Ver 3.0

Hybrid-R™

For total RNA isolation from tissues and cultured cells

RNA PURIFICATION HANDBOOK

GeneAll

Customer & Technical Support

Should you have any further questions, do not hesitate to contact us.

We appreciate your comments and advice.

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www.geneall.com

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This protocol handbook is included in :

GeneAll® Hybrid-R™ (305-101)

Visit www.geneall.com for FAQ, Q&A and more information.

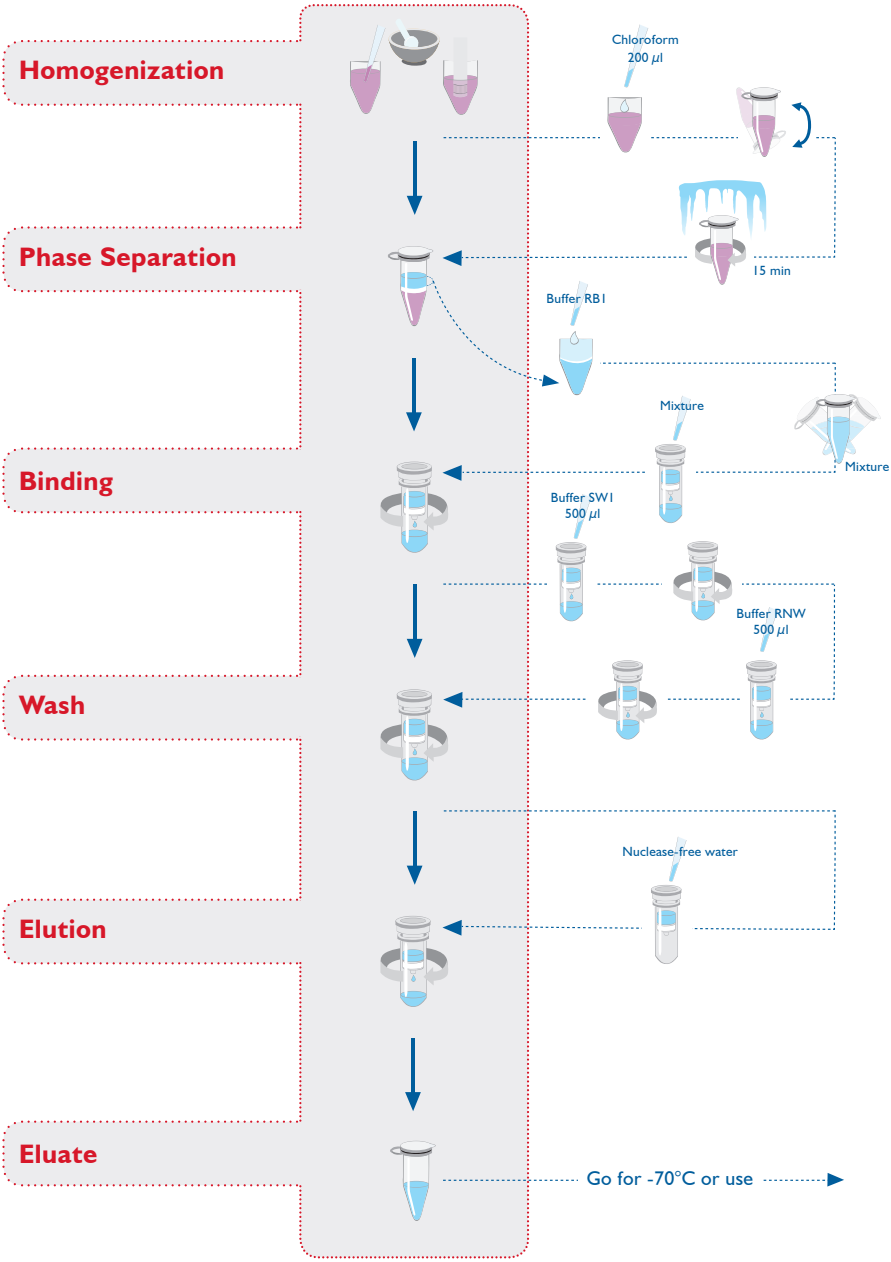
Brief Protocol

Hybrid-R™

Homogenization	Homogenize ~100 mg tissue samples or ~1 x 10^7 cells per 1 ml RiboEx™. Incubate the homogenate for 5 min at RT.
Phase Separation	Add 200 µl chloroform and mix vigorously. Incubate the mixture for 2 min at RT. Centrifuge at 12,000 x g for 15 min at 4°C, then transfer the aqueous phase to a fresh tube.
Binding	Add 1 volume of Buffer RB1 to the sample and mix thoroughly by inverting. *Do NOT centrifuge. Transfer (up to 700 µl) the mixture to a mini column and centrifuge at ≥10,000 x g for 30 sec (repeat this step to bind all mixture).
Wash	Add 500 µl Buffer SW1 to the mini column and centrifuge at ≥10,000 x g for 30 sec. Add 500 µl Buffer RNW to the mini column and centrifuge at ≥10,000 x g for 30 sec. Centrifuge at ≥10,000 x g for an additional 1 min.
Elution	Add 50~100 µl Nuclease-free water to the center of the membrane in the mini column. Let it stand for 1 min. Centrifuge at ≥10,000 x g for 1 min.

Brief Protocol

Hybrid-R™



INDEX

Kit Contents

Cat. No.	305-101	Storage
Components	**Quantity**	
RiboEx™	100 ml	2~8°C
Buffer RB1 (concentrate) *	15 ml	Room temperature (15~25°C)
Buffer SW1	55 ml	
Buffer RNW (concentrate)* †	12 ml	
Nuclease-free water	20 ml	
Column Type F (mini) (with collection tube)	100	
1.5 ml microcentrifuge tube	100	
Protocol Handbook	1	

** Before first use, add absolute ethanol (ACS grade or better) into Buffer RB1 and RNW as indicated on the bottle.*

† Contains sodium azide as a preservative

