百 时 美
BestEnzymes

PRODUCT FOR BIOPHARMA

—— Supporting Drug R&D and Manufacturing

Engaged in the research and development (R&D) and production of tool enzymes, raw material enzymes and related reagents for life science research, nucleic acid drugs, molecular diagnostics and synthetic biology.

2000+
Clean production plant (m²)

9000+
R&D and production base (m²)

13485
Quality management system certification

In every critical stage of developing and manufacturing innovative therapeutics—such as antibody drugs, mRNA vaccines, and cell-gene therapies (CGT)—precise, efficient, and reliable molecular biology tools are indispensable.

At BestEnzymes Biotech, we are dedicated to creating advanced molecular biology tools to support the discovery of these technologies. Our extensive range of high-quality reagents are designed to meet the rigorous demands of the biotherapeutic industry.

Why Choose Us?

- **Superior Performance:** Performance comparable to competing products, high cost-effectiveness, and stable supply.
- **Strict Quality Control:** Full process quality management system, offering GMP-grade products and supporting DMF filing.
- **Comprehensive Product Range:** Offering over 150 types of full-range enzyme preparations, covering DNA/RNA/protein operations. One-stop product portfolio from R&D to production.
- **Customization Support:** Providing customization for large packaging and GMP-grade products.

PRODUCT FOR BIOPHARMA ——Product Selection Guide

RNA Therapeutics

❶ Template Generation

- Restriction Endonucleases
- T4 DNA Ligase
- Ultra T4 DNA Ligase
- M-MLV Reverse Transcriptase
- High Fidelity Polymerase PCR Mix
- Seamless Assembly Mix
- phi29 II DNA Polymerase
- TelN Protelomerase
- BsaI, GMP Grade
- BspQI, GMP Grade
- XbaI, GMP Grade
- XhoI, GMP Grade
- NheI, GMP Grade

❷ *In Vitro* Transcription (IVT)

- T7 High Yield RNA Synthesis Kit
- T7 RNA Polymerase, GMP Grade
- High T7 RNA Polymerase
- Murine RNase Inhibitor, GMP Grade
- DNase I, RNase-free
- DNase I-ST, GMP Grade
- Pyrophosphatase, Inorganic (Yeast, GMP Grade)
- Thermostable Inorganic Pyrophosphatase
- NTP, Modified NTP
- Cap1 analogue AG
- Poly(A) RNA Polymerase
- Proteinase K

❸ Small RNA

- T4 RNA Ligase 2, GMP Grade
- T4 Polynucleotide Kinase

❹ Circular RNA

- T4 RNA Ligase 1

❺ Analysis & Quality Inspection

- RNase GG
- RNase T1
- Thermostable RNase T1
- RNase H
- Thermostable RNase H
- MazF
- RNase A
- BsaI ELISA ELISA Kit
- XhoI ELISA ELISA Kit
- XbaI ELISA ELISA Kit
- BsmBI ELISA ELISA Kit

Antibody Drugs

❶ Molecular Cloning Construction

- Restriction Endonucleases
- High Fidelity Polymerase PCR Mix
- T4 DNA Ligase
- Seamless Assembly Mix
- phi29 II DNA Polymerase

❷ Screening & Development

- Cell-Free Protein Synthesis Kit

❸ protein purification

- DNase I, RNase-free
- DNase I-ST, GMP Grade
- RNase A
- Omni-nuclease (Benzonase)
- TEV Protease (with His-tag)

