Instruction Manual

FastRNA™ *Win* Kit for Plant

Size: 50 preps/Sample Kit: 6 preps

Storage: Ambient Temperature – 15-30°C

Cat. No.: 116080050/116080000

Protocol Revision: #116080050-201909/#116080000-201909

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1. Introduction

The FastRNA™ *Win* Kit for Plant is designed to isolate and purify high quality total RNA from plant tissues and cells in a spin filter format. Efficient lysis of the starting material and simultaneous inactivation of endogenous RNases is achieved by mixing the sample with the lysis buffer in a tube containing a specifically selected lysing matrix, and then processing the sample in a FastPrep® homogenizer to release total cellular RNA, DNA and proteins.

FastPrep® instruments are high-speed, benchtop devices that use a unique, optimized motion to homogenize samples by multidirectional, simultaneous impaction with lysing matrix particles. FastPrep® instruments provide an extremely quick and highly reproducible homogenization that surpasses traditional lysis methods using enzyme digestion, sonication, blending, douncing and vortexing.

Following the FastPrep® homogenization, genomic DNA is separated from the total RNA by binding to specially optimized mineral carrier particles included in the lysis buffer. DNase-digestion to remove contaminating genomic DNA is therefore, most often, not necessary.

After a centrifugation step to pellet the genomic DNA, the supernatant containing total RNA is mixed with ethanol and transferred to a spin filter containing an RNA binding membrane. The RNA then binds, contaminants are washed away, and the pure RNA is eluted.

The FastRNA™ *Win* Kit for Plant is the ideal tool for reliable and fast isolation and purification of high quality total RNA from up to 100 mg or 1 x 10^7 cells of plant material. All RNA molecules longer than 200 nucleotides are purified, and the procedure provides enrichment for mRNA since most RNAs <200 nucleotides are selectively excluded. The size distribution of the purified RNA is comparable to that obtained by centrifugation through a CsCl cushion, where small RNAs do not sediment very efficiently.

For some studies, a simultaneous investigation of RNA and cell specific proteins may be necessary. Therefore, this manual includes an isolation protocol of RNA and intracellular proteins from the same sample.

1.1 Principle and procedure

The FastRNA *Win* Kit for Plant procedure is based on the following steps:

- Homogenization of the plant material and cell lysis
- Genomic DNA removal
- Total RNA binding to a membrane
- Washing of contaminants and ethanol removal
- Elution of pure total RNA

1 Sample homogenization

Efficient and complete disruption and homogenization of plant tissue samples are essential for the isolation of high yields of total RNA.

Designed for use with the FastPrep® instruments from MP Biomedicals, plant tissues, including stems, roots, leaves, buds, flowers, fruits and seeds are easily lysed within seconds. These benchtop devices use a unique, optimized motion to homogenize samples by multidirectional, simultaneous impaction with lysing matrix particles.

Samples are placed into 2.0 mL tubes containing Lysing Matrix Z, a 2 mm specially stabilized zirconium oxide particles mix designed to efficiently lyse a wide variety of Plantae kingdom specimens, while in the presence of a specially formulated lysis buffer.

Two lysis buffers are included in the FastRNA™ *Win* Kit for Plant: the Lysis Solution PS, designed for plants showing a high polysaccharide content, and the Lysis Solution PH, developed for plants showing a high phenol content.

A single 40 second run at a speed setting of 6.0 in the FastPrep instrument will thoroughly lyse most plant samples. If the user experimentally determines that additional processing time is required, the sample should be incubated on ice in the Lysing Matrix Z tube for at least 2 minutes between successive FastPrep instrument homogenizations to prevent sample heating and possible RNA degradation.

Alternatively, plant samples can be processed in a FastPrep instrument combined with the CoolPrep™ adapter (Cat. No. 116002528). This adapter helps ensure efficient cooling of the samples as dry-ice, placed into the cooling chamber, is in direct contact with the sample tubes.

Due to a high heat transfer capacity and FastPrep precise lysis parameter settings, the samples can be repeatably homogenized without an increase in temperature.

