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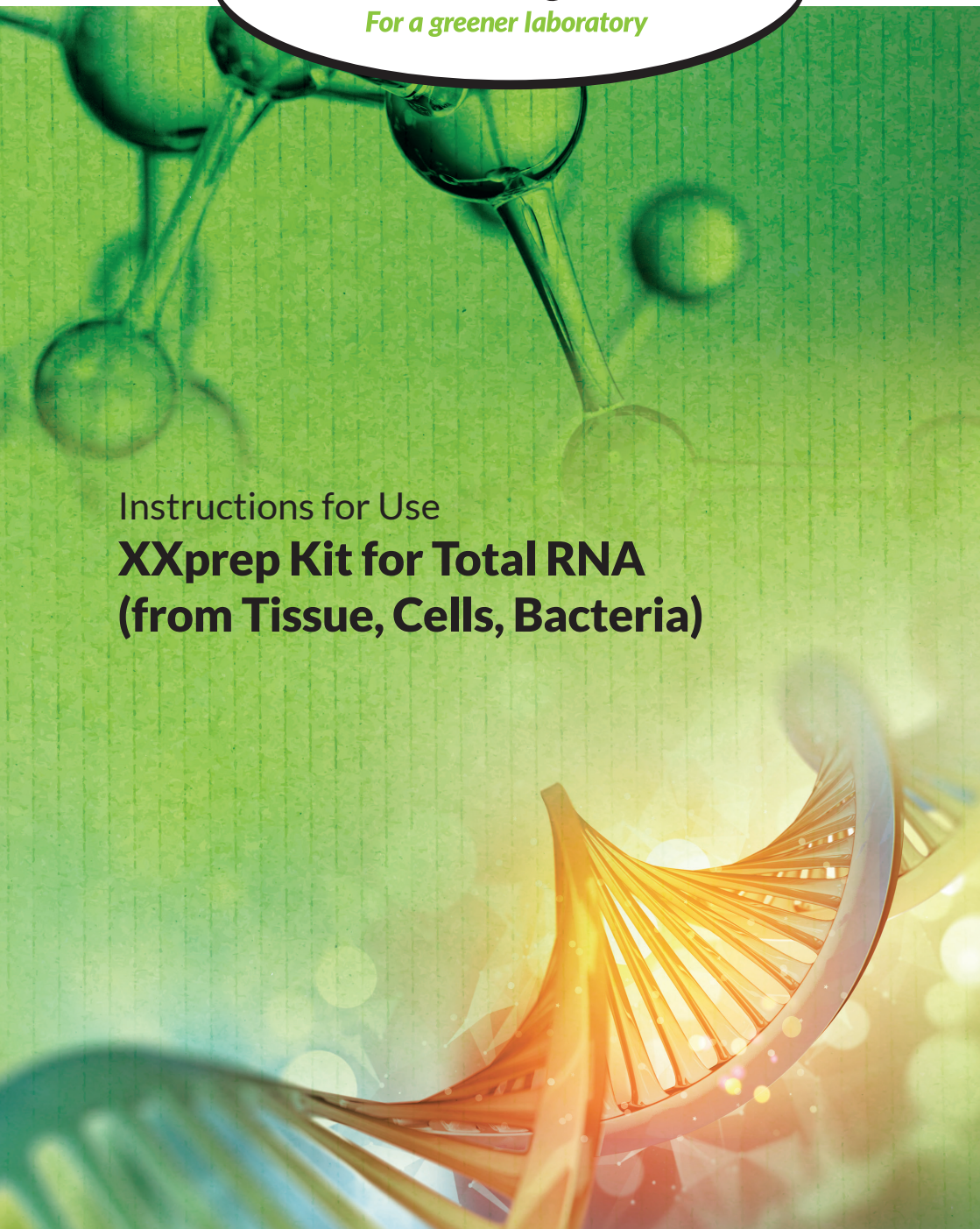

Instructions for Use

XXprep Kit for Total RNA (from Tissue, Cells, Bacteria)

Published July 2021, TDS_EN_6780_XXprep-Kit-for-Total-RNA
This Instruction for Use describes the state at the time of publishing.
It needs not necessarily agree with future versions. Subject to change!
The latest version is available via the following QR code:

Order no.	
6780RC010	XXprep Kit for Total RNA (from Tissue, Cells, Bacteria), 10 Reactions
6780RC050	XXprep Kit for Total RNA (from Tissue, Cells, Bacteria), 50 Reactions
6780RC250	XXprep Kit for Total RNA (from Tissue, Cells, Bacteria), 250 Reactions

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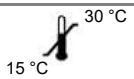
1 Introduction

1.1 Intended use

The XXprep Kit for Total RNA has been designed for simple, reliable and fast isolation of total RNA. The kit can be used for isolation of RNA from tissue samples, eukaryotic cells and Gram-negative or Gram-positive bacteria. The isolation procedure is based on a new kind of patented technology.