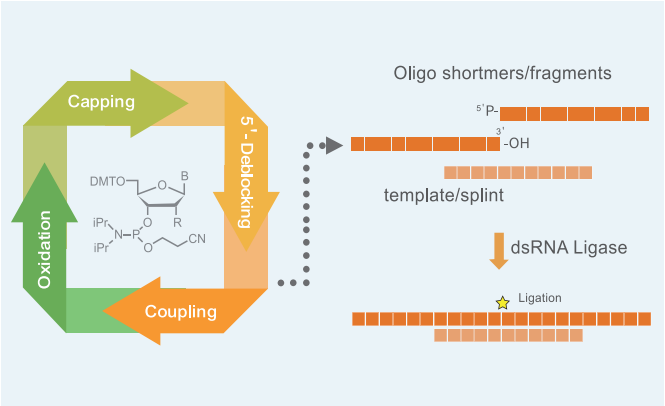
❹ Quality Control

- Benzonase ELISA Kit
- PNGase F

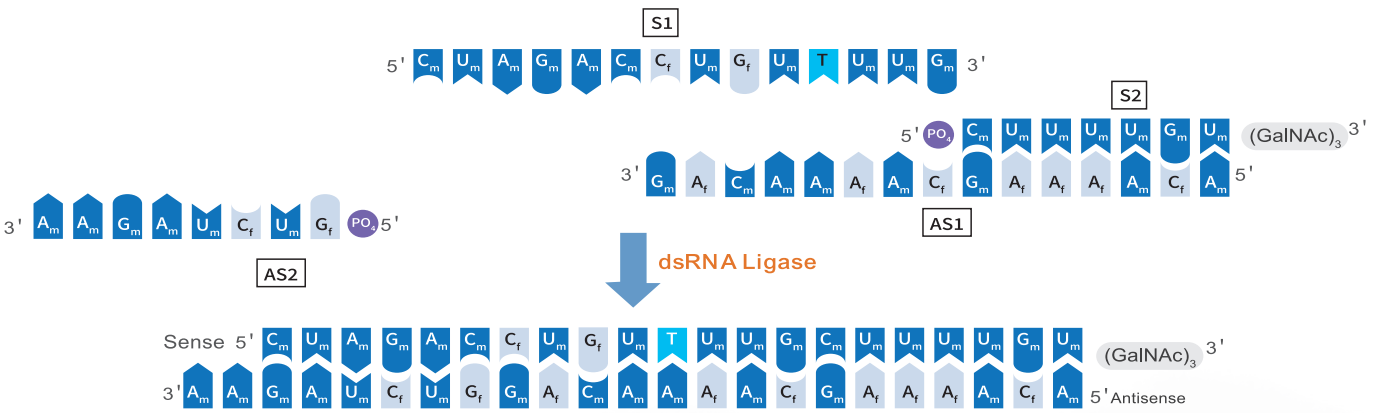
Enzymatic Synthesis Solution for Small RNA

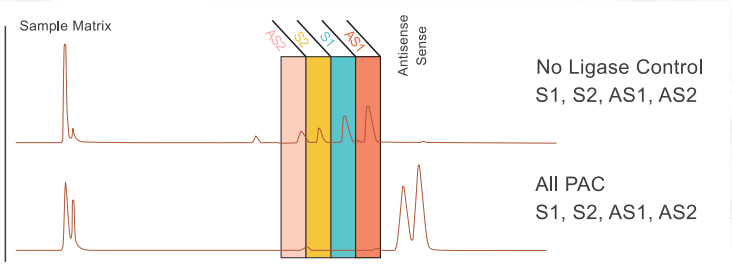
T4 RNA Ligase 2, GMP Grade——The RNA ligase is used to ligate four short single-stranded RNA fragments into intact double-stranded small RNA, with a ligation efficiency of over 95%.

