



# Enzymes

CATALOG NUMBER

## PHENOL:CHLOROFORM SATURATED SOLUTION, pH 4.7

This is a ready-to-use saturated solution of phenol and chloroform suitable for the purification of RNA from mixtures containing DNA, RNA, and other proteins.

5:1 solution, pH 4.7

802512 100 ml  
802513 400 ml

## RIBONUCLEASE INHIBITOR

### From Human Placenta

Activity: 10.0 units/ $\mu$ l min.

Unit Definition: One unit is the amount required to inhibit 50% of the activity of 5 ng of Ribonuclease A in a cytidine 2',3'-cyclic monophosphate system at 25°C.

Supplied as a solution in 50% glycerol, 20 mM HEPES-KOH, pH 7.6, 50 mM KCl, 5 mM DTT.

154170 1 KU  
-20°C 2 KU  
5 KU  
10 KU

## RIBONUCLEIC ACID, TRANSFER

### [9014-25-9]

(Transfer RNA; t-RNA)

Activity: ~19 A<sub>260</sub> units/mg.

Acceptor activities given in picomoles (10<sup>-12</sup> moles) per A<sub>260</sub> unit.

Unit Definition: One unit will yield an A<sub>260</sub> of 1.0 in 1.0 ml of water (1 cm light path).

### From Bakers Yeast

Lyophilized powder

Typical Amino Acid Acceptor Activity (picomoles per A<sub>260</sub> unit): glutamic acid: 45; phenylalanine: 55; valine: 90; alanine: 70.

156534 100 U  
0°C 500 U  
1 KU  
5 KU

## RNase ERASE™

### Spray Bottle

A novel RNase decontamination solution. Completely removes RNase contamination from glass and plastic surfaces, pipettes, and equipment that must be "RNase-free."

821682 250 ml  
RT

## RNase ERASE™

### Dropper/Squirt Bottle

A novel RNase decontamination solution. Completely removes RNase contamination from glass and plastic surfaces, pipettes, and equipment that must be "RNase-free."

821683 2x125 ml  
RT

## SEPHADEX® G-25

[9041-35-4]

### Super-Fine Fractionation Range (MW)

Globular proteins: 1000-5000

Dextrans: 100-5000

Dry Bead Diameter: 20-50  $\mu$ g

Bed Volume: 4-6 ml/g

195253 10 g  
RT 50 g  
100 g

## SEPHADEX® G-50

[9048-71-9]

### Fine Fractionation Range (MW)

Globular proteins: 1500-30,000

Dextrans: 500-10,000

Dry Bead Diameter: 20-80  $\mu$ g

Bed Volume: 9-11 ml/g

195581 10 g  
RT 50 g  
100 g

## SEPHADEX® G-50

[9048-71-9]

### Medium Fractionation Range (MW)

Globular proteins: 1500-30,000

Dextrans: 500-10,000

Dry Bead Diameter: 50-150  $\mu$ g

Bed Volume: 9-11 ml/g

195580 10 g  
RT 50 g  
100 g

CATALOG NUMBER

## SEPHADEX® G-100

[9050-94-6]

### Super-Fine

#### Fractionation Range (MW)

Globular proteins: 4000-100,000

Dextrans: 1000-100,000

Dry Bead Diameter: 20-50  $\mu$ g

Bed Volume: 15-20 ml/g

195583 10 g  
RT 50 g  
100 g

## SODIUM ACETATE

[127-09-3]

### Molecular Biology Reagent

#### Anhydrous

Purity: >98%

C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>Na MW 82.03

194012 250 g  
RT 1 kg  
5 kg

## SPERMINE

[306-67-2]

### Tetrahydrochloride

#### Molecular Biology Reagent

Purity: >96

Ideal for DNA precipitation from low salt aqueous buffers.

C<sub>10</sub>H<sub>26</sub>N<sub>4</sub> • 4HCl MW 348.2

194013 1 g  
0°C 5 g  
10 g

## ENZYMES

## AGARASE

[37288-57-6]

(Agarose 3-glycanohydrolase;

EC 3.2.1.81)

From *Pseudomonas atlantica*

Lyophilized powder containing BSA as a stabilizer.

Activity:  $\geq$ 10 units/mg protein.

Highly purified, DNase, RNase, and phosphatase undetectable.

Unit Definition: one unit will solubilize 500 mg of molten 1% LMP agarose per hour at 40-42°C.

194119 25 U  
-20°C 100 U

## DEOXYRIBONUCLEASE I

[9003-98-9]

### Bovine Pancreas

Activity: 2,000-2,600 Kunitz units/mg, Dry weight.

A lyophilized powder containing a small amount of glycine stabilizer.

Stable: 2-3 years

100575 5 mg  
0-5°C 10 mg  
20 mg  
100 mg  
250 mg

## DEOXYRIBONUCLEASE I

[9003-98-9]

### From Bovine pancreas

E.C.3.1.4.5

Lyophilized solid

Activity: 50,000-150,000 Dornase units/mg solid.

Unit Definition: One Dornase unit is defined as the amount of enzyme that causes the fall of 1.0 relative viscosity unit in a solution of highly polymerized DNA in ten minutes at 30°C from the initial relative viscosity of 4.0 (95,000 Dornase units equal approx. 3,000 Kunitz units).

190062 1x10<sup>7</sup> U  
0°C 5x10<sup>7</sup> U



# Restriction Enzymes

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191421 **MAGNESIUM CHLORIDE, ACS** 100 g  
RT [7791-18-6] 500 g  
**ACS Reagent Grade** 1 kg  
**Purity: 99.0-101.0%** 5 kg  
**Hexahydrate**  
**Crystalline**  
MgCl<sub>2</sub> • 6H<sub>2</sub>O MW 203.3

194801 **MINERAL OIL** 1 vial  
RT **Molecular Biology Reagent** 5 vials  
1 ml = approx. 0.84 gm  
For PCR applications.  
Each vial contains 1.5 ml.

1696054 **WATER** 500 ml  
**For Cell Culture**  
Double deionized via reverse osmosis  
Sterile  
Storage temperature: 15-30°C

## RESTRICTION ENZYMES

153798 **Aat II** 500 U  
-20°C **5'...GACGT/C...3'**  
[84067-31-2]  
Isolated from *Acetobacter aceti*  
(IFO 3281).  
**Activity:** 15,000 to 25,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated bovine serum albumin and 50% glycerol.  
Aat II requires 50 mM K<sup>+</sup> ions, 20mM Tris-acetate, 10mM magnesium acetate, 1mM dithiothreitol (pH 7.9 at 25°C) for optimal activity. Incubate at 37°C. This enzyme cleaves pBR322 DNA 5-10 times more efficiently than lambda DNA. Purified free of Aat I.  
**Ref.:** Sugisaki, H., Maekawa, Y., Kanazawa, S. and Takanami, M.  
(1982) *Nucleic Acids Res.* **10**, 5747-5752.

150221 **Acc I** 100 U  
0°C **5'...GT(A|Y|T)(C|G)AC...3'** 500 U  
[87683-74-7]  
From *Acinetobacter calcoaceticus*  
Supplied in 50% glycerol containing  
10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 50 mM KCl, 1 mM dithiothreitol, 200 µg/ml acetylated bovine serum albumin.  
**Activity:** 3,000 to 10,000 units/ml  
**Ref.:** 1. Nelson, M. and McClelland, M., *Nucl. Acids Res.*, **s19**, 2045 (1991). 2. Zabeau, M. and Roberts, R.J., unpublished observations.

159381 **Acc III** 200 U  
-20°C **5'...T/CCGGA...3'** 1 KU  
From *Acinetobacter calcoaceticus*  
**Activity:** 8,000 to 12,000 units/ml.  
Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.  
**Isoschizomers:** BspE I, Mro I. Incubation should be at 65°C, will exhibit approx. 10-25% activity at 37°C.

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159382 **Acc65 I** 1 KU  
-20°C **5'...G/GTACC...3'** 5 KU  
From *Acinetobacter calcoaceticus*  
**Isoschizomers:** Kpn I, Asp718 I  
**Activity:** 500 to 15,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.  
Does not display star activity like Kpn I.

159383 **AccB7 I** 200 U  
-20°C **5'..CCANNNN/NTGG...3'** 1 KU  
From *Acinetobacter calcoaceticus* B7  
**Activity:** 8,000 to 12,000 units/ml.  
Supplied in 300 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.  
It is not sensitive to overlapping *dcm* methylation like its isoschizomer PfiM I. Also, possible star activity with low salt or high pH conditions.

159384 **Aci I** 200 U  
-20°C **5'...C/CGC...3'** 1 KU  
From *Arthrobacter citreus*  
**Activity:** 5,000 to 15,000 units/ml.  
Supplied in 100 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

159385 **Acy I** 100 U  
-20°C **5'...GR/CGYC...3'** 500 U  
From *Anabaena cylindrica*  
**Activity:** 3,000 to 20,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.6), 0.1 mM EDTA, 7 mM 2-mercaptoethanol, and 50% glycerol.

159386 **Afi II** 1 KU  
-20°C **5'...C/TTAAG...3'** 5 KU  
From *Anabaena flosaquae*  
**Activity:** 5,000 to 15,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml, and 50% glycerol.

159387 **Afi III** 250 U  
-20°C **5'...A/CPuPyGT...3'**  
From *Anabaena flosaquae*  
**Activity:** 1,000 to 10,000 units/ml.  
Supplied in 100mM NaCl, 50 mM Tris-HCl (pH 7.4), 10 mM MgCl<sub>2</sub>, 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

159388 **Age I** 100 U  
-20°C **5'...A/CCGGT...3'** 500 U  
From *Agrobacterium gelatinovorum*  
**Activity:** 1,000 to 5,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

# Restriction Enzymes



CATALOG NUMBER		
150277 -20°C	<b>Alu I</b> 5'...AG/CT...3' [81295-04-7] From <i>Arthrobacter luteus</i> (ATCC 21606) Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin <b>Activity:</b> 3,000 to 10,000 units/ml <b>Ref.:</b> Recognition sequence from Roberts, R.J., Meyers, P.A. Morrison, A and Murry, K. (1976). J. Mol. Biol. 102, 157-165	400 U 2 KU
159389 -20°C	<b>Alu I METHYLASE</b> 5'...AG/C-(CH <sub>3</sub> )T...3' From <i>Arthrobacter luteus</i> <b>Activity:</b> 3,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM DTT, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U
159390 -20°C	<b>Alw44 I</b> 5'...G/TGCAC...3' From <i>Acinetobacter iwoffii</i> RFL44 <b>Activity:</b> 8,000 to 12,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU
159391 -20°C	<b>Alw I</b> 5'...GGATC(N) <sub>n</sub> ...3' From <i>Acinetobacter lwoffii</i> <b>Activity:</b> 500 to 5,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U
159392 -20°C	<b>AlwN I</b> 5'...CAGNNN/CTG...3' From <i>Acinetobacter iwoffii</i> N <b>Activity:</b> 5,000 to 15,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 100 µg/ml acetylated BSA, and 50% glycerol.	500 U
153799 -20°C	<b>Apa I</b> 5'...GGGCC/C...3' [85270-15-1] Isolated from <i>Acetobacter pasteurianus</i> sub. <i>pasteurianus</i> (NCIB 7215). <b>Activity:</b> 20,000 to 60,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Apa I is sensitive to NaCl concentrations higher than 80 mM. <b>Ref.:</b> Seurinck, J., van de Voorde, A. and van Montagu, M., (1983), Nucleic Acids Res., 11, 4409-4415.	2 KU 5 KU 25 KU
153800 -20°C	<b>ApaL I</b> 5'...G/TGCAC...3' [100630-51-1] Isolated from <i>Acetobacter pasteurianus</i> <b>Activity:</b> 5,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated bovine serum albumin and 50% glycerol. Sensitive to NaCl concentrations higher than 50 mM. <b>Ref.:</b> Yamada, Y. and Murakami, M., (1985), Agri.Biol.Chem., 49:12, 3627-3629.	1 KU 5 KU