1.2 Notes on the use of this manual

For easy reference and orientation, the manual uses the following warning and information symbols as well as the shown methodology:

Symbol	Information
	REF Catalogue number.
	Content Contains sufficient reagents for <N> reactions.
	Storage conditions Store at room temperature or shown conditions respectively.
	Consult instructions for use This information must be observed to avoid improper use of the kit and the kit components.
	Expiry date
	Lot number The number of the kit batch.
	Manufactured by Contact information of manufacturer.
	For single use only Do not use components for a second time.
	Note / Attention Observe the notes marked in this way to ensure correct function of the kit and to avoid operating errors for obtaining correct results.

The following systematic approach is introduced in the manual:

- The chapters and figures are numbered consecutively.
- A cross reference is indicated with an arrow (e.g. → „Notes on the use of this manual“ p. 3).
- Working steps are numbered.

2 Safety precautions

NOTE

Read through this chapter carefully prior to guarantee your own safety and a trouble-free operation.

Follow all the safety instructions explained in the manual, as well as all messages and information, which are shown.

All due care and attention should be exercised in handling the materials and reagents contained in the kit. Always wear gloves while handling these reagents and avoid any skin contact! In case of contact, flush eyes or skin with a large amount of water immediately.

FOR SINGLE USE ONLY!

This kit is made for single use only!

ATTENTION!

Don't eat or drink components of the kit!

The kit shall only be handled by educated personnel in a laboratory environment!

If the buffer bottles are damaged or leaking, wear gloves and protective goggles when discarding the bottles in order to avoid any injuries. This kit could be used with potential infectious samples. Therefore, all liquid waste must be considered as potentially infectious and must be handled and discarded according to local safety regulation.

Please observe the federal, state and local safety and environmental regulations. Follow the usual precautions for applications using extracted nucleic acids. All materials and reagents used for DNA or RNA isolation should be free of DNases or RNases.

ATTENTION!
Do not add bleach or acidic components to the waste after sample preparation!

NOTE
Emergency medical information in English and German can be obtained 24 hours a day from:

Poison Information Center, Freiburg / Germany
Phone: +49 (0)761 19 240.

For more information, please ask for the material safety data sheet (MSDS).

3 Storage conditions

The XXprep Kit for Total RNA should be stored dry at room temperature (15 °C to 30 °C). When stored at room temperature, the kit is stable until the expiration date printed on the label on the kit box.

If there are any precipitates within the provided solutions solve these precipitates by careful warming. Before every use make sure that all components have room temperature.

For further information see chapter “Kit components” (→ p. 7).

4 Functional testing and technical assistance

The neoFroxx GmbH guarantees the correct function of the kit for applications as described in the manual. This product has been produced and tested in an ISO 13485 certified facility.

We reserve the right to change or modify our products to enhance their performance and design. If you have any questions or problems regarding any aspects of the XXprep Kit for Total RNA or other neoFroxx products, please do not hesitate to contact us. For technical support or further information in Germany please dial +49 (0) 6251 989240. For other countries please contact your local distributor.

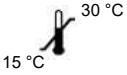
5 Product use and warranty

The kit is not designed for the usage of other starting materials or other amounts of starting materials than those, referred to in the manual (→ “Intended use“ p. 2), (→ “Product specifications“ p. 10). Since the performance characteristics of neoFroxx kits have just been validated for the application described above, the user is responsible for the validation of the performance of neoFroxx kits using other protocols than those described below. neoFroxx kits may be used in clinical diagnostic laboratory systems after the laboratory has validated the complete diagnostic system as required by CLIA’ 88 regulations in the U.S. or equivalents in other countries.

All products sold by neoFroxx GmbH are subjected to extensive quality control procedures and are warranted to perform as described when used correctly. Any problems should be reported immediately.