2 Genomic DNA removal

The Lysis Solutions PS and PH both contain mineral carrier particles, which efficiently bind DNA. The particle-bound DNA is removed from the solution by centrifugation: the genomic DNA (bound to the mineral carrier particles) is pelleted down together with the cell debris and Lysing Matrix beads immediately after the homogenization step and the total RNA is found in the supernatant.

For most applications, DNase-digestion to remove contaminating genomic DNA is not necessary. However, some RNA applications are very sensitive to DNA contaminations. An optional DNase digestion can therefore be performed. If the DNase digestion is carried out during the RNA purification, the DNase will be removed completely in the wash steps of the RNA binding Spin Filter.

3 Total RNA binding

The RNA-containing supernatant is filtered through a Prefilter. After centrifugation, the total RNA is found in the flow-through. Ethanol is added to adjust the RNA binding conditions. The solution is then transferred to the RNA binding Spin Filter and the RNA is bound on the membrane during centrifugation.

4 Residual contaminants removal

Contaminants are efficiently washed away using RNA Wash Buffers 1 and 2, while the RNA remains bound to the membrane of the RNA binding Spin Filter.

5 Elution of pure total RNA

Total RNA is eluted from the membrane using 30–60 µL RNA Elution Buffer (or RNase free water). The eluted RNA is ready for use in various downstream applications.

1.2 Sampling and storage of starting material

Ideal results are obtained using fresh plant material. If samples need to be frozen, it is essential that cells are immediately flash frozen after the plant tissue harvest and are stored at -80°C. Total RNA is preserved as long as samples are shock-frosted or incubated with RNase inhibitors or denaturing reagents.

RNA from deep frozen samples is stable for months. Frozen tissue should not be thawed during handling. RNA purification should be processed as soon as possible.

Samples can be stored in Lysis Solution PS/ Lysis Solution PH at -80°C after the homogenization step.

To avoid overloading the binding filter, weighing tissues or direct counting of cells is recommended to determine the amount of starting material.

1.3 Amount of starting material

Optimal RNA yield and purity can be obtained with the correct amount of starting material. A maximum amount of 100 mg plant material or 1 x 10^7 cells can generally be processed. For most plant materials, the RNA binding capacity of the RNA Spin Filter will not be exceeded by these amounts.

1.4 Expected yield and quality of total RNA

The FastRNA *Win* Kit for Plant allows purification of up to 80 µg of high quality total RNA from up to 100 mg or 1 x 10^7 cells of plant material. The procedure takes about 15 minutes after lysis of the starting material. Expected A_{260}/A_{280} ratios are around 1.6–2.0. The extracted RNA contains enriched mRNA. The particle size distribution of purified RNA is similar to results obtained using CsCl - gradients.

1.5 Downstream Applications

Total RNA isolated with the FastRNA *Win* Kit for Plant has a high purity and is ready to use for a broad range of downstream applications, including:

- Northern Blot
- RNA dot blots
- in vitro translation
- RT-PCR
- DDRT-PCR
- cDNA-library
- TaqMan® analysis and array technologies

2. Kit Components and User Supplied Materials

2.1 FastRNA *Win* Kit for Plant Components

Product	50 preps	Cat. No.	6 preps (Sample Kit)	Sample Cat. No.
Lysing Matrix Z tubes	50 x 2 mL tubes	116961050	6 x 2 mL tubes	116961006
Lysis Solution PS	50 mL	116080051	4 mL (for 3 extractions only)	116080001
Lysis Solution PH	50 mL	116080052	4 mL (for 3 extractions only)	116080002
RNA Wash Buffer 1	20 mL (final volume 40 mL)	116080053	15 mL (ready to use)	116080003
RNA Wash Buffer 2	2 x 12 mL (final volume 2 x 60 mL)	116080054	15 mL (ready to use)	116080004
RNA Elution Buffer	2 x 2 mL	116080055	2 mL	116080005
Prefilter	50	116080056	6	116080006
RNA Spin Filter Set	50	116080057	6	116080007
2.0 mL Collection Tubes	50	116080058	6	116080008
1.5 mL Elution Tubes	50	116080059	6	116080009
Manual	1	-	1	-

2.2 Kit Storage

Components and buffers in the FastRNA *Win* Kit for Plant are stable at room temperature (15–30°C). All buffers should be stored well sealed and dry and are stable for at least 12 months under these conditions.