CATALOG NUMBER		
159393 -20°C	<b>Apo I</b> 5'...Pu/AATPy...3' From <i>Arthrobacter protophormiae</i> <b>Activity:</b> 2,000 to 10,000 units/ml. Supplied in 100 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U
159394 -20°C	<b>Asc I</b> 5'...GG/CGGCC...3' From <i>Arthrobacter</i> species <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	50 U 250 U
159395 -20°C	<b>Ase I</b> 5'...AT/TAAT...3' From <i>Aquaspirillum serpens</i> <b>Activity:</b> 5,000 to 50,000 units/ml. Supplied in 500 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	2 KU 10 KU
153814 -20°C	<b>AspH I</b> 5'...G <sup>(A)</sup> <sub>(T)</sub> GC <sup>(A)</sup> <sub>(T)</sub> C ... 3' Isolated from <i>Achromobacter</i> sp. <b>Activity:</b> 2,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. High concentrations of salt (NaCl > 100 mM) is required for optimal activity. <b>Ref.:</b> Brown, N.L., McClelland, M. and Whitehead, P.R., (1980), Gene, 9, 49-68.	100 U 500 U
197021 -20°C	<b>Ava I</b> 5'...C/PyCGPuG...3' [81295-06-9] Derived from <i>Anabaena variabilis</i> <b>Activity:</b> 2,000-10,000 units/ml. <b>Unit Definition:</b> One unit of activity is defined by the amount of enzyme required to completely digest one microgram of lambda DNA in 60 minutes at 37°C in a total volume of .05 ml. Supplied in 50mM KCL, 10mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200µg/ml acetylated bovine serum albumin, and 50% glycerol.	2 KU 10 KU
197011 -20°C	<b>Ava II</b> 5'...G/G(A,T)CC...3' [81295-07-0] Derived from <i>Anabaena variabilis</i> for sequence G/G (A, T) CC <b>Activity:</b> 2,000-20,000 units/ml. <b>Unit Definition:</b> One unit of activity is defined by the amount of enzyme required to completely digest one microgram of lambda DNA in 60 minutes at 37°C in a total volume of .05 ml. Supplied in 50mM KCL, 10mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1mM dithiothreitol, 200µg/ml acetylated BSA, and 50% glycerol.	100 U 200 U 500 U
159396 -20°C	<b>Avr II</b> 5'...C/CTAGG...3' From <i>Anabaena variabilis</i> UW <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 8.0), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U

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153801 -20°C	<b>Bal I</b> 5'...TGG/CCA...3' Isolated from <i>Brevibacterium albidum</i> (ATCC 15831). <b>Activity:</b> 2000 to 10,000 units/ml. Supplied in 50mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. This enzyme is stable and a fraction of a unit can be incubated for extended periods of time (16 hrs) to give complete digestion of DNA. BAL I is sensitive to NaCl concentrations higher than 40 mM and to overlapping dcm methylation. <b>Ref.:</b> Gelinas, R.E., Myers, P.A., Weiss, G.A., Roberts, R.J. and Murray, K.E., (1977), <i>J. Mol. Biol.</i> , <b>114</b> , 433-440	50 U
150421 -20°C	<b>BamH I</b> 5'...G/GATCC...3' [81295-09-2] From <i>Bacillus amylolique faciens</i> Solution in 50% glycerol containing 10 mM Tris pH 7.5, 0.1mM EDTA, 50 mM KCl, 1 mM Dithiothreitol, 200 µg/ml acetylated Bovine Serum Albumin. <b>Activity:</b> 2,000 to 20,000 units/ml <b>Ref.:</b> Recognition sequence from: Roberts, R.J., Wilson, G.A. and Young, E., <i>Nature</i> , <b>265</b> , 82-84 (1977).	10 KU 50 KU
159397 -20°C	<b>BamH I METHYLASE</b> 5'...G/GATC-(CH <sub>3</sub> )C...3' From <i>Bacillus amyloliquefaciens</i> H <b>Activity:</b> 3,000 to 10,000 units/ml. Supplied in 50 mM Tris-HCl (pH 7.5), 10 mM EDTA, 1 mM DTT, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U
153802 -20°C	<b>Ban I</b> 5'...G/GPyPuCC...3' [85876-07-9] Isolated from <i>Bacillus aneurinolyticus</i> (IAM 1077). <b>Activity:</b> 10,000 to 60,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <i>Ban I</i> is sensitive to NaCl concentrations higher than 80 mM. Purified free of <i>Ban II</i> and <i>III</i> . <b>Ref.:</b> Sugisaki, H., Maekawa, Y., Kanazawa, S. and Takanami, M., (1982), <i>Nucleic Acids Res.</i> , <b>10</b> , 5747-5752. Schildkraut, I., Lynch, J. and Morgan, R., (1987), <i>Nucleic Acids Res.</i> , <b>15</b> , 5492.	5 KU 25 KU
153803 -20°C	<b>Ban II</b> 5'...GPuGCPy/C...3' [84067-33-4] Isolated from <i>Bacillus aneurinolyticus</i> (IAM 1077) <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <b>Ref.:</b> Sugisaki, H., Maekawa, Y., Kanazawa, S. and Takanami, M., (1982), <i>Nucleic Acids Res.</i> , <b>10</b> , 5747-5752.	1 KU 5 KU

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159398 -20°C	<b>Ban III</b> 5'...AT/CGAT...3' From <i>Bacillus aneurinolyticus</i> <b>Activity:</b> 3,000 to 20,000 units/ml. Supplied in 100 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 10 mM 2-mercaptoethanol, 500 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU
159399 -20°C	<b>Bbs I</b> 5'...GAAGAC(N) <sub>2</sub> /...3' From <i>Bacillus laterosporus</i> <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in 150 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU
159400 -20°C	<b>Bbu I</b> 5'...GCATG/C...3' From <i>Bacillus</i> sp. <b>Activity:</b> 8,000 to 12,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU
153804 -20°C	<b>Bbv I</b> 5'...GCAGC(N) <sub>8/12</sub> /...3' Isolated from <i>Bacillus brevis</i> (ATCC 9999) <b>Activity:</b> 200 to 2,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <b>Ref.:</b> Gingeras, T.R., Milazzo, J.P. and Roberts, R.J., (1978), <i>Nucleic Acids Res.</i> , <b>5</b> , 4105-4127. Schildkraut, I., unpublished observations.	150 U
150426 -20°C	<b>Bcl I</b> 5'...T/GATCA...3' [81295-11-6] From the thermophile <i>Bacillus caldolyticus</i> solution in 50% glycerol containing 10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 50 mM KCl, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 3,000 to 15,000 units/ml <b>Ref.:</b> Recognition sequence from: Bingham, A.H.A., Atkinson, T., Sciaky, D. and Roberts, R.J., (1978), <i>Nucleic Acids Res.</i> , <b>5</b> , 3457-3460.	2 KU 10 KU
159401 -20°C	<b>Bfa I</b> 5'...C/TAG...3' From <i>Bacteroides fragilis</i> <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U
150463 -20°C	<b>Bgl I</b> 5'...GCCNNNN/NGGC...3' [80449-04-3] From <i>Bacillus globigii</i> Rub 561 Solution contains 50% glycerol containing 10 mM K <sub>3</sub> PO <sub>4</sub> pH 7.4, 0.1 mM EDTA, 200 mM KCl, 10 mM 2-mercaptoethanol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 2,000 to 20,000 units/ml <b>Ref.:</b> Recognition sequence from: Bickle, T.A. and Ineichen, K., (1980), <i>Gene</i> , <b>9</b> , 205-211; and Van Heuverswyn, H., and Fiers, W., (1980), <i>Gene</i> , <b>9</b> , 195-203.	1 KU 5 KU

# Restriction Enzymes



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159464 -20°C	<b>Bgl II</b> 5'...A/GATCT...3' [81295-12-7] From <i>Bacillus globigii</i> Rub 562 Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 10 mM MgCl <sub>2</sub> , 10 mM 2-mercaptoethanol, 100 µg/ml bovine serum albumin. <b>Activity:</b> 3,000 to 40,000 units/ml <b>Ref.:</b> Recognition sequence from: Pirotta, V., (1976), <i>Nucleic Acids Res.</i> , <b>3</b> , 1747-1760.	1 KU 5 KU
159402 -20°C	<b>Bpm I</b> 5'...CTGGAG(N) <sub>16</sub> /...3' From <i>Bacillus pumilus</i> <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 100 mM NaCl, 50 mM Tris-HCl (pH 7.4), 10 mM MgCl <sub>2</sub> , 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	50 U 250 U
159403 -20°C	<b>Bpu1102 I</b> 5'...GC/TNAGC...3' (Esp I) <b>Activity:</b> 1,000 to 20,000 units/ml. Supplied in a reaction bufer.	200 U
159404 -20°C	<b>Bsa I</b> 5'...GGTCTC(N) <sub>1</sub> /...3' From <i>Bacillus stearothermophilus</i> <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied 100 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U
159405 -20°C	<b>BsaA I</b> 5'...PyAC/GTPu...3' From <i>Bacillus stearothermophilus</i> A <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U
159406 -20°C	<b>BsaB I</b> 5'...GATNN/NNATC...3' From <i>Bacillus stearothermophilus</i> B <b>Activity:</b> 5,000 to 20,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU
151256 -20°C	<b>BsaH I</b> 5'...GPu/CGPyC...3' [92228-42-7] From <i>Bacillus stearothermophilus</i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 2,000 to 20,000 units/ml <b>Ref.:</b> Recognition Sequence from: Kroger, M., Hobom, G., Schutte, H. and Mayer, H., (1984), <i>Nucleic Acids Res.</i> , <b>12</b> , 3127-3141.	1 KU 5 KU
159408 -20°C	<b>BsaJ I</b> 5'...C/CNNGG...3' From <i>Bacillus stearothermophilus</i> J <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	250 U