NOTE
For research use only!

6 Kit components



STORAGE CONDITIONS
All components are stored at room temperature.

	Σ 10	Σ 50	Σ 250
REF	6780RC010	6780RC050	6780RC250
Lysis Solution RL	6 ml	30 ml	125 ml
Washing Solution HS (conc.)	3 ml	15 ml	70 ml
Washing Solution LS (conc.)	2 ml	8 ml	40 ml
RNase-free Water	2 ml	6 ml	2 x 15 ml
Spin Filter D	10	50	5 x 50
Spin Filter R	10	50	5 x 50
Receiver Tubes	50	5 x 50	25 x 50
Elution Tubes	10	50	5 x 50
Manual	1	1	1

	Σ 10	Σ 50	Σ 250
Initial steps	Washing Solution HS Add 3 ml of 96-99.8 % ethanol to the bottle and mix thoroughly. Keep the bottle always firmly closed! Washing Solution LS Add 8 ml of 96-99.8 % ethanol to the bottle and mix thoroughly. Keep the bottle always firmly closed!	Washing Solution HS Add 15 ml of 96-99.8 % ethanol to the bottle and mix thoroughly. Keep the bottle always firmly closed! Washing Solution LS Add 32 ml of 96-99.8 % ethanol to the bottle and mix thoroughly. Keep the bottle always firmly closed!	Washing Solution HS Add 70 ml of 96-99.8 % ethanol to the bottle and mix thoroughly. Keep the bottle always firmly closed! Washing Solution LS Add 160 ml of 96-99.8 % ethanol to the bottle and mix thoroughly. Keep the bottle always firmly closed!

NOTE
Use only absolute/pure ethanol, NO methylated or denatured alcohol!

Components not included in the kit

- 1.5 ml reaction tubes
- Ethanol (70 %, 96–99.8 %); non denatured or methylated
- ddH_2O

Components needed for isolation of RNA from tissue samples (optional)

- DNase I
- TE-Buffer (10 mM Tris-HCl; 1 mM EDTA; pH 8.0)
- 80 % ethanol; non denatured or methylated

Components needed for isolation of RNA from bacteria (optional)

- Lysozyme (stock solution: 10 mg/ml, 400 U/µl)
- Mutanolysin (stock solution: 0.4 U/µl)
- Lysostaphin (stock solution: 0.4 U/µl)
- TE-Buffer (10 mM Tris-HCl; 1 mM EDTA; pH 8.0)

7 Product specifications

1. Starting material:
   - Eukaryotic cells (up to 5 x 10^6 cells)
   - Tissue samples (up to 20 mg)
   - Gram-positive and Gram-negative bacteria (up to 1 x 10^9 cells)
   - Biopsies (up to 20 mg)

2. Time for isolation:
   - Approximately 15–40 minutes

3. Typical yield:
   - Depends on the type and the amount of the starting material

4. Binding capacity:
   - Approximately 100 µg RNA

8 GHS classification

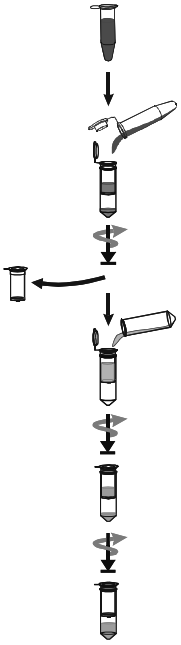
Component	Hazard contents	GHS Symbol	Hazard phrases	Precaution phrases	EUH
Lysis Solution RL	Guanidinium thiocyanate 25–50 %	 Danger	302, 314, 412	101, 102, 103, 260,303+361+353, 305+351+338, 310, 405, 501	032
Washing Solution HS (conc.)	Guanidinium thiocyanate 50–100 %	 Danger	302, 314, 412	101, 102, 103, 260,303+361+353, 305+351+338, 310, 405, 501	032

CAUTION
DO NOT add bleach or acidic solutions directly to the sample-preparation waste.

9 Recommended steps before starting

- Ensure that the Washing Solution HS and Washing Solution LS have been prepared according to the instruction (→ "Kit components" p. 7).
- Centrifugation steps should be performed at room temperature.
- Avoid freezing and thawing of starting materials.