RNA Wash Buffer 1 and 2 with added ethanol should be appropriately sealed.

If precipitates appear in the provided solutions, they can be dissolved by carefully warming at room temperature (up to 30°C).

Store 1 M DTT solution (not provided) at -20°C to prevent oxidative damage. Under this condition, the solution of 1 M DTT is stable for 12 months. If the kit components are consumed in more than one run it is recommended to aliquot the 1 M DTT solution to minimize the number of freezing and thawing cycles.

2.3 User Supplied Materials

- FastPrep homogenizer or equivalent bead-beating instrument
- Microcentrifuge
- 96–100 % ethanol
- Sterile RNase-free pipet tips
- DTT or β-Mercaptoethanol

3. FastRNA *Win* Kit for Plant Protocol

3.1 Reagents and Buffers Preparation

For all FastRNA *Win* for Plant Kits

1. Adjust **Lysis Solution PS / Lysis Solution PH** with 1/100 volume of 1 M DTT. It is possible to replace DTT with β-Mercaptoethanol. In this case, adjust **Lysis Solution PS/ Lysis Solution PH** with 1/100 volume of β-Mercaptoethanol.

   Due to the instability of dissolved DTT or β-Mercaptoethanol under oxidative conditions, do not mix the entire Lysis Solution with DTT or β-Mercaptoethanol. For the 50 preparations kit, we recommend preparing only the volume needed for the number of samples that will be processed in one run. Store the remaining **Lysis Solution PS/ Lysis Solution PH** and DTT or β-Mercaptoethanol separately in accordance to the storage instructions.

2. Shake **Lysis Solution PS/ Lysis Solution PH** gently before use to homogenize the DNA-binding mineral carrier particles. Wait briefly before using until foam formation is reduced.

For the 50 preps FastRNA *Win* for Plant Kit

1. Prepare Lysis Solution as described in previous section.

2. Add 20 mL 96–100% ethanol to the bottle of **RNA Wash Buffer 1**

3. Add 48 mL 96–100% ethanol to each bottle of **RNA Wash Buffer 2**

3.2 Extraction Scheme of the FastRNA *Win* Kit for Plant Protocol

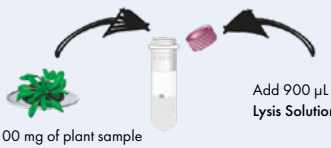
Please read protocols carefully prior to the start of the preparation procedure. Perform all extraction steps at room temperature.

NOTE: Homogenize the carrier in the Lysis Solution PS or PH by shaking and mix it with DTT or β-Mercaptoethanol prior to use.

1. Prepare the Sample

NOTE: Prevent thawing of the starting material

Transfer plant material into the **Reaction Tube** prefilled with **Lysing Matrix Z**



Up to 100 mg of plant sample

Add 900 µL **Lysis Solution PS** or **Lysis Solution PH**

2. Homogenize with the FastPrep instrument *(or similar instrument)*

40 sec

Load tube in FastPrep instrument.
Process: 40 s at a speed setting of 6.0 m/s.
Repeat up to three times (optical control)

1 min
max speed

Centrifuge for 1 minute at maximum speed.

3. gDNA Removal

1 min
11,000 x g

Place **Prefilter** in a 2.0 mL **Collection Tube**.
Transfer supernatant into **Prefilter**.

Centrifuge for 1 min at 11,000 x g.
Discard the **Prefilter**.

4. RNA Binding

Add 500 µL of **96–100% ethanol**.
Mix thoroughly by pipetting up and down.