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159409 -20°C	<b>BsaW I</b> 5'...(A) <sub>1</sub> CCGG(A) <sub>1</sub> ...3' From <i>Bacillus stearothermophilus</i> W1 <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in 100 mM NaCl, 50 mM Tris-HCl (pH 7.6), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol	100 U 500 U
159410 -20°C	<b>Bsh1236 I</b> 5'...CG/CG...3' From <i>Bacillus sphaericus</i> <b>Activity:</b> 3,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U
159411 -20°C	<b>BsiE I</b> 5'...CGPuPy/CG...3' From <i>Bacillus stearothermophilus</i> <b>Activity:</b> 5,000 to 15,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU
159412 -20°C	<b>BsiHKA I</b> 5'...G(A)GC(A)C...3' From <i>Bacillus stearothermophilus</i> <b>Activity:</b> 5,000 to 15,000 units/ml. Supplied in 100 mM NaCl, 50 mM Tris-HCl (pH 7.6), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU
159413 -20°C	<b>Bsi I</b> 5'...CCNNNNN/NGG...3' From <i>Bacillus</i> species <b>Activity:</b> 3,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U
153805 -20°C	<b>Bsm I</b> 5'...GAATGC(N) <sub>1/1</sub> /...3' [122007-72-1] Isolated from <i>Bacillus stearothermophilus</i> NUB 36 (N. Welker). <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10mM Tris-HCl (pH 7.4),0.1mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <b>Ref.:</b> Myers, P.A. and Roberts, R.J., unpublished observations. Christ, C. and Ingalls, D., unpublished observations.	200 U 1 KU
159414 -20°C	<b>BsmA I</b> 5'...GTCTC(N) <sub>1</sub> /...3' From <i>Bacillus stearothermophilus</i> <b>Activity:</b> 3,000 to 20,000 units/ml. Supplied in 200 mM KCl, 10 mM Tris-HCl (pH7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU
159415 -20°C	<b>BsmF I</b> 5'...GGGAC(N) <sub>10/14</sub> /...3' From <i>Bacillus stearothermophilus</i> F <b>Activity:</b> 2,000 to 10,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 1 mM dithiothreitol, 0.1 mM EDTA, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U



# Restriction Enzymes

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159416 **Bsp120 I** 3 KU  
-20°C 5'...G/GGCC...3' 15 KU  
Activity: 3,000 to 20,000 units/ml.  
Supplied in reactive buffer.

150527 **Bsp1286 I** 500 U  
-20°C 5'... G<sup>(G)</sup>A<sup>(A)</sup>GC<sup>(C)</sup>A<sup>(T)</sup>C...3' 2.5 KU  
From *Bacillus sphaericus*  
Activity: 3,000 to 10,000 units/ml.  
Solution in 50% glycerol containing 100 mM Tris-HCl pH 7.4, 50 mM KCl, 0.1 mM EDTA, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
Ref.: Shibata, T., Ikawa, S., Kim, C. and Ando, T.J. (1976), J. Bacteriol, 128, 473-476. Recognition sequence from: Roberts, R.J. unpublished observations. Cleavage sequence from: Schildkraut, I. and Christ, C. unpublished observations.

159417 **BspD I** 1 KU  
-20°C 5'...AT/CGAT...3' 5 KU  
From *Bacillus* species  
Activity: 3,000 to 15,000 units/ml.  
Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

159418 **BspE I** 1 KU  
-20°C 5'...T/CCGGA...3' 5 KU  
From *Bacillus* sp.  
Activity: 3,000 to 20,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

159419 **BspH I** 200 U  
-20°C 5'...T/CATGA...3' 1 KU  
From *Bacillus* species H  
Activity: 1,000 to 10,000 units/ml.  
Supplied in 100 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

159420 **BspM I** 100 U  
-20°C 5'...ACCTGC(N)<sub>4</sub>...3' 500 U  
From *Bacillus* species M  
Activity: 1,000 to 5,000 units/ml.  
Supplied in 150 mM KCl, 10 mM Tris-HCl (pH 7.4), 10 mM MgCl<sub>2</sub>, 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

150528 **BssH II** 100 U  
-20°C 5'...G/CGCG...3' 500 U  
From *Bacillus stearothermophilus* Strain H3  
Activity: 4,000 to 20,000 units/ml.  
Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
Ref.: Langdale, J.A., Myers, P.A. and Roberts, R.J. unpublished observations. Cleavage sequence from: Schildkraut, I. and Greenough, L. unpublished observations.

159421 **Bst1107 I** 200 U  
-20°C 5'...GTA/TAC...3'  
Activity: 1,000 to 15,000 units/ml.  
Supplied in reactive buffer.

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159422 **BstB I** 2.5 KU  
-20°C 5'...TT/CGAA...3'  
From *Bacillus stearothermophilus* B  
Activity: 5,000 to 25,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

150529 **BstE II** 2 KU  
-20°C 5'...G/GTNACC...3' 10 KU  
From *Bacillus stearothermophilus*  
Activity: 5,000 to 50,000  
Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
Ref.: Recognition sequence from: Lautenberger, J.A., Edgell, M.H. and Hutchison, C.A. III, (1980), Gene, 12, 171-174.

150530 **BstN I** 2 KU  
-20°C 5'...CC(A)<sub>10</sub>GG...3' 10 KU  
[81811-51-0]  
From *Bacillus stearothermophilus*  
Activity: 5,000 to 20,000  
Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
Ref.: Recognition sequence from: Langdale, J.A., Myers, P.A. and Roberts, R.J. unpublished observations.

159423 **BstU I** 1 KU  
-20°C 5'...CG/CG...3' 5 KU  
From *Bacillus stearothermophilus* U  
Activity: 3,000 to 20,000 units/ml.  
Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

150531 **BstX I** 1 KU  
-20°C 5'...CCANNNN/NTGG...3' 2 KU  
[92228-43-8] 5 KU  
From *Bacillus stearothermophilus*  
Activity: 5,000 to 15,000 units/ml  
Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 1.0 mM dithiothreitol 50 mM KCl, 200 µg/ml bovine serum albumin.

159424 **BstY I** 500 U  
-20°C 5'...Pu/GATCPy...3'  
From *Bacillus stearothermophilus* Y  
Activity: 3,000 to 15,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

159425 **Bsu36 I** 500 U  
-20°C 5'...CC/TNAGG...3'  
From *Bacillus subtilis* 36 I  
Activity: 3,000 to 20,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

# Restriction Enzymes



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159426 -20°C	<b>Cfo I</b> <b>5'...GCG/C...3'</b> From <i>Clostridium formicoaceticum</i> sp. <b>Activity:</b> 8,000 to 12,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.	3 KU 15 KU	
153806 -20°C	<b>Cla I</b> <b>5'...AT/CGAT...3'</b> [83589-01-9] Isolated from <i>Caryophanon latum</i> L (H. Mayer) <b>Activity:</b> 4,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <i>Cla I</i> is inhibited by overlapping <i>dam</i> methylation. Cleaves to produce a 5' CG extension which can be readily ligated with DNA fragments generated by <i>Aha II</i> , <i>Asu II</i> , <i>HinP I</i> , <i>Hpa II</i> , <i>Mae II</i> , <i>Msp I</i> , <i>Nar I</i> , and <i>Taq I</i> . <b>Ref.:</b> Mayer, H., Grosschedl, R., Schutte, H. and Hobom, G., (1981), <i>Nucleic Acids Res.</i> , <b>19</b> , 4833-4845.	500 U	
159427 -20°C	<b>Cla I METHYLASE</b> <b>5'...AT/CGA-(CH<sub>3</sub>)T...3'</b> From <i>Caryophanon latum</i> <b>Activity:</b> 3,000 to 10,000 units/ml. Supplied in 50 mM Tris-HCl (pH 7.5), 10 mM EDTA, 5 mM 2-mercaptoethanol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U	
159428 -20°C	<b>dam METHYLASE</b> <b>5'...GA-(CH<sub>3</sub>)TC...3'</b> From <i>E. coli</i> with <i>dam</i> modification <b>Activity:</b> 5,000 to 20,000 units/ml. Supplied in 50 mM KCl, 50 mM Tris-HCl (pH 7.5), 10 mM EDTA, 1 mM DTT, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U	
153807 -20°C	<b>Dde I</b> <b>5'...C/TNAG...3'</b> Isolated from <i>Desulfovibrio desulfuricans</i> (NCIB 8310). <b>Activity:</b> 2,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Cleaves single-stranded DNA very slowly. <b>Ref.:</b> Makula, R.A. and Meagher, R.B., (1980), <i>Nucleic Acids Res.</i> , <b>8</b> , 3125-3131. Gelinas, R.E. and Roberts, R.J., unpublished observations.	200 U 500 U 1 KU	
153808 -20°C	<b>Dpn I</b> <b>5'...GmA/TC...3'</b> [81295-14-9] <i>E. coli</i> recombinant isolated from <i>Diplococcus pneumoniae</i> strain 641 (S. Lacks). <b>Activity:</b> 5,000 to 20,000 units/ml. Supplied in 100 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 0.1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <i>Dpn I</i> is an isoschizomer of <i>Sau 3A I</i> and <i>Mbo I</i> . However, <i>Dpn I</i> requires N <sup>6</sup> -methylation of the A residues on both strands of the recognition sequence for cleavage activity. <b>Ref.:</b> Lacks, S. and Greenberg, B., (1975), <i>J. Biol. Chem.</i> , <b>250</b> , 4060-4066. Geier, G.E. and Modrich, P., (1979), <i>J. Biol. Chem.</i> , <b>254</b> , 1048-1413. Lacks, S. and Greenberg, B., (1977), <i>J. Mol. Biol.</i> , <b>114</b> , 153-168.	1 KU 5 KU	
159429 -20°C	<b>Dpn II</b> <b>5'...GATC...3'</b> From <i>E. coli</i> <b>Activity:</b> 5,000 to 20,000 units/ml. Supplied in 200 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU	
190516 -20°C	<b>Dra I</b> <b>5'...TTT/AAA...3'</b> [87843-68-3] From <i>Deinococcus radiophilus</i> (ATCC 27603) <b>Activity:</b> 5,000 to 20,000 units/ml. Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Ref.:</b> (1) Recognition Sequence from: Purvis, I.J., and Moseley, B.E.B., (1983), <i>Nucleic Acid Res.</i> , <b>11</b> , 5467-5474; (2) Recognition Sequence from: Hedgpeth, J., Goodman, H.M. and Boyer, H.M., (1972), <i>Proc. Natl. Acad. Sci. USA</i> , <b>69</b> , 3448-3452.	2 KU 10 KU	
159430 -20°C	<b>Dra II</b> <b>5'...RG/GNCCY...3'</b> From <i>Deinococcus radiophilus</i> <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 200 mM NaCl, 20 mM Tris-HCl (pH 8.0), 0.1 mM EDTA, 10 mM 2-mercaptoethanol, 500 µg/ml acetylated BSA, and 50% glycerol.	50 U 250 U	
153809 -20°C	<b>Dra III</b> <b>5'...CACNNN/GTG...3'</b> Isolated from <i>Deinococcus radiophilus</i> (ATCC 27603). <b>Activity:</b> 2,000 to 15,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <b>Ref.:</b> Grosskopt, R., Wolf, W., Kessler, C., (1985), <i>Nucleic Acids Res.</i> , <b>13</b> , 1517-1528.	150 U 500 U	
159431 -20°C	<b>Drd I</b> <b>5'...GACNNNN/NGTC...3'</b> From <i>Deinococcus radiodurans</i> <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	300 U	
153810 -20°C	<b>Eae I</b> <b>5'...Py/GGCCPu...3'</b> [86352-28-5] Isolated from <i>Enterobacter aerogenes</i> (P.R. Whitehead). <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <b>Ref.:</b> Whitehead, P.R. and Brown, N.L., (1983), <i>FEBS Letters</i> , <b>155</b> , 97-101. Jacobs, D. and Brown, N.L., (1986), <i>Biochem. J.</i> , <b>238</b> , 613-616.	100 U 500 U	
159432 -20°C	<b>Eag I</b> <b>5'...C/GGCCG...3'</b> From <i>Enterobacter agglomerans</i> <b>Activity:</b> 3,000 to 20,000 units/ml. Supplied in 500 mM NaCl, 10 mM Tris-HCl (pH 8.2), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U	