10 General procedure for RNA extraction



Homogenization / Lysis of starting material

Selective removing of gDNA by using Spin Filter D

Selective binding of RNA onto Spin Filter R

Washing of RNA

Elution of RNA

11 General notes and safety recommendations on handling RNA

RNA is far less stable than DNA. It is very sensitive to degradation by endogenous RNases in the biological material and exogenous RNases which are permanently present everywhere in the lab. To achieve satisfactory qualitative and quantitative results in RNA preparations, contaminations with exogenous RNases have to be reduced to a minimum in accordance with the following recommendations:

- Always wear latex or vinyl gloves while handling reagents and RNA samples to prevent RNase contaminations from surface of the skin or from dusty laboratory equipment.
- Change gloves frequently and keep tubes closed.
- Keep isolated RNA on ice.
- Reduce preparation time as much as possible.
- Use only sterile, disposable polypropylene tubes throughout the procedure (these tubes are generally RNase-free.)
- Non-disposable plastic ware should be treated before use to ensure that it is RNase-free. Plastic ware should be thoroughly rinsed with 0.1 M NaOH, 1 mM EDTA followed by RNase-free Water. You can also take chloroform-resistant plastic ware rinsed with chloroform to inactivate RNases.
- All glassware should be treated before use to ensure that it is RNase-free. Glassware should be cleaned with detergent, thoroughly rinsed and oven baked at 240 °C for four or more hours before use. Autoclaving alone will not inactivate many RNases completely. Oven baking inactivates RNases and ensures that no other nucleic acids (such as plasmid DNA) are present on the surface of the glassware. You can also clean glassware with 0.1 % DEPC (diethyl pyrocarbonate). The glassware has to be immersed in 0.1 % DEPC solution for 12 hours at 37 °C and then it has to be autoclaved or heated to 100 °C for 15 minutes to remove residual DEPC.

- Electrophoresis tanks should be cleaned with detergent solution (e.g. 0.5 % SDS), thoroughly rinsed with RNase-free Water, rinsed with ethanol and finally allowed to dry.
- All buffers have to be prepared with DEPC-treated RNase-free ddH_2O.
- Avoid handling bacterial cultures, cell cultures or other biological sources of RNases in the same lab where the RNA purification will be performed.
- Do not use equipment, glassware and plastic ware employed for other applications which might introduce RNase contaminations in the RNA isolation.

12 Protocol 1: RNA extraction from tissue samples

IMPORTANT
Please note that up to 20 mg of tissue samples can be processed.
Avoid freezing and thawing of tissue samples!

1. Homogenization of starting material.

NOTE
To maximize the final yield of total RNA a complete homogenization of tissue sample is important!

For the homogenization of tissue samples, it is possible to use commercially available rotor-stator homogenizer or bead mills. It is also possible to disrupt the starting material using mortar and pestle in liquid nitrogen and grind the tissue sample to a fine powder.

A. Homogenization of tissue samples using a rotor-stator homogenizer

1. Transfer the weighed amount of fresh or frozen starting material in a suitable reaction vessel for the homogenizer.
2. Add 450 µl Lysis Solution RL.
3. Homogenize the sample.
4. Transfer the homogenized tissue sample into a 1.5 ml reaction tube and place the sample in Lysis Solution RL for longer storage at -22 °C to -18 °C or use the sample immediately for isolation of total RNA following the protocol step 2.

B. Disruption of the tissue sample using a mortar and pestle and liquid nitrogen

1. Transfer the weighed amount of fresh or frozen starting material under liquid nitrogen and grind the material to a fine tissue powder.
2. Transfer the powder into a 1.5 ml reaction tube. Don't allow the sample to thaw!
3. Add 450 µl Lysis Solution RL and incubate the sample for appropriate time for a further lysis under continuous shaking.
4. Finally place the sample under Lysis Solution RL for longer storage at -22 °C to -18 °C or use the sample immediately for isolation of total RNA following protocol step 2.

2. After lysis spin down unlysed material by centrifugation at maximum speed for 1 minute. Place a Spin Filter D into a Receiver Tube. Transfer the supernatant of the lysed sample onto the Spin Filter D. Centrifuge at 11,000 x g (~11,000 rpm) for 2 minutes. Discard the Spin Filter D.

   Do not discard the filtrate, because the filtrate contains the RNA!

NOTE
If the solution has not completely passed through the Spin Filter, centrifuge again at higher speed or prolong the centrifugation time.

