

## 5' DNA Adenylation Kit



E2610S 001130415041

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10 reactions Lot: 0011304

RECOMBINANT Store at -20°C Exp: 4/15

**Description:** The 5' DNA adenylation Kit is a simple and efficient enzymatic method for generating 5'-adenylated DNA. The kit is optimized to produce the adenylated DNA with or without 3'-terminator. The 5' DNA adenylation kit routinely generates greater than 95% conversion of pDNA to AppDNA (1). This highly efficient process eliminates the need for gel isolation of the product and increases overall yield.



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**Source:** *Mth* RNA Ligase is purified from an *E. coli* strain carrying a plasmid encoding thermostable RNA ligase from *Methanobacterium thermoautotrophicum* (2).

### Advantages:

- One step reaction gives quantitative adenylation. Simpler than existing chemical and enzymatic methods.
- Reduces need for extensive purification of reaction product.
- 65°C reaction temperature reduces secondary structural concerns.
- Easily scalable from pmol to μmol range.

### Application:

- Enzymatic 5'-adenylation of single-stranded DNA linkers for next generation sequencing.

### Kit Components:

*Mth* RNA Ligase  
10X 5' DNA Adenylation Reaction Buffer  
1 mM ATP

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Supplied in: *Mth* RNA Ligase is supplied in 10 mM Tris-HCl (pH 7.5), 50 mM NaCl, 1 mM DTT, 0.1 mM EDTA and 50% glycerol.

### 1X 5' DNA Adenylation Reaction Buffer:

50 mM Sodium Acetate (pH 6.0 @ 25°C)  
10 mM MgCl<sub>2</sub>  
5 mM DTT  
0.1 mM EDTA  
Supplement with 0.1 mM ATP, Incubate at 65°C

### Protocol for Oligonucleotide Adenylation:

1. Set up the following reaction in a sterile microfuge tube:

COMPONENTS	VOLUME
Phosphorylated DNA Oligonucleotide	100 pmol (5 pmol/μl)
10X 5' DNA Adenylation Reaction Buffer	2 μl
1 mM ATP	2 μl
<i>Mth</i> RNA Ligase	2 μl (100 pmol)
Nuclease-free Water	to 20 μl

2. Incubate at 65°C for 1 hour
3. Inactivate the enzyme by incubation at 85°C for 5 minutes

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### Quality Control Assays

**RNase Assay:** A 10 μl reaction in 5' DNA Adenylation Reaction Buffer containing 40 ng of labeled RNA and 100 pmol of *Mth* RNA Ligase incubated at 37°C. After incubation for 4 hours, > 90% of the substrate RNA remains intact as determined by polyacrylamide electrophoresis.

**Exonuclease Activity:** Incubation of a 50 μl reaction containing 100 pmol of *Mth* RNA Ligase with 1 μg of a mixture of single and double-stranded <sup>3</sup>H *E. coli* DNA (200,000 cpm/μg) for 4 hours at 37°C released < 0.1% of the total radioactivity.

**Endonuclease Activity:** Incubation of a 50 μl reaction containing 100 pmol of *Mth* RNA Ligase with 1 μg φX174 RF I DNA for 4 hours at 37°C resulted in < 10% conversion to RFI as determined by agarose gel electrophoresis.

**Phosphatase Activity:** Incubation of 100 pmol of *Mth* RNA Ligase with 2.5 μmol *p*-nitrophenyl phosphate (PNPP) in 50 μl Reaction Buffer for 3 hours at 65°C released less than 0.05 μmol inorganic phosphate.

(see other side)

CERTIFICATE OF ANALYSIS

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**Usage Notes:**

- The adenylation reaction can be scaled up to 6X without a loss of efficiency, to a final concentration of 30 pmol of oligonucleotide and 30 pmol of *Mth* RNA Ligase per  $\mu$ l. The oligonucleotide can be purified by phenol extraction and alcohol precipitation or column chromatography to remove protein and ATP.
- For substrates with unprotected 3' termini increase concentration of ATP to 0.5 mM to prevent circularization and concatemerization.
- The low turnover of the enzyme requires an approximately equimolar concentration of the enzyme and the oligonucleotide substrate.
- Adenylated DNA linkers can be used for 3'-end ligation of RNA in cDNA library preparation for Next Generation sequencing protocols [3,4].

**References:**

1. Zhelkovsky, A.M. and McReynolds, L.A. (2011) *Nucl. Acids Res.* 39(17): e117.
2. Torchia, C., Takagi, Y. and Ho, C.K. (2008) *Nucleic Acids Res.*, 36, 6218–6227.
3. Hafner, M. et al. (2008) *Methods*, 44, 3–12.
4. Vigneault, F., Sismour, A.M. and Church, G.M. (2008) *Nature Methods*, 5, 777–779.

Patent Pending

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