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159433 -20°C	<b>Eae I</b> 5'...CTCTTC(N) <sub>1</sub> ...3' From <i>Enterobacter aerogenes</i> <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U
159434 -20°C	<b>Eco130 I</b> 5'...C/CWWGG...3' From <i>Escherichia coli</i> <b>Activity:</b> >1,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU
159435 -20°C	<b>Eco47 I</b> 5'...G/GWCC...3' From <i>Escherichia coli</i> <b>Activity:</b> 3,000 to 20,000 units/ml. Supplied in 100 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU
159436 -20°C	<b>Eco47 III</b> 5'...AGC/GCT...3' <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in reactive buffer.	200 U
159437 -20°C	<b>Eco52 I</b> 5'...C/GGCCG...3' From <i>Escherichia coli</i> <b>Activity:</b> 1000 to 5,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.	50 U 250 U
159438 -20°C	<b>Eco57 I</b> 5'...CTGAAG(N) <sub>16</sub> ...3' <b>Activity:</b> 1,000 to 15,000 units/ml. Supplied in reagent buffer.	100 U
159439 -20°C	<b>Eco72 I</b> 5'...CAC/GTG...3' <b>Activity:</b> 5,000 to 12,000 units/ml. Supplied in 100 mM KCl, 10 mM Tris-HCl (pH 7.4), 1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU
159440 -20°C	<b>EcoN I</b> 5'...CCTNN/NNNAGG...3' From <i>Escherichia coli</i> <b>Activity:</b> 3,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU
153811 -20°C	<b>EcoO 109 I</b> 5'...PuG/GNCCPy...3' [95725-92-1] Isolated from <i>E. coli</i> H709c (I. Orskov). <b>Activity:</b> 5,000 to 20,000 units/ml. Supplied in 60 mM NaCl, 20 mM Tris-HCl (pH 8.2), 0.5 mM EDTA, 14 mM 2-mercaptoethanol, 50% glycerol. This enzyme is an isoschizomer of <i>Dra</i> II. <b>Ref.:</b> Mise, K. and Nakajima, K., (1985), <i>Gene</i> , <b>36</b> , 363-367.	2 KU 10 KU

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151025 -20°C	<b>EcoR I</b> 5'...G/AATTC...3' From <i>E. coli</i> RY13 Solution in 50% glycerol containing 5 mM Tris-KPO <sub>4</sub> pH 7.4, 0.1 mM EDTA, 5 mM 2-Mercaptoethanol, 400 mM NaCl, 0.15% Triton X-100, 200 µg/ml bovine serum albumin <b>Ref.:</b> Recognition Sequence from: Hedgpeth, J., Goodman, H.M. and Boyer, H.M., (1972), <i>Proc. Natl. Acad. Sci USA</i> , <b>69</b> , 3448-3452.	10 KU 50 KU
159441 -20°C	<b>EcoR I METHYLASE</b> 5'...G/AA-(CH <sub>3</sub> )TTC...3' From <i>Escherichia coli</i> <b>Activity:</b> 5,000 to 40,000 units/ml. Supplied in 200 mM NaCl, 100 mM KPO <sub>4</sub> (pH 7.4), 0.1 mM EDTA, 10 mM 2-mercaptoethanol, 200 µg/ml acetylated BSA, and 50% glycerol.	10 KU 50 KU
159442 -20°C	<b>EcoR II</b> 5'.../CCWGG...3' From <i>Escherichia coli</i> <b>Activity:</b> 3,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U
151026 -20°C	<b>EcoR V</b> 5'...GAT/ATC...3' [83589-02-0] From <i>Escherichia coli</i> J62P7G74 <b>Activity:</b> 5,000 to 20,000 Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Ref.:</b> Recognition Sequence from: Kholmina, G.V., Rebentish, B.A., Skoblov, Yu.S., et al., <i>Pokl. Akad. Nauk. SSSR</i> , <b>253</b> , 495-497.	2 KU 10 KU
159443 -20°C	<b>Fnu4H I</b> 5'...GC/NGC...3' From <i>Fusobacterium nucleatum</i> 4H <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U
159444 -20°C	<b>FnuD II METHYLASE</b> 5'...C-(CH <sub>3</sub> )GCG...3' From <i>Fusobacterium nucleatum</i> D <b>Activity:</b> 5,000 to 15,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM DTT, 200 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU
153812 -20°C	<b>Fok I</b> 5'...GGATG(N) <sub>9/13</sub> ...3' Isolated from <i>Flavobacterium okeanokoites</i> (IFO 12536) <b>Activity:</b> 2,000 to 12,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <b>Ref.:</b> Sugisaki, H. and Kanazawa, S. (1981) <i>Gene</i> <b>16</b> , 73-78.	1 KU 5 KU

For a complete selection of restriction enzymes, DNA/RNA modifying enzymes, linkers, primers, and vectors, please see the Molecular Biology Section.



# Restriction Enzymes



CATALOG NUMBER		CATALOG NUMBER	
159445 -20°C	<b>Fsp I</b> <b>5'...TGC/GCA...3'</b> From <i>Fischerella</i> species <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	500 U	
151220 -20°C	<b>Hae II</b> <b>5'...GG/CC...3'</b> [81295-17-2] From <i>Haemophilus aegyptius</i> (ATCC11116) <b>Activity:</b> 2,000 to 15,000 units/ml. Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Ref.:</b> Recognition Sequence from: Tu, C.-P.D., Roychoudhury, R. and Wu R., (1976), <i>Biochem. Biophys. Res. Comm.</i> , <b>72</b> , 355-362.	2 KU 10 KU	
151221 -20°C	<b>Hae III</b> <b>5'...GG/CC...3'</b> [81295-18-3] Source: <i>E. coli</i> strain that carries the cloned Hae III gene from <i>Haemophilus aegyptius</i> Supplied in 100 mM KCl, 10 mM Tris-HCl, pH 7.4, 0.1 mM EDTA, 10 mM 2-mercaptoethanol, 500 µg/ml BSA, 50% glycerol. <b>Activity:</b> 5,000 to 20,000 units/ml. <b>Ref.:</b> Recognition Sequence from: Kroger, M., Hobom, G., Schutte, H. and Mayer, H., (1984), <i>Nucleic Acids Res.</i> , <b>12</b> , 3127-3141.	3 KU 15 KU	
159446 -20°C	<b>Hae III METHYLASE</b> <b>5'...GG/C-(CH<sub>3</sub>)C...3'</b> From <i>Haemophilus aegyptius</i> <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 50 mM KCl, 50 mM Tris-HCl (pH 7.5), 10 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	250 U	
153813 -20°C	<b>Hga I</b> <b>5'...GACGC(N)<sub>5-10</sub>...3'</b> Isolated from <i>Haemophilus gallinarum</i> (ATCC 14385) <b>Activity:</b> 500 to 2,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Cleaves to produce a five-base 5' extension. Cleaves single-stranded DNA very slowly. <b>Ref.:</b> Takanami, M., (1974), <i>Methods in Mol. Biol.</i> , <b>7</b> , 113-133. Brown, N.L. and Smith, M., (1977), <i>Proc. Nat'l. Acad. Sci. USA</i> , <b>74</b> , 3213-3216. Sugisaki, H., (1978), <i>Gene</i> , <b>3</b> , 17-28.	50 U 250 U	
151257 -20°C	<b>Hha I</b> <b>5'...GCG/C...3'</b> [81295-20-7] From <i>Haemophilus haemolyticus</i> (ATCC 10014) <b>Activity:</b> 10,000 to 25,000 units/ml Solution in 50% glycerol containing 150 mM KCl, 5 mM KPO <sub>4</sub> pH 7.4, 0.1 mM EDTA, 150 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Ref.:</b> Recognition Sequence from: Roberts, R.J., Myers, P.A., Morrison, A. and Murry, L., (1976), <i>J. Mol. Biol.</i> , <b>103</b> , 199-208.	2 KU 10 KU	
159407 -20°C	<b>Hha I METHYLASE</b> <b>5'...GC-(CH<sub>3</sub>)G/C...3'</b> From <i>Haemophilus haemolyticus</i> <b>Activity:</b> 5,000 to 25,000 units/ml. Supplied in 50 mM NaCl, 50 mM Tris-HCl (pH 7.5), 10 mM EDTA, 5 mM 2-mercaptoethanol, 200 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU	
151258 -20°C	<b>HinC II</b> <b>5'...GTPy/PuAC...3'</b> [81811-55-4] From <i>Haemophilus influenzae R<sub>c</sub></i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol 200 µg/ml bovine serum albumin. <b>Activity:</b> 5,000 to 25,000 units/ml. <b>Ref.:</b> Recognition Sequence from: Kelly, T.J., Jr. and Smith, H.O., (1970), <i>J. Mol. Biol.</i> , <b>51</b> , 393-409 [1] Landy, A., Ruedisueli, E., Robinson, L., Foeller, C. and Ross, W., (1974), <i>Biochemistry</i> , <b>13</b> , 2134-2142.	1 KU 5 KU	
197020 0°C	<b>HinD II</b> <b>5'...GTPy/PuAC...3'</b> Derived from <i>Haemophilus influenzae Rd com</i> <sup>10</sup> <b>Activity:</b> 2,000-10,000 units/ml. <b>Unit Definition:</b> One unit of activity is defined by the amount of enzyme required to completely digest one microgram of lambda DNA in 60 minutes at 37°C in a total volume of .05 ml.	100 U 1 KU	
151259 -20°C	<b>HinD III</b> <b>5'...A/AGCTT...3'</b> [81295-22-9] From <i>Haemophilus influenzae</i> <b>Activity:</b> 10,000-100,000 Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Ref.:</b> Recognition Sequence from: Old, R., Murry, K., and Roizes, G., (1975), <i>J. Mol. Biol.</i> , <b>92</b> , 331-339 [1] Gromkova, R., Bendier, J. and Goodgal, S., (1973), <i>J. Bacteriol.</i> , <b>r</b> , 1151.	10 KU 50 KU	
151260 -20°C	<b>HinF I</b> <b>5'...G/ANTC...3'</b> [81295-23-0] From <i>Haemophilus influenzae</i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 2,000 units-10,000 units/ml. <b>Ref.:</b> Recognition and Cleavage Sequence from: Hutchinson, C.A. III and Barreli, B.G., unpublished observations.	5 KU 25 KU	
151261 -20°C	<b>HinP: I</b> <b>5'...G/CGC...3'</b> [95229-16-6] From <i>Haemophilus influenzae</i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 5,000 to 20,000 units/ml. <b>Ref.:</b> Recognition and Cleavage Sequence from: Shen, S., Li, Q., Yan, P., Zhou, B., Ye, S., Lu, Y., and Wang, D., (1980), <i>Science Sin.</i> , <b>23</b> , 1435-1442.	2 KU 10 KU	



# Restriction Enzymes

CATALOG  
NUMBER

**Hpa I** 500 U  
 151266  
 -20°C 5'...C/CGG...3'  
 [81295-24-1]  
 From *Haemophilus parainfluenzae*  
 Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
**Activity:** 2,000 to 10,000 units/ml  
**Ref.:** Recognition Sequence from: Garfin, D.E. and Goodman, H.M., (1974), *Biochem. Biophys. Res. Comm.*, **59**, 108-116.

