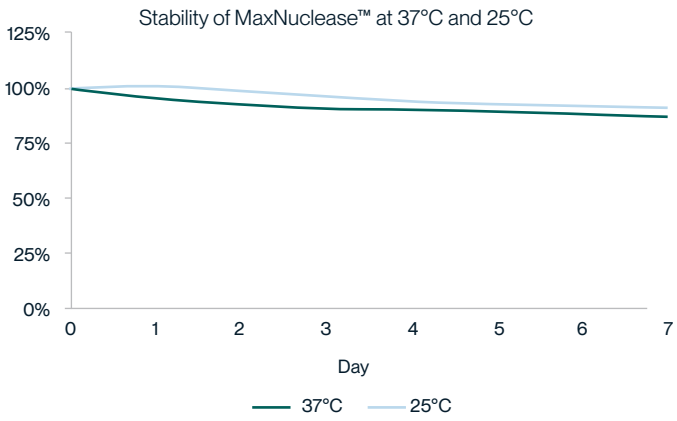


Figure 10. Temperature stability testing. MaxNuclease™ remains active when stored at 25°C/37°C for 7 days.

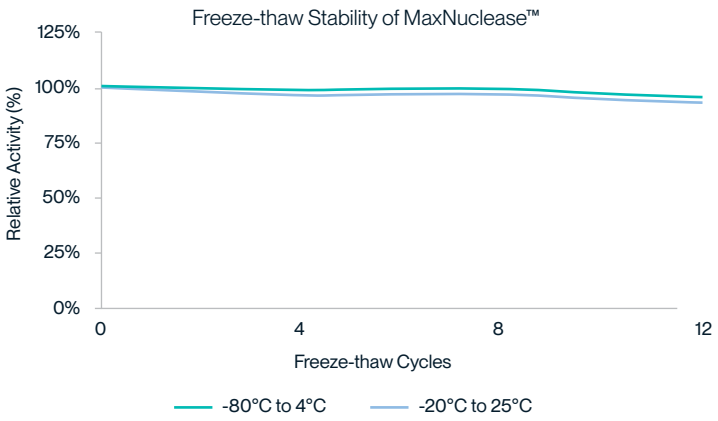


Figure 11. Freeze/thaw stability testing. Repeated freeze/thaws (up to 12) at -20°C / -80°C does not affect the performance.

High Purity: >99% via SEC-HPLC

Figure 12. The purity of MaxNuclease™ detected by SEC-HPLC is ≥ 99%.