DATA SHEET

Jena Bioscience

HighYield T7 RNA Crosslinking Kit (4-Thio-UTP)

Synthesis of 4-Thio-modified RNA

Cat. No.	Amount
RNT-135	15 reactions x 20 µl

For general laboratory use.

Shipping: shipped on gel packs

Storage Conditions: store at -20 °C

Additional Storage Conditions: avoid freeze/thaw cycles

Shelf Life: 12 months after date of delivery

Description:
HighYield T7 RNA Crosslinking Kit (4-Thio-UTP) is designed to produce randomly 4-Thio-modified RNA probes via *in vitro* transcription. Such probes are ideally suited for the detection of RNA-Protein interactions by photocrosslinking. The photoreactive Thio group triggers the formation of a covalent bond between the RNA and closely interacting proteins upon UV irradiation.

4-Thio-UTP is efficiently incorporated into RNA as substitute for its natural counterpart UTP using an optimized reaction buffer and T7 RNA Labeling Polymerase Mix. 80 % 4-Thio-UTP substitution typically results in an optimal balance between reaction and labeling efficiency. Individual optimization of 4-Thio-UTP/UTP ratio however, can easily be achieved with the single nucleotide format. The resulting 4-Thio-modified RNA probe can be used for photocrosslinking experiments using a 365 nm UV light.

The kit contains sufficient reagents for 15 labeling reactions of 20 µl each (100 % 4-Thio-UTP substitution, 7.5 mM ATP, 7.5 mM GTP, 7.5 mM CTP,7.5 mM 4-Thio-UTP).

A 20 µl reaction with **100 % substitution** yields about **10 µg RNA**, with **80 % substitution** about **50 µg RNA after 30 min incubation (1 µg T7 control template, 1.4 kb RNA transcript)**. Yields may however vary depending on the template (promotor design, sequence length, secondary structure formation).

Content:
HighYield T7 RNA Polymerase Mix
2x 40 µl incl. RNase inhibitor and 50 % glycerol (v/v)

HighYield T7 Reaction Buffer
1x 200 µl (10x), HEPES-based

ATP - Solution
1x 100 µl (100 mM)

GTP - Solution
1x 100 µl (100 mM)

CTP - Solution
1x 100 µl (100 mM)

UTP - Solution
1x 100 µl (100 mM)

4-Thio-UTP
3x 10 µl (100 mM)

T7 G-initiating control template (1.4 kbp)
1x 10 µl (200 ng/µl), 1.4 kbp PCR fragment plus T7 class III phi6.5 promotor resulting in 1400 nt RNA transcript

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PCR-grade water
1x 1.2 ml

DTT
1x 150 µl (100 mM)

To be provided by user
T7 Promotor-containing DNA template
RNA purification tools
RNAse-free DNAse I

Important Notes (Read before starting)

Prevention of RNAse contamination
Although a potent RNase Inhibitor is included, creating a RNAse-free work environment and maintaining RNAse-free solutions is critical for performing successful *in vitro* transcription reactions. We therefore recommend

- to perform all reactions in sterile, RNAse-free tubes using sterile pipette tips.
- to wear gloves when handling samples containing RNA.
- to keep all components tightly sealed both during storage and reaction procedure.

Template requirements

- **Template type**: Linearized plasmid DNA or PCR products containing a double-stranded G-initiating T7 class III phi6.5 promotor region upstream of the target sequence.

  Minimum T7 promotor sequences:

  T7 class III phi6.5 promotor (G-initiating)
  5'-TAATACGACTCACTATA**G***NN*...-3'
  Bold: First base incorporated into RNA, *NN*: ideally CG

- **Template quality**: DNA template quality directly influences yield and quality of transcription reaction. Linearized plasmid DNA needs to be fully digested and to be free of contaminating RNase, protein and salts. We recommend selecting restriction enzymes that generate blunt ends or 5´-overhangs and purification by phenol/chloro¬form extraction. A PCR mixture can be used directly however, better yields will usually be obtained with purified PCR products (e.g. via silica-membrane based purification columns).

- **mRNA production**: For the production of functional mRNA, the DNA template needs to encode the following structural features e.g. 3'-UTR, 5'-UTR, correctly orientated target sequence and poly(A)-tail. Alternatively, poly (A)-tailing can post-transcriptionally be performed with Poly(A) polymerase.

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In vitro Transcription protocol

The general protocol is set up for 0.5 µg - 1 µg DNA template (refer to section 1.2 regarding template requirements), a final NTP concentration of 7.5 mM and 100 % substitution of UTP by Pseudo-UTP, respectively.

Depending on the RNA sequence and final application, individual reaction optimization may improve product yield and biological function (e.g. variation 4-Thio-UTP/UTP ratio , variation of template amount, variation of incubation time).

Component	Volume	Final conc.
PCR-grade water	X µl	
HighYield T7 Reaction Buffer (10x)	2 µl	1x
DTT (100 mM)	2 µl	10 mM
GTP (100 mM)	1.5 µl	7.5 mM
4-Thio-UTP (100 mM)	1.5 µl	7.5 mM
CTP (100 mM)	1.5 µl	7.5 mM
ATP (100 mM)	1.5 µl	7.5 mM
Template DNA	X µl	1 µg
HighYield T7 RNA Polymerase Mix	2 µl	
Total volume	**20 µl**	

- Place HighYield T7 RNA Polymerase Mix on ice.
- Thaw all remaining components at room temperature (RT), mix by voretexing and spin down briefly.
- Assemble all components at RT to a nuclease-free microtube (sterile pipette tips) in the following order:
- Mix PCR-grade water, HighYield T7 Reaction Buffer and DTT by voretexing and spin down briefly.
- Add nucleotide solutions and template DNA, vortex and spin down briefly.
- Add HighYield T7 RNA Polymerase Mix vortex and spin down briefly.
- Incubate for 2h at 37°C in the dark (e.g. PCR cycler). Individual optimization may increase product yield (0.5h–4h at 37°C).

Please note: Reagents for the following steps are not provided within this kit.

DNA template removal (optional)

Depending on the down-stream application, removal of template DNA might be required. We recommend a salt-resistant, high efficiency DNAase such as Turbo™DNAse (ThermoFisher). Follow the manufacturer instructions.

RNA purification

Purification of RNA is required for certain applications such as measurement of AF488-labelled RNA probe concentration. Spin column purification will remove proteins, salts and unincorporated nucleotides. Please follow the manufacturer instructions and ensure that the columns match with product size and possess a sufficient binding capacity (e.g. RNA Clean & Concentrator™ columns (Zymo Research) or Monarch® RNA Cleanup kit (NEB)). Other RNA purification methods such as LiCl precipitation may work but have not been tested.

Total RNA quantitation

RNA concentration can be determined by absorbance measurement at 260 nm (A_{260}) according to the Law-of-Lambert-Beer (A_{260} = 1 correspond to 40 µg/ml ssRNA).

Related Products:

4-Thio-UTP, #NU-1156