Transfer lysate into RNA binding **RNA Spin Filter**.

2 mins
11,000 x g

Centrifuge for 2 mins at 11,000 x g.
Discard flow-through and place **RNA Spin Filter** back into the RNA Receiver Tube.

Transfer residual sample into the same RNA binding **RNA Spin Filter.**

1 min
11,000 x g

Centrifuge for 1 min at 11,000 x g.
Discard flow-through and place **RNA Spin Filter** back into the RNA Receiver Tube.

Continued on next page

5. Wash

Pipet 500 µL **RNA Wash Buffer 1**

1 min
11,000 x g

Centrifuge for 1 min at 11,000 x g.
Discard flow-through and reuse
RNA Receiver Tube.

Pipet 700 µL **RNA Wash Buffer 2**

1 min
11,000 x g

Centrifuge for 1 min at 11,000 x g.
Discard flow-through and reuse
RNA Receiver Tube.

Repeat this step once.

6. Dry

4 mins
max speed

Centrifuge for 4 min at maximum speed
to eliminate any traces of ethanol.
Discard RNA Receiver Tube.

7. Elute

Transfer **RNA Spin Filter** into
RNase free **Elution Tube**.

Pipet 30-60 µL of **Elution Buffer R**.

2 mins

Incubate for 2 minutes.

1 min
11,000 x g

Centrifuge for 1 min at 11,000 x g.
Discard the **RNA Spin Filter**

Place eluted total RNA immediately on ice.

3.3 Detailed protocol

3.3.1 Protocol for total RNA extraction from plant specimens

1 **Choice of Lysis Solution**

Simultaneous with cell lysis, genomic DNA is fixed at the surface of the nucleic acid binding mineral carrier particles present in the **Lysis Solution PS** or **Lysis Solution PH**. Selective binding of the DNA is assured by optimized buffer conditions that keep undesired binding of the RNA to a minimum. Some secondary metabolites of plants are able to bind to the DNA-binding carrier particles and block the interaction with the DNA. Thus, the complete removal of DNA can be disturbed. To avoid this effect, **Lysis Solution PS** is optimized for plant material showing a high polysaccharide concentration, and **Lysis Solution PH** is adapted to plant material with high phenol content.

Depending on the content and type of secondary metabolites in some plant materials, guanidine thiocyanate can cause solidification of the sample. In this case, the use of **Lysis Buffer PH** is recommended.

Recommendations for the use of Lysis Solutions PH or PS:

Lysis Solution PH for phenol containing plants	*Lysis Solution PS for polysaccharide containing plants*
Allium cepa[3]	*Actinidia deliciosa*
Arabidopsis thaliana[1]	*Beta vulgaris*
Ascomyceten	*Brassica napus*[1]
Brassica oleracea[1]	*Chlorophyceae*
Casuarina [1/3/5] *(Australian tree)*	*Fungi*
Fusarium avenaceum[4]	*Hordeum vulgare*[1]
Gossypium spec.[1]	*Solanum tuberosum*[1]
Lycopersicon esculentum[1]	*Arabidopsis thaliana*[1]
Malus sylvestris[1]	*Nicotiana tabacum BY-2*
Mangifera indica	
Nicotiana tabacum[1]	
Oryza sativa[2]	
Picea abies	
Rosa hybrida[1]	
Solanaceae[1]	
Vitis vinifera[1]	
Zea mays	

[1] Leave; [2] Cotyledone; [3] Root; [4] Mycelium; [5] Bark

Shake **Lysis Solution PS** or **Lysis Solution PH** gently before use. Add DTT or β-Mercaptoethanol. Wait briefly before using until foam formation is reduced.

2 Cell/ Tissue Disruption

Add up to 100 mg of plant tissues or 1 x 10^7 cells and 900 µL of **Lysis Solution PS** or **Lysis Solution PH** to the **Lysing Matrix Z tubes**.

The final total volume of the Lysing Matrix tube must maintain at least 5 mm air space in the tube during FastPrep® instrument processing. Sample loss or tube failure may result from overfilling the Lysing Matrix tube.