Phosphoramidite Chemistry | **Enzymatic Ligation**



	Chemical Synthesis (SPOS)	Enzymatic Ligation
Process Principle	Sequentially add nucleotides on solid phase, form chemical bonds to extend the chain	Short fragments synthesis + enzymatic ligation
Core Steps	Circulation Deprotection → Coupling → Oxidation → Capping	Fragment synthesis → Annealing → Enzymatic ligation → Purification
Yield	36-mer 69% (decreases with length)	> 95% (avoids cumulative loss)
Impurity Control	Difficult (prone to N-1/N-2 deletion impurities)	Easy
Cost	High	Medium
Environmental Friendliness	Poor (large organic waste discharge)	Excellent (aqueous reaction, reduce 50% waste)
Application Scenarios	< 20 - mer	> 30 - mer
Strategic Significance	Transitional technology	Future industry standard





Fragment Composition	% Ligation	
	Sense	Antisense
4 PAC	**98.4**	**98.2**

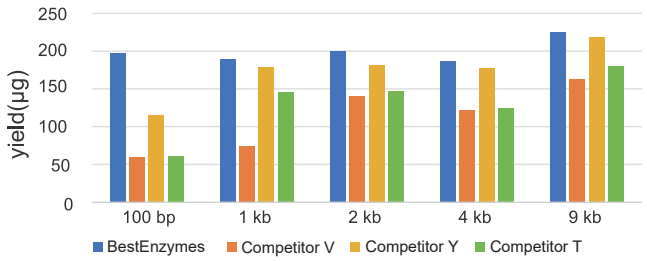
In Vitro Transcription (IVT)

Example of Quality Standards for GMP-grade Raw Material Enzymes

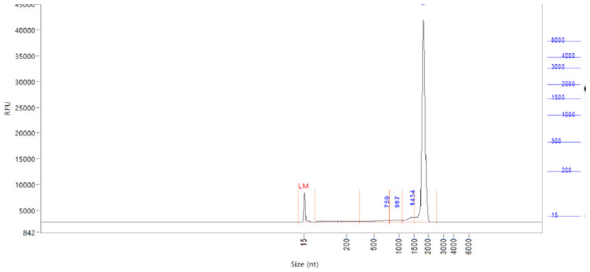
Quality Control	Quality Standard	Detection Method
Protein Purity	≥ 95%	SDS-PAGE
Non-specific Endonuclease Activity	Supercoiled plasmid conformational change < 20%	20 U enzyme was incubated with supercoiled plasmid at 37℃ for 4 hours
DNase Activity	No dsDNA degradation observed	20 U enzyme was incubated with dsDNA fragments at 37℃ for 16 hours
RNase Activity	RNA degradation ≤ 10%	20 U enzyme was incubated with RNA at 37℃ for 1 hour CFU/mL
Host Cell DNA	< 10 copies/20 U	ChP(2025) Volume IV, Detection of Exogenous DNA Residues, Method 3 (General Chapter 3407)
Host Cell Protein	< 50 ppm	ChP(2025) Volume IV, Measurement of E. coli Host Cell Proteins (General Chapter 3412)
Bacterial Endotoxin	< 10 EU/mg	ChP(2025) Volume IV, Bacterial Endotoxins Test, Method 1 (General Chapter 1143)
Mycoplasma	Negative	Mycoplasma test kit
Heavy Metals	< 10 ppm	ChP(2025) Volume IV, Limit Test for Heavy Metals, Method I (General Chapter 0821)
Microbial Limit	The total aerobic microbial count is below 5 cfu/ml, and the total combined yeasts/molds count is below 5 cfu/ml.	ChP(2025) Volume IV, Microbial Limit Tests for Non-Sterile Products: Microbial Enumeration Method (General Chapter 1105)

Note: The above information is given as examples of BsaI, GMP Grade .

The T7 High Yield RNA Synthesis Kit is capable of synthesizing long or short RNA transcripts in large quantities from DNA templates containing a T7 promoter. The kit's T7 Enzyme Mix is optimized with RNase inhibitor and inorganic pyrophosphatase, ensuring highly efficient and robust RNA synthesis.The synthesized RNA is applicable for a wide range of downstream applications, including *in vitro* translation, RNA structure and function studies, RNase protection assays, probe hybridization, RNA interference, and more.