**Hpa II** 500 U  
 151267  
 -20°C 5'...C/CGG...3'  
 From *Haemophilus parainfluenzae*  
 Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
**Activity:** 2,000 to 20,000 units/ml  
**Ref.:** Recognition Sequence from: Garfin, D.E. and Goodman, H.M., (1974), *Biochem. Biophys. Res. Comm.*, **59**, 108-116.

**Hpa II METHYLASE** 100 U  
 159447  
 -20°C 5'...C/C-(CH<sub>3</sub>)GG...3'  
 From *Haemophilus parainfluenzae*  
**Activity:** 1,000 to 5,000 units/ml.  
 Supplied in 50 mM Tris-HCl (pH 7.5), 10 mM EDTA, 5 mM 2-mercaptoethanol, 200 µg/ml acetylated BSA, and 50% glycerol.

**Hph I** 50 U  
 153815  
 -20°C 5'...GGTGA(N)<sub>8/7</sub>...3'  
 [81295-26-3]  
 Isolated from *Haemophilus parahaemolyticus* (C.A. Hutchison III)  
**Activity:** 1,000 to 10,000 units/ml.  
 Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Unstable during incubation at 37°C.  
**Ref.:** Middleton, J.H., Stankus, P.V., Edgell, M.H. and Hutchinson, C.A. III, unpublished observations. Kleid, D., Humayun Z., Jeffrey A. and Ptashne, M., (1976), *Proc. Natl. Acad. Sci. USA*, **73**, 293-297.

**Kas I** 100 U  
 159448  
 -20°C 5'...G/GCGCC...3'  
 From *Kluyvera ascorbata*  
**Activity:** 1,000 to 5,000 units/ml.  
 Supplied in 300 mM KCl, 10 mM Tris-HCl (pH 7.4), 10 mM MgCl<sub>2</sub>, 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

**Kpn I** 2 KU  
 151405  
 10 KU 5'...GGTAC/C...3'  
 [81295-27-4]  
 From *Klebsiella pneumoniae* OK8  
 Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
**Activity:** 2,000 to 20,000 units/ml.  
**Ref.:** Recognition Sequence from: Tomassini, J., Roychoudhury, R., and Roberts, R.J. (1978) *Nucleic Acids Res.* **5**, 4055-4064.

CATALOG  
NUMBER

**Mbo I** 200 U  
 151590  
 -20°C 5'.../GTAC ...3'  
 [81295-28-5]  
 From *Moraxella bovis* (ATCC 10900)  
 Solution in 50% glycerol containing 10 mM tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
**Activity:** 5,000 to 15,000 units/ml  
**Ref.:** Recognition sequence from: Gelinás, R.E., Myers, P.A., and Roberts, R.J., (1977), *J. Mol. Biol.*, **114**, 169-179.

**Mbo II** 250 U  
 153816  
 -20°C 5'...GAAGA(N)<sub>8/7</sub>...3'  
 [81295-29-6]  
 Isolated from *Moraxella bovis* (ATCC 10900).  
**Activity:** 2,000 to 20,000 units/ml.  
 Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. *Mbo II* is sensitive to overlapping *dam* methylation. Purified free of *Mbo I*.  
**Ref.:** Brown, N.L., Hutchison, C.A. III, and Smith, M., (1980), *J. Mol. Biol.*, **140**, 143-148. Gelinás, R.E., Myers, P.A. and Robers, R.J., (1977), *J. Mol. Biol.*, **114**, 169-179. Endow, S.A., (1977), *J. Mol. Biol.*, **114**, 441-449. McClelland, M., Nelson, M. and Cantor, C.R., (1985), *Nucleic Acids Res.*, **13**, 7171-7182.

**Mlu I** 1 KU  
 151701  
 -20°C 5'...A/CGCGT...3'  
 [81458-04-0]  
 From *Micrococcus luteus*  
 Solution in 50% glycerol containing 10 mM tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
**Activity:** 1,000 to 10,000 units/ml  
**Ref.:** Sugisaki, H., and Kanazawa, S. (1981) *Gene* **16**, 73-78.

**Mnl I** 100 U  
 151702  
 -20°C 5'...CCTC(N)<sub>7</sub>...3'  
 From *Moraxella nonliquefaciens*  
 Solution in 50% glycerol containing 10 mM tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol.  
**Activity:** 400 to 2,000 units/ml  
**Ref.:** Cleavage Site from: Schildkraut, I. and Greenough, L., unpublished observations.

**Mro I** 40 U  
 159449  
 -20°C 5'...T/CCGGA...3'  
 From *Micrococcus roseus*  
**Activity:** 3,000 to 15,000 units/ml.  
 Supplied in 200 mM NaCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 5 mM 2-mercaptoethanol, 200µg/ml BSA, and 50% glycerol.

**Msc I** 100 U  
 159450  
 -20°C 5'...TGG/CCA...3'  
 E. coli recombinant from *Micrococcus* species  
**Activity:** 3,000 to 15,000 units/ml.  
 Supplied in 150 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

# Restriction Enzymes



CATALOG NUMBER		CATALOG NUMBER	
159451 -20°C	<b>Mse I</b> <b>5'...T/TAA...3'</b> From <i>Micrococcus</i> species <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU	
159452 -20°C	<b>Msl I</b> <b>5'...CAPyNN/NNPuTG...3'</b> From <i>Moraxella osloensis</i> <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 100 mM NaCl, 10 mM Tris-HCl (pH 7.6), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU	
151717 -20°C	<b>Msp I</b> <b>5'...C/CGG...3'</b> [81811-56-5] From <i>Moraxella</i> species Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.5, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 3,000 to 20,000 units/ml <b>Ref.:</b> (1) Schildkraut, I., and Greenough, L. unpublished results; (2) Waalwijk, C., and Flavell, R.A., (1976), <i>Nucleic Acids Res.</i> , <b>5</b> , 3231-3236.	5 KU 25 KU	
159453 -20°C	<b>Msp I METHYLASE</b> <b>5'...C-(CH<sub>3</sub>)/CGG...3'</b> From <i>Moraxella</i> species <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 8.0), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	5 KU 25 KU	
159454 -20°C	<b>Mun I</b> <b>5'...C/AATTG...3'</b> <b>Activity:</b> 8,000 to 10,000 units/ml. Supplied in 100 mM KCl, 10 mM Tris-HCl (pH 7.4), 1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U	
159455 -20°C	<b>Mwo I</b> <b>5'...GCNNNNN/NNGC...3'</b> From <i>Methanobacterium wolfeii</i> <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 100 mM NaCl, 50 mM Tris-HCl (pH 7.6), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	250 U	
153819 -20°C	<b>Nae I</b> <b>5'...GCC/GGC...3'</b> Isolated from <i>Nocardia aerocolonigenes</i> (ATCC 23870) <b>Activity:</b> 4,000 to 12,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <i>Nae I</i> exhibits marked different cleavage rates for different DNA sequences surrounding the recognition site. <b>Ref.:</b> Wilson, G., Comb, D., Greenough, L. and Schildkraut, I., unpublished observations.	200 U 1 KU	
153820 -20°C	<b>Nar I</b> <b>5'...GG/CGCC...3'</b> [93586-00-6] Isolated from <i>Nocardia argentinensis</i> (ATCC 31306). <b>Activity:</b> 2,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Similar to <i>Nae I</i> , <i>Nar I</i> exhibits marked different cleavage rates for different sites depending on the surrounding DNA sequences. Sensitive to high concentrations of salt (NaCl > 80 mM). Unstable during incubation at 37°C. <b>Ref.:</b> Comb, D., Wilson, G., Schildkraut, I. and Greenough, L., unpublished observations.	200 U 1 KU	
151733 -20°C	<b>Nci I</b> <b>5'...CC/(C)GG...3'</b> [95076-97-4] From <i>Neisseria cinerea</i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 2,000 to 10,000 units/ml <b>Ref.:</b> Recognition sequence from: Watson, R., Zuker, M., Martin, S.M. and Visentin, L.P., (1980), <i>FEBS Letters</i> , <b>118</b> , 47-50.	2 KU 10 KU	
151734 -20°C	<b>Nco I</b> <b>5'...C/CATGG...3'</b> [107824-63-5] From <i>Nocardia corallina</i> Solution in 50% glycerol containing Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 2,000 to 20,000 units/ml <b>Ref.:</b> Recognition sequence from: Langdale, J.A., Myers, P.A. and Roberts, R.J. unpublished observations.	1 KU 5 KU	
151735 -20°C	<b>Nde I</b> <b>5'...CA/TATG...3'</b> [84628-87-5] From <i>Neisseria denitrificans</i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 3,000 to 20,000 units/ml <b>Ref.:</b> Watson, R.J., Schildkraut, I., Qiang, B.Q., Martin, S.M., and Visentin, L.P., (1982), <i>FEBS Letters</i> , <b>150</b> , 114-116.	4 KU 20 KU	
153821 -20°C	<b>Nhe I</b> <b>5'...G/CTAGC...3'</b> [92228-45-0] Isolated from <i>Neisseria mucosa</i> subsp. <i>heidelbergensis</i> (ATCC 25999) <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Cleaves to produce a 5' CTAG extension which is readily ligated to DNA fragments generated by <i>Avr II</i> , <i>Spe I</i> , and <i>Xba I</i> . <b>Ref.:</b> Comb, D., Grandoni, R. and Schildkraut, I., unpublished observations.	500 U	

Molecular Biology



# Restriction Enzymes

CATALOG  
NUMBER

**Nla III** 500 U  
 159456  
 -20°C 5'...CATG/...3'  
 From *Neisseria lactamica*  
**Activity:** 4,000 to 20,000 units/ml.  
 Supplied in 200 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.  
 MW 312.4

**Nla IV** 200 U  
 159457  
 -20°C 5'...GGN/NCC...3'  
 From *Neisseria lactamica*  
**Activity:** 4,000 to 20,000 units/ml.  
 Supplied in 150 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

**Not I** 500 U  
 153836  
 -20°C 5'...GC/GGCCGC...3'  
 [103780-20-7]  
 Isolated from *Nocardia otitidis-caviarum* (ATCC14630)  
**Activity:** 2,000 to 20,000 units/ml.  
 Supplied in 200 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM DTT, 0.15% Triton X-100, 200 µg/ml bovine serum albumin and 50% glycerol.  
*Not I* and *Sfi* are the only two known 8-base recognizing restriction endonucleases.  
**Ref.:** Borsetti, R., Wise, D. and Schildkraut, L. unpublished observations. Schildkraut, I., Wise, D., Borsetti, R., and Qiang, B.-Q., unpublished observations.

**Nru I** 1 KU  
 151776  
 -20°C 5'...TCG/CGA...3'  
 [92228-46-1]  
 From *Nocardia rubra*  
 Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin.  
**Activity:** 5,000 to 50,000 units/ml.  
**Ref.:** Recognition and cleavage site from: Schildkraut, I. and Greenough, L. unpublished observations.