The Lysing Matrix tube cap must be secure, but not overtightened, to prevent sample leakage. If the sample is too large for processing in a single tube, divide the sample and process using multiple tubes.

Load the **Lysing Matrix Z tube** into the FastPrep® instrument and process samples for one to three runs of 40 seconds at speed 6.0 m/s.

3 Genomic DNA Removal

After the homogenization with the FastPrep® instrument, centrifuge the Lysing Matrix tubes at maximum speed for 1 minute.

Place the **Prefilter** into a 2.0 mL **Collection Tube**.

Transfer the cleared supernatant carefully into the **Prefilter**. Centrifuge for 1 minute at 11,000 x g. Discard the **Prefilter**. The RNA is in the filtrate (approximately 800 µL).

4 RNA binding conditions adjustment

Add 500 µL of 96–100 % **ethanol** to the filtrate. Mix very well by pipetting up and down several times. It is important to mix the lysate completely with the ethanol.

5 Total RNA Binding to the RNA Spin Filter

Transfer approximatively 750 µL of the lysate to a **RNA Spin Filter** (placed in a Receiver Tube). Incubate for 1 min and centrifuge at 11,000 x g for 2 min.

Discard the flow-through and place the **RNA Spin Filter** back into the Receiver Tube. Reload the **RNA Spin Filter** with the residual volume of lysate and centrifuge again for 1 minute. Discard the flow-through and place the **RNA Spin Filter** back into the Receiver Tube.

6 RNA Spin Filter wash 1

Add 500 µL **RNA Wash Buffer 1** to the **RNA Spin Filter** and centrifuge for 1 minute at 11,000 x g.

Discard the flow-through and reuse the Receiver Tube.

7 Wash 2

Add 700 µL **RNA Wash Buffer 2** to the **RNA Spin Filter** and centrifuge for 1 minute at 11,000 x g. Discard the flow-through and reuse the Receiver Tube.

Repeat this washing step once more.

8 Drying of the RNA Spin Filter

Centrifuge for 4 minutes at 11,000 x g to eliminate any traces of ethanol. Discard the Receiver Tube.

9 Elution of total RNA

Transfer the **RNA Spin Filter** into a RNase-free **Elution Tube**.

Add 30–60 µL of **RNA Elution Buffer** directly to the membrane of the **RNA Spin Filter**.

Incubate for 2 minutes and centrifuge for 1 minute at 11,000 x g.

Discard the **RNA Spin Filter** and place the eluted total RNA immediately on ice.

NOTE: Depending on the expected yield or the required concentration, total RNA can be eluted with different volumes of RNA Elution Buffer. A lower volume of RNA Elution Buffer will increase the concentration of RNA and a higher volume of RNA Elution Buffer will lead to an increased yield but lower concentration of total RNA. The minimum volume of Elution Buffer should be 30 µL.

3.3.2 Supplemental protocol for DNA digestion on the RNA Spin Filter

For applications requiring complete removal of DNA, such as RT-qPCR, we recommend a DNase digestion directly on the **RNA Spin Filter**.

Therefore, change Step 7 in the protocol according to the following procedure:

RNA Spin Filter wash 2

Add 700 µL **RNA Wash Buffer 2** to the **RNA Spin Filter** with the bound RNA and centrifuge for 1 minute at 11,000 x g.

Discard the flow-through and place the **RNA Spin Filter** back into the Receiver Tube.

Add 10 µL of a DNase reaction mixture at a concentration of 5U/µL (Cat. No. 0219006210) directly to the center of the **RNA Spin Filter** membrane. Incubate the **RNA Spin Filter** at room temperature for 10 min.

Add 600 µL **RNA Wash Buffer 2** to the **RNA Spin Filter**, and incubate for 1 minute. Centrifuge for 1 minute at 11,000 x g. Reuse the Receiver Tube.

Repeat this washing step once more and follow the protocol further from step 8.