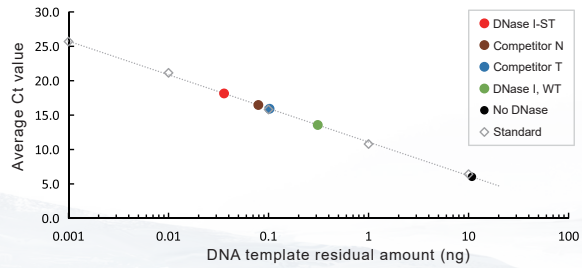
The relationship between different template lengths and the products output.



As tested by customers，when using cap analogues for co-transcription, the integrity of the capped mRNA exceeds 85%.

DNase I-ST, GMP Grade——Through protein design and modification, BestEnzymes Biotech has developed a new salt-tolerant DNase I based on the wild-type DNase I. This product features:

- Significantly enhanced DNA affinity, enabling higher digestion efficiency for low-concentration DNA.
- High salt tolerance, which can efficiently degrade DNA even in solutions containing 300 mM salt.
- Recombinant expression, with no RNase contamination.
- Especially suitable for removing DNA templates after IVT reactions.



	Average Ct value	Residual DNA (ng)	Residual DNA ratio	DNA removal fold
DNase I-ST	18.1	0.036	0.332%	~300
Competitor N	16.5	0.079	0.732%	~130
Competitor T	15.9	0.102	0.948%	~100
DNase I, WT	13.6	0.311	2.875%	~30
No DNase	6.0	10.805	100%	-

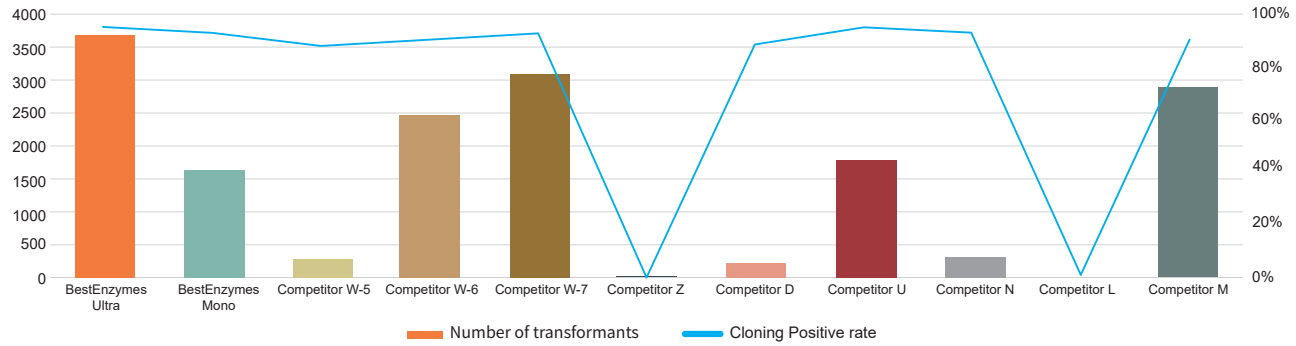
As shown in the image, *in vitro* transcription (IVT) reactions using different competitor systems—all with high salt concentrations—were performed using linearized plasmid DNA as template. After transcription, 2 U of DNase I were added. The RNA products were purified and recovered, and residual DNA was quantified by qPCR. The results demonstrate that BestEnzymes Biotech DNase I-ST achieved significantly higher DNA removal efficiency than the wild-type DNase I and competing products.

Template Generation

Restriction Endonucleases , GMP-grade Restriction Endonucleases (BsaI,BspQI,NheI,XhoI,XbaI). BestEnzymes offers multiple GMP-grade Endonucleases . We ensure full traceability of the production process and raw materials, with no antibiotics or animal-derived raw materials/excipients used. Strict control is implemented over process-related impurities (e.g., host cell protein, host cell DNA, non-specific endonuclease activity, DNase activity, RNase activity) as well as microbial limit and bacterial endotoxin, thus meeting the strict requirements for raw materials/excipients in the vaccine and drug production fields.