**Nsi I** 1 KU  
 153822  
 -20°C 5'...ATGCA/T...3'  
 [122097-02-3]  
 Isolated from *Neisseria sicca* (ATCC 29256)  
**Activity:** 4,000 to 20,000 units/ml.  
 Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. This enzyme is an isoschizomer of *Ava III*.  
**Ref.:** Schildkraut, I., Jones, G., Parker, P., Grandoni, R. and Comb, D., unpublished observations.

**Pac I** 100 U  
 159458  
 -20°C 5'...TTAAT/TAA...3'  
 From *Pseudomonas alcaligenes*  
**Activity:** 1,000 to 5,000 units/ml.  
 Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

CATALOG  
NUMBER

**PaeR7 I** 2 KU  
 151797  
 -20°C 5'...CTCGAG...3'  
 [84522-61-2]  
 From *Pseudomonas aeruginosa*  
 Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml serum albumin.  
**Activity:** 2,000 to 40,000 units/ml.  
**Ref.:** Recognition Sequence from: Gingeras, T.R. and Brooks, J., (1983), Nat'l. Acad. Sci. USA, **80**, 402-406.

**Pflm I** 200 U  
 159459  
 -20°C 5'...CCANNNN/NTGG...3'  
 From *Pseudomonas fluorescens*  
**Activity:** 4,000 to 20,000 units/ml.  
 Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

**Pme I** 100 U  
 159460  
 -20°C 5'F128é...GTTT/AAAC...3'  
 From *Pseudomonas medicina*  
**Activity:** 4,000 to 20,000 units/ml.  
 Supplied in 100 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

**Pml I** 200 U  
 159461  
 -20°C 5'...CAC/GTG...3'  
 From *Pseudomonas maltophilia*  
**Activity:** 4,000 to 20,000 units/ml.  
 Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 10 mM MgCl<sub>2</sub>, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

**Ppum I** 100 U  
 159463  
 -20°C 5'...PuG/G(1)CCPy...3'  
 From *Pseudomonas putida* sp.  
**Activity:** 1000 to 5,000 units/ml.  
 Supplied in 100 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.

**Pst I** 10 KU  
 153837  
 -20°C 5'...CTGCA/G...3'  
 [81295-32-1]  
 Source: *Providencia stuartii*  
**Activity:** 5,000 to 40,000 units/ml  
 Storage buffer: 10 mM Tris-HCl, pH 7.5, 100 mM NaCl, 0.1 mM EDTA, 1 mM dithiothreitol, 0.15% (v/v) Triton x-100, 50% (v/v) glycerol.  
**Ref.:** 1. Smith, D.I., Blattner, F.R., and Davies, J., (1976), Nucleic Acids Res., **3**, 343-353.

**Pst I METHYLASE** 100 U  
 159464  
 -20°C 5'...C-(CH<sub>3</sub>)CGG...3'  
 From *Providencia stuartii*  
**Activity:** 1,000 to 5,000 units/ml.  
 Supplied in 50 mM KCl, 50 mM Tris-HCl (pH 7.5), 10 mM EDTA, 10 mM mercaptoethanol, 200 µg/ml acetylated BSA, and 50% glycerol.

# Restriction Enzymes



CATALOG NUMBER		CATALOG NUMBER	
151978 -20°C	<b>Pvu I</b> <b>5'...CGAT/CG...3'</b> [81295-33-2] From <i>Proteus vulgaris</i> <b>Activity:</b> 1,000 to 10,000 units/ml. Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Ref.:</b> Recognition and Cleavage Sequence from: Gingeras, T.R., Greenough, L., Schildkraut, I. and Roberts R.J., (1981), <i>Nucleic Acids Res.</i> , <b>9</b> , 4525-4536.	100 U 500 U	
151979 -20°C	<b>Pvu II</b> <b>5'...CAG/CTG...3'</b> [81295-34-3] From <i>Proteus vulgaris</i> <b>Activity:</b> 2,000 to 15,000 units/ml. Solution in 50% glycerol containing 5 mM KPO <sub>4</sub> (pH 7.0), 0.05 mM EDTA, 5 mM 2-mercaptoethanol, 100 µg/ml bovine serum albumin. <b>Ref.:</b> Recognition and Cleavage Sequence from: Gingeras, T.A., Greenough, L., Schildkraut, I. and Roberts, R.J., (1981), <i>Nucleic Acids Res.</i> , <b>9</b> , 4525-4536.	5 KU 25 KU	
152035 -20°C	<b>Rsa I</b> <b>5'...GT/AC...3'</b> [80449-06-5] From <i>Rhodopseudomonas sphaerioides</i> <b>Activity:</b> 5,000 to 40,000 units/ml. Solution in 50% glycerol containing 10 mM Tris-HCl, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Ref.:</b> Recognition Sequence from Lynn, S.P., Cohen, L.K., Kaplan, S. and Gardner, J.F., (1980), <i>J. Bacteriol.</i> , <b>142</b> , 380-383.	1 KU 5 KU	
153823 -20°C	<b>Rsr II</b> <b>5'...CG/G↓CCG...3'</b> [93229-62-0] Isolated from <i>Rhodopseudomonas sphaeroides</i> (S. Kaplan). <b>Activity:</b> 500 to 5,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Sensitive to NaCl concentrations higher than 50 mM. <b>Ref.:</b> O'Connor, C.D., Metcalf, E., Wrighton, C.J., Harris, T.J.R. and Saunders, J.R., (1984), <i>Nucleic Acids Res.</i> , <b>12</b> , 6701-6708.	100 U 500 U	
151450 0°C	<b>Sac I</b> <b>5'...GAGCT/C...3'</b> [81295-35-4] From <i>Streptomyces achromogenes</i> <b>Activity:</b> 2,000 to 20,000 units/ml. Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Ref.:</b> Recognition sequence from: Arrand, J.R., Myers, P.A. and Roberts, R.J., unpublished observations.	1 KU 5 KU	
153824 -20°C	<b>Sac II</b> <b>5'...CCGC/GG...3'</b> [81295-36-5] Isolated from <i>Streptomyces achromogenes</i> (ATCC 12767) <b>Activity:</b> 2,000 to 30,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Purified free of Sac I and III. Sac II is an isoschizomer of <i>Sst II</i> . Sensitive to NaCl concentrations higher than 50 mM. Sac II exhibits very different cleavage rates for different sites depending on the surrounding DNA sequences. <b>Ref.:</b> Arrand, J.R., Myers, P.A. and Roberts, R.J., unpublished observations.	2 KU 10 KU	
152041 -20°C	<b>Sal I</b> <b>5'...G/TCGAC...3'</b> [81295-38-7] From <i>Streptomyces albus</i> Solution in 50% glycerol containing 5 mM KPO <sub>4</sub> pH 7.4, 0.1 mM EDTA, 50 mM KCl, 5 mM 2-mercaptoethanol, 500 µg/ml bovine serum albumin. <b>Activity:</b> 2,000 to 20,000 units/ml <b>Ref.:</b> Arrand, J.R., et al., <i>J. Mol. Biol.</i> , <b>118</b> , 127 (1979).	2 KU 10 KU	
159465 -20°C	<b>Sap I</b> <b>5'...GCTCTC(N)<sub>1</sub>...3'</b> From <i>Saccharopolyspora species</i> <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 150 mM NaCl, 10 mM Tris-HCl (pH 7.5), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	25 U	
153838 -20°C	<b>Sau3A I</b> <b>5'...N/GATC...3'</b> [81725-92-0] Source: <i>Staphylococcus aureus</i> 3A Storage Buffer: 10 mM Tris-HCl, pH 7.5, 50 mM KCl, 0.1 mM EDTA, 1.0 mM dithiothreitol, 250 µg/ml bovine serum albumin, 50% (v/v) glycerol. <b>Ref.:</b> 1. Sussenbach, J.S., Monofoort, C.H., Schiphof, R. and Stobbering, E.E., (1976), <i>Nucleic Acids Res.</i> , <b>3</b> , 3193-3202.	200 U 1 KU	
153825 -20°C	<b>Sau96 I</b> <b>5'...G/GNCC...3'</b> [81811-57-6] Isolated from <i>Staphylococcus aureus</i> PS96 (E. E. Stobberingh). <b>Activity:</b> 5,000 to 15,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. This enzyme is an isoschizomer of <i>Asu I</i> . <i>Sau96 I</i> is inhibited by overlapping <i>dcm</i> methylation. <b>Ref.:</b> Sussenbach J.S., Steenberg, P.H., Rost, J.A., van Leeuwen, W.J. and van Embden, J.D. A., (1978), <i>Nucleic Acids Res.</i> , <b>5</b> , 1153-1163.	1 KU 5 KU	



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152048 -20°C	<b>Sca I</b> 5'...AGT/ACT...3' [95329-12-7] From <i>Streptomyces caespitosus</i> Solution in 50% glycerol containing 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 1,000 to 8,000 units/ml <b>Ref.:</b> Kojima, H., Takahashi, H., and Saito, H., unpublished observations.	1 KU 5 KU
152051 -20°C	<b>Scr F I</b> 5'...CC/NGG...3' [85537-83-3] From <i>Streptococcus cremoris</i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 1,000 to 10,000 units/ml <b>Ref.:</b> Recognition sequence from: Fitzgerald, G.F., Daly, C., Brown, L.R. and Gingeras, T.R., (1982), <i>Nucleic Acids Res.</i> , <b>10</b> , 8171-8179.	1 KU 5 KU
159466 -20°C	<b>Sfa N I</b> 5'...GCATC(N) <sub>5</sub> /...3' From <i>Streptococcus faecalis</i> <b>Activity:</b> 500 to 2,000 units/ml. Supplied in 250 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	20 U 100 U
159467 -20°C	<b>Sfc I</b> 5'...C/TPuPyAG...3' From <i>Streptococcus faecium</i> <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 150 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 400 µg/ml acetylated BSA, and 50% glycerol.	50 U 250 U
153839 -20°C	<b>Sfi I</b> 5'...GGCCNNNN/NGGCC...3' [91930-79-9] Source: <i>Streptomyces fimbriatus</i> <b>Activity:</b> 2,000 to 10,000 units/ml. Storage buffer: 10 mM Tris-HCl, pH 7.5, 50 mM KCl, 0.1 mM EDTA, 1 mM Dithiothreitol, 200 µg/ml bovine serum albumin, 50% (v/v) glycerol. <b>Ref.:</b> 1. Qiang, B.-Q. and Schildkraut, I., (1984), <i>Nucleic Acids Res.</i> , <b>12</b> , 4507-4515.	2 KU 10 KU
159468 -20°C	<b>Sin I</b> 5'...G/G <sup>A</sup> CC...3' From <i>Salmonella infantis</i> <b>Activity:</b> 8,000 to 12,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU
152059 -20°C	<b>Sma I</b> 5'...CCC/GGG...3' [82391-42-2] From <i>Serratia marcescens</i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin <b>Activity:</b> 5,000 to 20,000 units/ml <b>Ref.:</b> Recognition Sequence from: Endow, S.A., and Roberts, R.J., (1977), <i>J. Mol. Biol.</i> , <b>112</b> , 521-529.	2 KU 10 KU