3.3.3 Supplemental protocol for simultaneous isolation of RNA and proteins

Simultaneous preparation of RNA and proteins from the same sample is possible when following the protocol below.

IMPORTANT NOTE: The buffer solutions for RNA purification promote denaturing conditions due to the presence of salts. Proteins isolated according to the protocol below are denatured and can be analyzed by SDS-PAGE or Western Blot. Experiments requiring the native state of the proteins (e.g. interaction assays) are excluded.

1 **Collection of protein containing material**

The protein fraction is found in the flow-through of the **RNA Spin Filter** in the purification protocol at step 5. Measure the volume of the flow-through.

2 **Precipitation of proteins**

Add a three-fold volume of ice cold **acetone** and mix well by vortexing. Centrifuge for 10 minutes at 13,000 x g at 4°C. Discard the supernatant. Be careful not to remove the pellet.

3 **Washing step**

Add 500 µL of ice cold **ethanol** and centrifuge for 3 minutes at 13,000 x g at 4°C. Discard the supernatant. Be careful not to remove the pellet.

4 **Protein resuspension**

Dissolve the protein pellet by suspending in a buffer solution suitable for the subsequent application. For SDS-PAGE, directly dissolve proteins in 1-fold Laemmli Buffer and heat at 99°C for 5 minutes.

4. Troubleshooting

4.1 Low A_{260}/A_{280} values

Problem / Probable Cause	Suggestions / Comments
RNA sample is diluted in water	Do not use RNase-free water to dilute the sample for measuring RNA purity. Use of a neutral buffer (10 mM Tris/HCl, pH 7.0) is recommended.
Protein contamination of RNA	Use less sample. Repeat washing step.
RNA sample is to strong diluted	Sample concentration is out of the range of the photometer.

4.2 Total RNA does not perform well in downstream applications (e.g. RT-PCR)

Problem / Probable Cause	Suggestions / Comments
Ethanol carryover during elution	Increase g-force or centrifugation time when drying the RNA Spin Filter.
Salt carryover during elution	Ensure that RNA Wash Buffer 1 and 2 are stored at room temperature. Check RNA Wash Buffer 1 and 2 for salt precipitates. If precipitates are present, dissolve them by careful warming.

4.3 DNA contamination

Problem / Probable Cause	Suggestions / Comments
Too much starting material	Reduce amount of starting material. DNase digestion of the eluate containing the total RNA.
Suboptimal homogenization of DNA binding carrier	Shake Lysis Solution PS/ Lysis Solution PH carefully before use.
Plant material contains DNA binding inhibitors	In subsequent preparations, reduce the amount of starting material and/ or increase volume of Lysis Solution PS or PH. Perform a DNase digestion from the eluate.

4.4 Clogged RNA Spin filter

Problem / Probable Cause	Suggestions / Comments
Insufficient homogenization of the starting material	Increase the time of homogenization with the FastPrep® instrument. After processing with the FastPrep® instrument, spin the lysate to pellet debris and continue with the protocol using the supernatant and increased g-force and/ or centrifugation times. All centrifugation steps should be conducted at room temperature.
Too much starting material	In subsequent preparations, reduce the amount of starting material and/ or increase volume of Lysis Solution PS or PH
Very viscous or gel-like lysate after addition of Lysis Solution PS or PH to plant material	If the plant material contains too much DNA, the carrier with the bound DNA will be too viscous to pipet after homogenization. In this case, divide the sample into two aliquots and adjust the volume of each aliquot to 900 µL with Lysis Solution PS or PH; continue with the procedure from this step.

4.5 Little or no total RNA eluted

Problem / Probable Cause	Suggestions / Comments
Insufficient disruption or homogenization	Reduce the amount of starting material. Overloading the filter column reduces the yield.
Incomplete elution	Prolong the incubation time with RNA Elution Buffer to 5–10 min or repeat elution step once more. Elute a second time with 100 µL RNA Elution Buffer and incubate RNA Spin Filter at room temperature (15–25°C) for 5 min prior to centrifugation.
Alcohol not added to the RNA Wash Buffer 1 and 2	Check that RNA Wash Buffer 1 and RNA Wash Buffer 2 concentrates were diluted with the correct volume of 96–100% ethanol. Do not use denatured alcohol, which contains other substances such as methanol or methylethylketone. Repeat the purification procedure with a new sample.