3. Place a Spin Filter R into a new Receiver Tube. Add an equal volume (approx. 400 µl) of 70 % ethanol to the filtrate from step 2. Mix the sample by pipetting up and down several times. Transfer the sample onto the Spin Filter R. Centrifuge at 11,000 x g (~11,000 rpm) for 2 minutes.

NOTE
If the solution has not completely passed through the Spin Filter, centrifuge again at higher speed or prolong the centrifugation time.

Discard the Receiver Tube with filtrate and place the Spin Filter R into a new Receiver Tube.

4. Open the Spin Filter R and add 500 µl Washing Solution HS, close the cap and centrifuge at 11,000 x g (~11,000 rpm) for 1 minute. Discard the Receiver Tube with the filtrate. Place the Spin Filter R into a new Receiver Tube.
5. Open the Spin Filter R and add 700 µl Washing Solution LS, close the cap and centrifuge at 11,000 x g (~11,000 rpm) for 1 minute. Discard the Receiver Tube with the filtrate. Place the Spin Filter R into a new Receiver Tube.

NOTE

Depending on sample material used an additional washing step with 700 µl of 80 % ethanol may increase purity of isolated RNA.

6. Centrifuge at 11,000 x g (~11,000 rpm) for 2 minutes to remove all traces of ethanol. Discard the Receiver Tube.
7. Place the Spin Filter R into an Elution Tube. Carefully open the cap of the Spin Filter R and add 30–80 µl RNase-free Water. Incubate at room temperature for 1 minute. Centrifuge at 11,000 x g (~11,000 rpm) for 1 minute.

NOTE

Depending on the extracted yield or the needed concentration of total RNA you can also elute with different volumes of RNase-free Water. A lower volume of RNase-free Water increases the concentration of RNA and a higher volume of RNase-free Water leads to an increased yield but a lower concentration of total RNA. Please note, that the minimum of RNase-free Water should be 20 µl.

13 Protocol 2: RNA extraction from eukaryotic cells

IMPORTANT
Please note that up to 5 x 10^6 cells can be processed.

1. Add 400 µl Lysis Solution RL to the cell pellet. Incubate for 2 minutes at room temperature. Re-suspend the cell pellet completely by pipetting up and down. Incubate the sample for further 3 minutes at room temperature.

NOTE
To maximize the final yield of total RNA a complete disruption and lysis of the cell pellet is important! No cell clumps should be visible after lysis step.

2. Place a Spin Filter D into a Receiver Tube. Transfer the lysed sample onto the Spin Filter D. Centrifuge at 11,000 x g (~11,000 rpm) for 2 minutes. Discard the Spin Filter D.

   Do not discard the filtrate, because the filtrate contains the RNA!

NOTE
If the solution has not completely passed through the Spin Filter, centrifuge again at higher speed or prolong the centrifugation time.

3. Place a Spin Filter R into a new Receiver Tube. Add an equal volume (approx. 400 µl) of 70 % ethanol to the filtrate from step 2. Mix the sample by pipetting several times up and down. Transfer sample onto the Spin Filter R. Centrifuge at 11,000 x g (~11,000 rpm) for 2 minutes.

NOTE
If the solution has not completely passed through the Spin Filter, centrifuge again at higher speed or prolong the centrifugation time.

Discard the Receiver Tube with filtrate and place the Spin Filter R into a new Receiver Tube.

4. Open the Spin Filter R and add 500 µl Washing Solution HS, close the cap and centrifuge at 11,000 x g (~11,000 rpm) for 1 minute. Discard the Receiver Tube with the filtrate. Place the Spin Filter R into a new Receiver Tube.
5. Open the Spin Filter R and add 700 µl Washing Solution LS, close the cap and centrifuge at 11,000 x g (~11,000 rpm) for 1 minute. Discard the Receiver Tube with the filtrate. Place the Spin Filter R into a new Receiver Tube.

NOTE

Depending on sample material used an additional washing step with 700 µl of 80 % ethanol may increase purity of isolated RNA.

6. Centrifuge at 11,000 x g (~11,000 rpm) for 3 minutes to remove all traces of ethanol. Discard the Receiver Tube.
7. Place the Spin Filter R into an Elution Tube. Carefully open the cap of the Spin Filter R and add 30–80 µl RNase-free Water. Incubate at room temperature for 1 minute. Centrifuge at 11,000 x g (~11,000 rpm) for 1 minute.