Meanwhile, BestEnzymes Biotech provides customization of GMP-grade restriction Endonucleases to meet personalized needs for plasmid templates.

Seamless Assembly Mix——Kits based on Gibson Assembly and Golden Gate principles are available for your selection. Support both single-fragment and multi-fragment assembly, with simple and convenient operation and high positive clone rate.



Transformant Count and Positive Rate for 10-Fragment Assembly

Phi29 II DNA Polymerase & TelN Protelomerase ——As core enzymes for Doggybone DNA™, they offer several advantages for mRNA template preparation: fast speed, high speed, flexible scale, good stability, and wide applicability.

RNA Analysis

When performing *in vitro* transcription with both capping and tailing to generate complete mRNA, it's crucial to analyze the quality of the RNA product. To address this need, BestEnzymes offers a diverse array of RNase. These enzymes provide versatile options for RNA secondary structure analysis, capping rate evaluation, and comprehensive integrity assessment.

Product Name	Reaction Substrate	Recognition Sequence	Application
RNase A	Primarily single-stranded RNA	C/U	Preparation of plasmids and genomic DNA Remove RNA from recombinant protein preparations RNA In combination with RNase T1 Identify single-base mutations in DNA or RNA
RNase T1/ Thermostable RNase T1	Single-stranded RNA	G	RNA sequencing Analysis of RNA secondary structure Combined with RNase A to remove RNA mRNA quality analysis
RNase H/ Thermostable RNase H	The RNA chain in the RNA-DNA hybrid molecule	Positional preference	Analysis of mRNA cap addition efficiency Remove mRNA before synthesizing the second strand of cDNA Removal of the poly(A) sequence from mRNA after oligo(dT) hybridization
MazF	Single-stranded RNA	Unmodified ACA	mRNA analysis
RNase GG	Single-stranded or multi-stranded RNA	GG	mRNA analysis

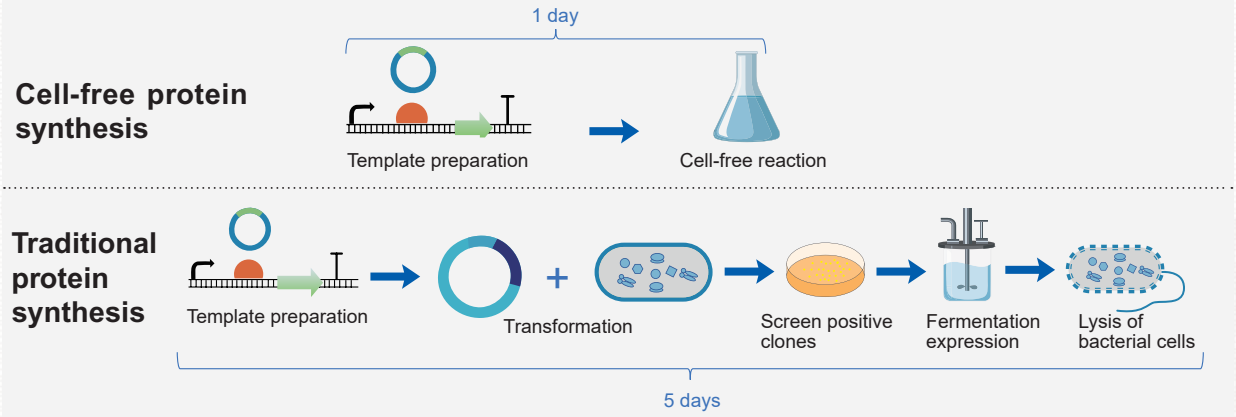
Antibody Screening & Development

Cell-Free Protein Synthesis Kit is an extract-based transcription/translation system derived from E. coli cells, which enables rapid, one-pot conversion of DNA/RNA templates to functional proteins in vitro. The kit employs a T7 promoter-based system, supporting multiple templates including circular plasmid DNA, linear DNA, and mRNA. It is particularly suitable for:

- Efficient production of difficult-to-express proteins (such as cytotoxic proteins).
- Correct folding of complex structured proteins which contain disulfide-rich proteins.
- Special modifications such as isotope labeling and incorporation of non-canonical amino acids.