4.6 Degraded RNA

Problem / Probable Cause	Suggestions / Comments
Inappropriate handling of the starting material	RNA purification protocol should be performed quickly. Plant material stored at -80°C for later processing should be immediately frozen after cell harvest by liquid nitrogen treatment.
Lysis Solution PS/ PH does not contain DTT or β-Mercaptoethanol	Ensure that DTT or β-Mercaptoethanol has been added to the Lysis Solution PS/ Lysis Solution PH.
RNase contamination	Check for RNase contamination of buffers. Be certain not to introduce any RNase throughout the procedure or during further handling for analysis.

5. Related Products

Description	Size	Cat. No.
FastRNA™ Pro Green Kit	50 preps	116045050
FastDNA™ SPIN Kit for Plant and Animal Tissue	100 preps	116540800
Lysing Matrix Z tubes	50 tubes	116961050
	100 tubes	116961100
	500 tubes	116961500

6. Product Use Limitation and Warranty

Unless otherwise indicated, this product is for research use only. Purchase of MP Biomedicals products does not grant rights to reproduce, modify, or repackage the products or any derivative thereof to third parties. MP Biomedicals makes no warranty of any kind, expressed or implied, including merchantability or fitness for any particular purpose, except that the products sold will meet our specifications at the time of delivery. Buyer's exclusive remedy and the sole liability of MP Biomedicals hereunder shall be limited to, at our discretion, no replacement or compensation, product credits, refund of the purchase price of, or the replacement of materials that do not meet our specification. By acceptance of the product, Buyer indemnifies and holds MP Biomedicals harmless against, and assumes all liability for, the consequence of its use or misuse by the Buyer, its employees or others, including, but not limited to, the cost of handling. Said refund or replacement is conditioned on Buyer notifying MP Biomedicals within thirty (30) days of receipt of product. Failure of Buyer to give said notice within thirty (30) days shall constitute a waiver by the Buyer of all claims hereunder with respect to said material(s).

The kit was not tested on its ability to desalinate RNA or for RNA purification from enzymatic reactions, like Proteinase digestion, RNA ligation or labeling reactions.

7. Safety Information

Always wear a suitable lab coat, disposable gloves, and protective goggles when working with chemicals. For more information, please consult the appropriate safety data sheets (SDS).

AVOID SKIN CONTACT! Adhere to the legal requirements for working with biological material.

European Community risk and safety phrases for the components of the FastRNA *Win* for Plant Kit are listed below:

Lysis Solution PS

Contains: Guanidinthiocyanate
Warning
(H302-312-332-412 EUH032 P273)

RNA Wash Buffer 1

Contains: Guanidinthiocyanate
Warning
(H302-312-332-412 EUH032 P273)

Lysis Solution PH

Contains: Guanidinhydrochloride
Warning
(H302-315-319 P280-305-351-338)

H302	Harmful if swallowed
H312	Harmful in contact with skin
H315	Causes skin irritation
H319	Causes serious eye irritation
H332	Harmful if inhaled
H412	Harmful to aquatic life with long lasting effects
EUH032	Contact with acids liberates very toxic gas
P273	Avoid release to the environment
P280	Wear protective gloves/protective clothing/eye protection/face protection
P305-351-338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

One Call. One Source. A World of Sample Preparation Products.

- Apoptosis
- Cell Biology
- Culture Growth Media
- FastPrep® Sample Prep
- Immunology
- Molecular Biology
- Adsorbents
- Biochemicals
- Fine Chemicals
- Labware
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- Research Diets
- SafTest™ Food Quality
- Diagnostics
- Drugs of Abuse
- Infectious Disease
- EIA/RIA

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