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153827 -20°C	<b>Sna B I</b> 5'...TAC/GTA...3' [103780-21-8] Isolated from <i>Sphaerotilus natans</i> (ATCC 15291). <b>Activity:</b> 2,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Sensitive to NaCl concentrations higher than 100 mM. <b>Ref.:</b> Borsetti, R., Grandoni, R. and Schildkraut, I., unpublished observations.	100 U 500 U
153828 -20°C	<b>Spe I</b> 5'...A/CTAGT...3' [115926-60-8] Isolated from <i>Sphaerotilus species</i> (ATCC 13923) <b>Activity:</b> 1,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Cleaves to produce a 5' CTAG extension which can be readily ligated to DNA fragments generated by <i>Avr II</i> , <i>Nhe I</i> , or <i>Xba I</i> . <b>Ref.:</b> Comb, D. and Grandoni, R., unpublished observations.	200 U 1 KU
152071 -20°C	<b>Sph I</b> 5'...GCATG/C...3' [85270-15-1] From <i>Streptomyces phaeochromogenes</i> Solution in 50% glycerol containing 10 mM Tris-HCl pH 7.4, 0.1 mM EDTA, 50 mM KCl, 1.0 mM dithiothreitol, 200 µg/ml bovine serum albumin. <b>Activity:</b> 1,000 to 4,000 units/ml <b>Ref.:</b> Recognition Sequence from: Fuchs, L.Y., Covarrubias, L., Escalante, L., Sanchez, S. and Bolivar, F., (1980), <i>Gene</i> , <b>10</b> , 39-46.	100 U 500 U
153829 -20°C	<b>Ssp I</b> 5'...AAT/ATT...3' Isolated from <i>Sphaerotilus species</i> (ATCC 13925) <b>Activity:</b> 2,000 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <i>Ssp I</i> , <i>Ase I</i> , <i>Dra I</i> ( <i>Aha III</i> ) and <i>Mse I</i> are the only known restriction endonucleases that recognize pure AT containing sequences. <b>Ref.:</b> Schildkraut, I. and Grandoni, R., unpublished observations.	200 U 500 U 1 KU
153830 -20°C	<b>Stu I</b> 5'...AGG/CCT...3' [84788-83-0] Isolated from <i>Streptomyces tubercidicus</i> (H. Takahashi) <b>Activity:</b> 4,000 to 25,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Inhibited by overlapping <i>dcm</i> methylation. <b>Ref.:</b> Shimotsu, H., Takahashi, H. and Salto, H., (1980), <i>Gene</i> , <b>11</b> , 219-225.	1 KU 5 KU

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153831 -20°C	<b>Sty I</b> 5'...C/C <sup>AA</sup> <sub>TT</sub> GG...3' [96880-98-7] Isolated from <i>Salmonella typhi</i> 27 (E.S. Anderson) <b>Activity:</b> 5,000 to 30,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <b>Ref.:</b> Mise, K. and Nakajima, K., (1985), <i>Gene</i> , <b>33</b> , 357-361. Mise, K., unpublished observations.	3 KU 15 KU	
152095 -20°C	<b>Taq I</b> 5'...T/CGA...3' From an <i>E.coli</i> strain that carries a <i>Taq I</i> overproducing plasmid pFBLT88 Solution in 50% glycerol containing 300 mM KCl, 10 mM Tris-HCl, pH 7.5, 1 mM EDTA, 1 mM DTT, 500 µg/ml BSA. <b>Activity:</b> 5,000 to 50,000 units/ml <b>Ref.:</b> Recognition sequence from: Sato, S., Hutchison, C.A. III and Harris, J.I., (1977), <i>Proc. Natl. Acad. Sci. USA</i> , <b>74</b> , 542-546.	4 KU 20 KU	
159469 -20°C	<b>Taq I METHYLASE</b> 5'...T/CGA-(CH <sub>3</sub> )...3' From <i>Thermus aquaticus</i> <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 100 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	1 KU 5 KU	
159470 -20°C	<b>Tfi I</b> 5'...G/A <sup>A</sup> <sub>T</sub> TC...3' From <i>Thermus filiformis</i> <b>Activity:</b> 1,000 to 5,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U	
159471 -20°C	<b>Tru9 I</b> 5'...T/TAA...3' From <i>Thermus ruber</i> 9 <b>Activity:</b> 8,000 to 12,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 500 µg/ml acetylated BSA, and 50% glycerol.	200 U 1 KU	
159472 -20°C	<b>Tsp509 I</b> 5'.../AATT...3' From <i>Thermus</i> species <b>Activity:</b> 4,000 to 20,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U	
153832 -20°C	<b>Tth 111 I</b> 5'...GACN/NGTC...3' Isolated from the thermophile <i>Thermus thermophilus</i> 111 (T. Oshima). <b>Activity:</b> 2,000 to 20,000 units/ml. Supplied in 200 mM KCl, 10 mM Tris-HCl (pH 7.8), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Purified free of <i>Tth</i> 111 II. Ligation can be improved after filling in the extensions with Klenow Fragment. <b>Ref.:</b> Shinomiya, T. and Sato, S., (1980), <i>Nucleic Acids Res.</i> , <b>8</b> , 43-56.	400 U 1 KU	
197010 -20°C	<b>Xba I</b> 5'...T/CTAGA...3' [81295-42-3] From <i>Xanthomonas badrii</i> <b>Activity:</b> 5,000-20,000 units/ml. Supplied in 50 mM NaCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200µg/ml acetylated BSA, and 50% glycerol.	3 KU 15 KU	
159473 -20°C	<b>Xcm I</b> 5'...CCANNNNN/NNNTGG...3' From an <i>E. coli</i> strain carrying a plasmid sequence from <i>Xanthomonas campestris</i> <b>Activity:</b> 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml acetylated BSA, and 50% glycerol.	100 U 500 U	
153840 -20°C	<b>Xho I</b> 5'...C/TCGAG...3' [81295-43-4] Source: <i>Xanthomonas holicola</i> . Storage Buffer: 20 mM Tris-HCl, pH 7.5, 50 mM KCl, 0.1 mM EDTA, 1.0 mM dithiothreitol, 100 µg/ml bovine serum albumin, 50% (v/v) glycerol. <b>Ref.:</b> 1. Gingeras, J.R., Myers, P.A., Olson, J.A., Hanberg, F.A., Roberts, R.J., (1978), <i>J. Mol. Biol.</i> , <b>118</b> , 113-122.	4 KU 20 KU	
153833 -20°C	<b>Xho II</b> 5'...Pu/GATCPy...3' Isolated from <i>Xanthomonas holicola</i> (ATCC 13461). <b>Activity:</b> 500 to 10,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-Hcl (pH 7.4), 0.1 mM EDTA, 10 mM 2-mercaptoethanol, 0.01% Triton X-100, 200 µg/ml bovine serum albumin, and 50% glycerol. A trace of <i>Xho</i> I cleavage may be detected upon overdigestion of <i>Xho</i> II. Cleaves the hybrid site generated by ligating between <i>Bam</i> H I and <i>Bgl</i> II digested DNA fragments. The hybrid site is resistant to cleavage by either <i>Bam</i> H I or <i>Bgl</i> II. <b>Ref.:</b> Olson, J.A., Myers, P.A. and Roberts, R.J., unpublished observations. Kramarov, V.M., Masanov, A.L. and Smolyaninov, V. V., (1982), <i>Bioorg. Khim.</i> , <b>8</b> , 220-223. Gingeras, T.R. and Roberts, R.J., unpublished observations.	100 U 500 U	
153834 -20°C	<b>Xma I</b> 5'...C/CCGGG...3' [81295-45-6] Isolated from <i>Xanthomonas malvacearum</i> (ATCC 9924). <b>Activity:</b> 500 to 5,000 units/ml. Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. <b>Ref.:</b> Endow, S.A. and Roberts, R.J., (1977), <i>J. Mol. Biol.</i> , <b>112</b> , 521-529.	50 U 250 U	
159474 -20°C	<b>Xma III</b> 5'...C/GGCCG...3' <b>Activity:</b> 5,000 to 20,000 units/ml. Supplied in 100 KCl, 20 mM Tris-HCl (pH 7.6), 0.1 mM EDTA, 10 mM β-mercaptoethanol, 500 µg/ml acetylated BSA, and 50% glycerol.	500 U	



# DNA and Nucleic Acid Modifying Enzymes

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**Xmn I** 600 U  
153835 -20°C 3 KU  
5'...GAANN/NTTC...3'  
Isolated from *Xanthomonas manihotis* 7AS1 (B.-C. Lin).  
**Activity:** 2,000 to 20,000 units/ml.  
Supplied in 50 mM KCl, 10 mM Tris-HCl (pH 7.4), 0.1 mM EDTA, 1 mM dithiothreitol, 200 µg/ml bovine serum albumin and 50% glycerol. Sensitive to NaCl concentrations higher than 80 mM.  
**Ref.:** Lin, B.-C., Chien, M.-C. and Lou, S.-Y., (1980), *Nucleic Acids Res.*, **8**, 6189-6198. Qiang, B.-Q. and Schildkraut, I., unpublished observations.

## DNA AND NUCLEIC ACID MODIFYING ENZYMES

**DNA-GYRASE** 100 U  
151004 -20°C 250 U  
(Topoisomerase II, Supercoiling Enzyme)  
Purified from *Micrococcus luteus* cells.  
Introduces negative superhelical turns into covalently closed DNA by double-stranded breakage and rejoining of phosphodiester bonds. Can catenate and decatenate, and provides a rapid and convenient method for supercoiling closed duplex DNAs such as plasmids.  
**Unit Definition:** One unit catalyzes the conversion of 0.5 µg relaxed pBR322 DNA to a supercoiled state in 30 min. at 37°C.  
Concentration: 5-15 units/µl in 100mM Tris HCl (pH 7.5), 20mM 2-mercaptoethanol, 1mg/ml BSA, 20% (v/v) glycerol.  
**Ref.:** 1.)Klevan, L and Wang,J.C., *Biochemistry*, **19**, 5229 (1980).  
2.) Gellert, M., *Ann. Rev. Biochem.*, **50**, 879 (1981).

**DNA LIGASE** 100 U  
151005 -20°C 500 U  
[9015-85-4]  
From T4-infected *E. coli*  
T4 DNA Ligase catalyzes the joining of two strands of DNA between the 5'-phosphate and 3'-hydroxyl groups of adjacent nucleotides. It has been shown to join RNA to either DNA or RNA in a duplex molecule, but not single-stranded nucleic acids.  
**Unit Definition:** One unit (Weiss) is the amount of enzyme that catalyzes the exchange of 1 nmole of <sup>32</sup>P from pyrophosphate into α,β-<sup>32</sup>P-ATP in 20 minutes at 37°C.  
**Storage Buffer:** 10 mM Tris-HCl, pH 7.4, 50 mM KCl, 0.1 mM EDTA, 1mM DTT, 50% glycerol.