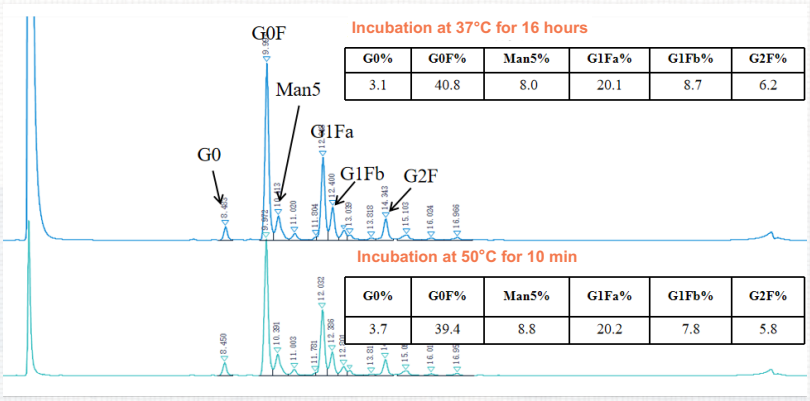
In addition, proprietary kits specifically designed for the insertion of three non-canonical amino acids—pAzF, pAcF and Kcr—are available for researchers.

Process Comparison



Antibody Quality Control

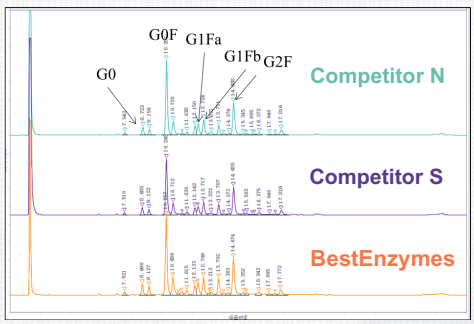
PNGase F is the most effective enzymatic method for removing almost all N-linked oligosaccharides from glycoproteins. PNGase F from BestEnzymes Biotech, recombinantly expressed in Escherichia coli, offers high purity and free from proteases or other glycosidases. It can be used either at 37° C using a standard reaction or at 50° C for a quick 10-minute reaction. In addition, A glycerol-free version of PNGase F (EG23304) is also offered for HPLC methods. PNGase F products are equipped with a His tag, facilitating their removal post-deglycosylation reaction.



G0%	G0F%	Man5%	G1Fa%	G1Fb%	G2F%
3.1	40.8	8.0	20.1	8.7	6.2

G0%	G0F%	Man5%	G1Fa%	G1Fb%	G2F%
3.7	39.4	8.8	20.2	7.8	5.8

Glycosylation analysis of a monoclonal antibody treated under two reaction conditions showed no significant differences in glycan types or relative abundance.



Name	G0%	G0F%	Man5%	G1Fa%	G1Fb%	G2%	G2F%
Competitor N	3.25	30.23	7.36	5.5	7.33	4.52	16.59
Competitor S	3.49	27.16	7.4	5.07	7.13	5.68	16.82
BestEnzymes	3.71	27.89	7.92	5.14	7.21	6.54	16.34

Incubation at 37° C for 16 hours, glycosylation analysis of the bispecific antibody showed no significant differences in glycan types or relative abundance compared to competing products.

BestEnzymes Biotech Co., Ltd.

Add: No.17 Huaguoshan Avenue,Lianyungang City, China

Tel: 0518-8558 6628 · support@best-enzymes.com · http://en.best-enzymes.com

ver.202603