NOTE

Depending on the extracted yield or the needed concentration of total RNA you can also elute with different volumes of RNase-free Water. A lower volume of RNase-free Water increases the concentration of RNA and a higher volume of RNase-free Water leads to an increased yield but a lower concentration of total RNA. Please note, that the minimum of RNase-free Water should be 20 µl.

14 Protocol 3: RNA extraction from bacterial cells

IMPORTANT
Please note that up to 1 x 10^9 cells can be processed.
We recommend a pre-incubation of bacterial cells with Lysozyme.

14.1 Collection of bacterial cells

1. Transfer the bacterial culture (volume depends on the concentration of starting material) into a tube 2.0 ml tube.
2. Collect the cells by centrifugation with parameters adequate for the cell type (e.g. 10 minutes at 3,000 x g). Discard the supernatant.

   Do not discard the pellet!
3. Resuspend the bacterial cell pellet in 100 µl TE-Buffer.
4. Proceed with appropriate pre-lysis step.

14.2 Pre-lysis of Gram-negative bacteria

NOTE
Although Gram-negative bacteria do not require a pre-lysis step, using Lysozyme (not included in the kit) can enhance the efficiency of lysis.

1. Add 20 µl Lysozyme (10 mg/ml). Pipette several times up and down; the solution should become clear or viscous.
2. Proceed with “Isolation of bacterial RNA” on p. 22.

14.3 Pre-lysis of Gram-positive bacteria

NOTE

Gram-positive bacteria require a pre-lysis step using Mutanolysin and/or Lysozyme (not included in the kit). As both exert synergistic activity a simultan usage will increase the yield of isolated nucleic acids.

1. Add 20 µl Lysozyme (10 mg/ml) and/or 5 µl Mutanolysin (0.4 U/µl) and incubate at 37 °C for 30 minutes under continuous shaking.
2. Proceed with "Isolation of bacterial RNA" on p. 22.

14.4 Pre-lysis of *Staphylococcus* strains

NOTE

For pre-lysis of *Staphylococcus* the enzyme Lysostaphin is recommended (not included in the kit).

1. Add 10 µl Lysostaphin (0.4 U/µl) and incubate at 37 °C for 30 minutes under continuous shaking.
2. Proceed with "Isolation of bacterial RNA" on p. 22.

14.5 Isolation of bacterial RNA

NOTE
The following protocol is done after pre-lysis of samples.

1. Add 450 µl Lysis Solution RL to the pre-lysed sample and vortex vigorously or pipette sometimes up and down. Incubate the sample for further 3 minutes at room temperature.

NOTE
To maximize the final yield of total RNA a complete disruption and lysis of the cell pellet is important! No cell clumps should be visible after lysis step.

2. Place a Spin Filter D into a Receiver Tube. Transfer the lysed sample onto the Spin Filter D. Centrifuge at 11,000 x g (~11,000 rpm) for 2 minutes. Discard the Spin Filter D.

   Do not discard the filtrate, because the filtrate contains the RNA!

NOTE
If the solution has not completely passed through the Spin Filter, centrifuge again at higher speed or prolong the centrifugation time.

3. Place a Spin Filter R into a new Receiver Tube. Add an equal volume (approx. 600 µl) of 70 % ethanol to the filtrate from step 2. Mix the sample by pipetting several times up and down.

4. Transfer 650 µl of the sample onto the Spin Filter R. Centrifuge at 11,000 x g (~11,000 rpm) for 1 minute. Discard the Receiver Tube and place the Spin Filter R into a new Receiver Tube. Load the residual sample on the Spin Filter R and centrifuge again at 11,000 x g (~11,000 rpm) for 1 minute.

NOTE
If the solution has not completely passed through the Spin Filter, centrifuge again at higher speed or prolong the centrifugation time.

Discard the Receiver Tube with filtrate and place the Spin Filter R into a new Receiver Tube.

5. Open the Spin Filter R and add 500 µl Washing Solution HS, close the cap and centrifuge at 11,000 x g (~11,000 rpm) for 1 minute. Discard the Receiver Tube with the filtrate. Place the Spin Filter R into a new Receiver Tube.
6. Open the Spin Filter R and add 700 µl Washing Solution LS, close the cap and centrifuge at 11,000 x g (~11,000 rpm) for 1 minute. Discard the Receiver Tube with the filtrate. Place the Spin Filter R into a new Receiver Tube.