**DNA LIGASE** 200 U  
152278 -20°C 1 KU  
[9015-85-4]  
From T4 infected *E. coli*  
T4 DNA Ligase catalyzes the formation of phosphodiester bonds between adjacent 5'-phosphoryl and 3'-hydroxyl groups in duplex DNA with concomitant cleavage of ATP to AMP with pyrophosphate. Unlike the *E. coli* DNA Ligase, this enzyme catalyzes the joining of duplex DNA molecules at blunt ends, as well as, sealing single-strand nicks in duplex DNA, and also covalently joining DNA fragments with complementary cohesive ends.  
**Unit Definition:** One unit is defined as the amount of enzyme required to convert 1 nmole of <sup>32</sup>P from pyrophosphate into Nori-adsorbable form in 20 min. at 37°C  
Supplied in a solution of 10 mM Tris-HCl, pH 7.5, 50 mM KCl, 1 mM DTT, 50% glycerol  
**Ref.:** (1) Weiss, B., et al., *J. Biol. Chem.* **243**, 4543-4555; (2) Pfeiffer, B.H., Zimmerman, S.B., *Nucleic Acid Res.*, **14**, 7853 (1983).

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**DNA LIGASE** 10 µg  
151006 -20°C 25 µg  
[9015-85-4]  
From *E. coli*  
*E. coli* DNA Ligase catalyzes the formation of a phosphodiester bond between duplex fragments with cohesive ends.  
**Unit Definition:** One unit is defined as the amount of enzyme required to yield 50% ligation of Hind III fragments of λ DNA in 30 min. at 16°C in 20 µl of our assay mixture (30 mM Tris-HCl, pH 8.0, 4mM MgCl<sub>2</sub>, 1.2 mM EDTA, 1.0 mM DTT, 0.026 mM NAD<sup>+</sup>, 0.05 mg/ml BSA, and Hind III fragments of λ DNA, incubated at 16°C for 30 min.) with a DNA terminus concentration of 0.024 µM (56 µg/ml).  
Supplied in a solution of 10 mM Tris-HCl, pH 7.4, 50 mM KCl, 0.1 mM EDTA, 10 mM Ammonium Sulfate, 1.0 mM DTT, 50% glycerol  
**Ref.:** (1) Okayama, H., Berg, P., *Mol. Cell. Biol.*, **2**, 161 (1982); (2) Gubler, U., Hoffman, B.J., *Gene*, **25**, 263 (1983).

**DNA POLYMERASE** 100 U  
151007 -20°C 500 U  
[9012-90-2]  
From T4-infected *E. coli*  
Catalyzes the 5'-3'synthesis of DNA, by a single-strand DNA template. Also useful to label 3'-end duplex DNA. Also has been used in place of nick translation for labeling DNA probes.  
**Unit Definition:** One unit catalyzes the incorporation of 10 nmole of total nucleotide into acid insoluble product in 30 minutes at 37°C.  
**Storage Buffer:** 0.2 M Potassium phosphate, pH 6.5, 2 mM DTT, 50% glycerol

**DNA POLYMERASE I** 100 U  
151008 -20°C 250 U  
[9012-90-2]  
From *E. coli*.  
**Unit Definition:** One unit is defined as the amount of enzyme required to incorporate 10 nmoles of deoxyribonucleotide into acid-insoluble material in 30 minutes at 37°C with DNase I-activated DNA as the template-primer.  
Supplied in a solution of 50 mM potassium phosphate, pH 7.0, 0.025 mM DTT, and 50% glycerol.  
**Ref.:** (1) Lehman, I.R., *The Enzymes*, **14**, 15-37 (1981); (2) Rigby, D.W.J., et al., *J. Mol. Biol.*, **113**, 237-251 (1977).

**DNA POLYMERASE I Klenow Fragment** 100 U  
151009 -20°C 500 U  
[9012-90-2]  
Klenow fragment, from *E. coli*.  
This enzyme is prepared from subtilisin treated DNA Polymerase I. This 75,000 Dalton Klenow fragment retains both the polymerase and 3'-exonuclease activities of DNA Polymerase I, but does lack the 5'-exonuclease activity.  
**Unit Definition:** 1 unit is defined as the amount of enzyme required to incorporate 10 nmole of total nucleotide into acid-soluble form in 30 min., at 37°C.  
Supplied in 50 mM potassium phosphate buffer, pH 7.5, 0.025 mM DTT, 50% glycerol  
**Ref.:** (1) Klenow, H., Henningsen, I., *Proc. Natl. Acad. Sci.*, **65**, 168 (1970); (2) Richardson, C.C., Schildkraut, C.L., et al., *J. Biol. Chem.*, **239**, 222 (1964).



# RNA Modifying Enzymes



CATALOG  
NUMBER

**151935** **POLYNUCLEOTIDE KINASE** 500 U  
-20°C [37211-65-7] 1 KU  
From T<sub>4</sub> infected *E. coli* 3 KU  
T<sub>4</sub> Polynucleotide Kinase catalyzes the transfer of the  $\gamma$ -phosphate of ATP to a 5'-OH terminus in DNA or RNA.  
**Unit Definition:** One unit is defined as the amount of enzyme required to transfer one nmole of  $\gamma$ -phosphate from ATP to the 5'-OH terminus of salmon sperm DNA fragments in 30 minutes, at 37°C.  
Supplied in a solution of 50 mM Tris-HCl, pH 7.6, 25 mM KCl, 1 mM DTT, 0.1  $\mu$ M ATP, 0.1 mM EDTA, and 50% glycerol.  
**Ref.:** (1) Richardson, C.C., Prog. in Nuc. Acid. Res. and Mol. Biol., **2**, 815 (1971); (2) Donis-Keller, H., Nuc. Acids. Res., **8**, 3133 (1980).  
Caution: Kinase activity is inhibited by phosphate and ammonium ions.

**800708** **POLYNUCLEOTIDE KINASE, T<sub>4</sub>** 500 U  
From T<sub>4</sub> infected *E. coli*  
T<sub>4</sub> Polynucleotide Kinase catalyzes the transfer of the  $\gamma$ -phosphate of ATP to the 5'-hydroxy terminus of polynucleotides (DNA and RNA). T<sub>4</sub> PNK is useful for 5'-end-labelling of nucleic acids with <sup>32</sup>P prior to sequencing. It is also used to phosphorylate synthetic linkers and fragments of DNA or RNA prior to ligation. The kinase also possesses a 3'-phosphatase activity.  
**Unit Definition:** One unit will transfer one nmol of  $\gamma$ -phosphate from ATP to the 5'-hydroxy termini of DNA (salmon sperm) fragments in 30 minutes at 37°C.  
Shipping & Storage: Solution in 50 mM Tris-HCl, pH 7.6, 25 mM KCl, 1 mM DTT, 0.1  $\mu$ M ATP, 0.1 mM EDTA and 50% glycerol. Shipped on dry ice.

## REVERSE TRANSCRIPTASE

### From Avian Myeloblastosis Virus

Approx. 30,000 units/ml  
**Unit Definition:** One unit is the amount required to incorporate 1 nmol of [<sup>3</sup>H]-TMP into nucleic acid product in 10 minutes at 37°C.  
Solution: 0.2 M potassium phosphate, pH 7.2, 2.0 mM DTT, 0.2% Triton X-100 and 50% glycerol  
**Synthetic Activity:** Globin mRNA at least 95% of cDNA product made in 5 minutes at 37°C was determined to be full length.  
This product is free of nonspecific nucleases and no acid soluble RNA fragments are formed after incubation of 40 units of Reverse Transcriptase with 1.0  $\mu$ gm of [<sup>3</sup>H]-RNA for 60 minutes at 37°C.

**855928** 500 U  
**855929** 1 KU

## REVERSE TRANSCRIPTASE

### From Moloney Murine Leukemia Virus

Murine Reverse Transcriptase is an RNA-dependent DNA polymerase that synthesizes a complementary DNA strand from single-stranded RNA or DNA in the presence of a primer. This enzyme is multifunctional, containing both reverse transcriptase and RNase H activities (similar to AMV reverse transcriptase).  
**Unit Definition:** One unit is the amount of enzyme required to incorporate 1 nmol of labeled dATP into acid-insoluble material in 10 min at 37°C.  
Supplied in a 50 mM Tris-HCl buffer, pH 8.0, 1 mM EDTA, 5 mM dithiothreitol, 0.1% nonidet P-40, 0.1mM NaCl and 50% glycerol.  
**Ref.:** Roth, M.J., Tanese, N., and Goff, S.P., J. Biol. Chem., **260**, 9326-9335 (1985).

**152020** 500 U  
-70°C 1 KU

CATALOG  
NUMBER

**152098** **TERMINAL DEOXYNUCLEOTIDYL TRANSFERASE** 100 U  
0°C (TDT; Terminal Transferase) 500 U  
From Calf Thymus  
**Unit Definition:** One unit equals the amount of enzyme that incorporates 1 nmole of deoxyadenylic acid into polymer in 1 hour, pH 7.0 at 37°C  
**Activity:**  $\geq$ 10 units/ $\mu$ l  
**Caution:** This enzyme may lose activity during incubation in low protein concentration solutions. We, therefore, recommend a minimum of 10 mg/ml protein concentration.  
**Ref.:** (1) Bollum, F.J., J. Biol. Chem. **237**, 1945-1949 (1962).

**152311** **TOPOISOMERASE I** 200 U  
-20°C (DNA Relaxing Enzyme) 500 U  
From Calf Thymus  
Relaxes both negatively and positively supercoiled DNA, catenates and decatenates nicked duplex DNA rings.  
**Unit Definition:** One unit catalyzes conversion of 0.5  $\mu$ g superhelical  $\phi$ x174 RF DNA to the relaxed state in 30 min. at 37°C  
**Concentration:** 5-15 units/ $\mu$ l in 30 mM KPO<sub>4</sub> (pH 7.0), 5 mM DTT, 0.1 mM Na<sub>2</sub> EDTA, 0.1 mM BSA, 0.1% Triton X-100, 50% (v/v) glycerol.  
**Ref.:** 1.) Gellert, M., *Ann. Rev. Biochem.*, **50**, 879 (1981). 2.) Wang, J.C. and Liu, L.F., in *Molecular Genetics* part III, p. 82, Academic Press (1979).  
Also see DNA Gyrase

## TOPOISOMERASE II

See DNA Gyrase

## RNA MODIFYING ENZYMES

**101075** **RIBONUCLEASE** 100 mg  
0°C [9001-99-4] 1 g  
From Beef Pancreas 5 g  
E.C. 2.7.7.16  
Lyophilized powder, salt-free, protease-free  
Prepared from 5X cryst material  
**Activity:**  $\sim$ 70 units/mg material  
**Unit Definition:** One unit causes the hydrolysis of RNA at a rate such that the velocity constant (k) equals 1 at 25°C and pH 5.0

**152024** **RIBONUCLEASE** 50 mg  
0°C [9001-99-4] 100 mg  
From Bovine Pancreas 1 g  
E.C.2.7.7.16  
Lyophilized powder, salt-free, protease-free  
Prepared from chromatographically homogeneous Ribonuclease A.  
**Activity:**  $\sim$ 90 units/mg material  
**Unit Definition:** Same as Ribonuclease 101075

**101076** **RIBONUCLEASE A** 100 mg  
0°C [9001-99-4] 250 mg  
From Beef Pancreas 1 g  
Prepared from aggregate-free RNase; Lyophilized;  
**Activity:** 50 Kunitz units/mg.  
Free of phosphate and protease; any aggregates can be converted to monomers.  
**Ref.:** J. Biol. Chem., **240**, 3868 (1965).