NOTE
Depending on sample material used an additional washing step with 700 µl of 80 % ethanol may increase purity of isolated RNA.

7. Centrifuge at 11,000 x g (~11,000 rpm) for 3 minutes to remove all traces of ethanol. Discard the Receiver Tube.
8. Place the Spin Filter R into an Elution Tube. Carefully open the cap of the Spin Filter R and add 30–80 µl RNase-free Water. Incubate at room temperature for 1 minute. Centrifuge at 11,000 x g (~11,000 rpm) for 1 minute.

NOTE

Depending on the extracted yield or the needed concentration of total RNA you can also elute with different volumes of RNase-free Water. A lower volume of RNase-free Water increases the concentration of RNA and a higher volume of RNase-free Water leads to an increased yield but a lower concentration of total RNA. Please note, that the minimum of RNase-free Water should be 20 µl.

15 Troubleshooting

Problem / probable cause	Comments and suggestions
Clogged Spin Filter	
Insufficient disruption or homogenization	After lysis centrifuge lysate to pellet debris and continue with the protocol using the supernatant. Reduce amount of starting material.
Little or no total RNA eluted	
Insufficient disruption or homogenization	Reduce amount of starting material. Overloading reduces yield!
Incomplete elution	Prolong the incubation time with RNase-free Water to 5 minutes or repeat elution step once again.
DNA contamination	
Too much starting material	Reduce amount of starting material.
Incorrect lysis of starting material	Use the recommended techniques for lysis of cell pellet. Perform DNase digest of the eluate containing the total RNA or perform an on-column DNase digest step after binding of the RNA on Spin Filter R!
Total RNA degraded	
RNA source inappropriately handled or stored	Ensure that the starting material is fresh! Ensure that the protocol, especially the first steps, has been performed quickly.
RNase contamination of solutions; Receiver Tubes, etc.	Use sterile, RNase-free filter tips. Before every preparation clean up the pipette, the devices and the working place. Always wear gloves!
Total RNA does not perform well in downstream applications (e.g. RT-PCR)	
Ethanol carryover during elution	Increase time for removing of ethanol.
Salt carryover during elution	Ensure that Washing Solution HS and Washing Solution LS are at room temperature. Checkup Washing Solution for salt precipitates. If there are any precipitate dissolves these precipitate by carefully warming.

Related Products

Other XXprep Kits:

2710 XXprep Kit for genomic DNA (from Blood, Tissue, Cells, Bacteria)
5482 XXprep Kit for DNA Fragments (from PCR reactions & Agarose gels)
4427 XXprep Kit for Plasmid DNA

Molecular biology chemicals and solutions:

1110 Agarose Basic for molecular biology
1057 Agarose low EEO for molecular biology
2276 Agarose low melt for molecular biology
1530 DNA Ladder 100 bp (lyophilized) for molecular biology
1531 DNA Ladder 1 kb (lyophilized) for molecular biology
1121 DNase I for molecular biology
2209 D-PBS (1X) w/o Ca and Mg (pH 7.4) for molecular biology
1340 EDTA for molecular biology
1108 EDTA disodium salt dihydrate for molecular biology
1353 EDTA solution pH 8.0 (0.5 M) for molecular biology
1131 Ethanol absolute for molecular biology
2324 Ethanol 80 % for molecular biology
2009 Ethanol 70 % for molecular biology
1254 Ethidium bromide solution 0.07 % dropping bottle for electrophoresis
1280 Glycerol anhydrous for molecular biology
1073 Glycerol 87 % for molecular biology
1317 LB Agar powder according to Lennox for molecular biology
1321 LB Agar powder according to Miller for molecular biology
1256 Lysozym for molecular biology
1496 2-Propanol for molecular biology
1263 RNase A (DNase-free) for molecular biology
1458 TE buffer (100X) pH 8.0 for electrophoresis
1115 Tris for molecular biology
1999 Tris Puffer pH 8.0 (1 M) for molecular biology
2001 Tris Puffer pH 7.5 (1 M) for molecular biology
1328 Tris hydrochloride for molecular biology
1058 Water for molecular biology

Everything is possible with us!

neoFroxx beyond – we get everything you need

You still did not find the right product? Contact us. Our product specialists will be happy to assist!

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