Materials Not Provided

Reagent

* Absolute ethanol (ACS grade or better)
* Chloroform or 1-bromo-3-chloropropane (BCP)

Disposable material

* RNase-free pipette tips
* Disposable gloves

Equipment

* Equipment for homogenizing solid tissue
* Microcentrifuge capable of attaining 12,000 x g at 4°C and room temperature
* Suitable protector (eg. lab coat, disposable gloves, goggles, etc.)

Product Specifications

Hybrid-R™	
Size	mini
Format	Spin
Maximum amount of starting samples	~100 mg or ~1 x 10^7 cells
Maximum loading volume	~700 μl
Minimum elution volume	~30 μl
Maximum binding capacity	~500 μg

Typical Total RNA Yields from Various Samples

Samples	Starting amount	Yield (μg)
Cultured cell (Raw264.7)	1 x 10^6 cells	10~15
Cultured cell (Jurkat)	1 x 10^6 cells	4~7
Cultured cell (NIH3T3)	1 x 10^6 cells	3~6
Cultured cell (K562)	1 x 10^6 cells	10~12
Brain	100 mg	37~47
Kidney	10 mg	35~45
Liver	50 mg	46~55
Spleen	50 mg	50~55
Skin	100 mg	35~85
Bacteria	1 x 10^9 cells	15~25
Yeast	1 x 10^9 cells	10~15
Soil	500 mg	10~12

Quality Control

All components of GeneAll® Hybrid-R™ are manufactured in strictly clean conditions, and their its degree of cleanliness is monitored periodically.
To maintain consistency, a quality control process is carried out thoroughly from lot to lot and only the qualified kits are approved for delivery according to ISO 9001:2008 and EN ISO13485:2012.

Storage Conditions

GeneAll® Hybrid-R™ except RiboEx™ solution should be stored at room temperature (15~25°C).
RiboEx™ solution should be stored at 2 to 8°C for optimal performance.
GeneAll® Hybrid-R™ is guaranteed until the expiration date printed on the product box.

Safety Information

GeneAll® Hybrid-R™ contains phenol and guanidine salt which are harmful as an irritant when in contact with skin or eyes, or when inhaled or swallowed. Care should be taken when handling such material. Always wear gloves and eye protection, and follow standard safety precautions.
RiboEx™, Buffer RB1, and SW1 contain chaotropes, which can form highly reactive compounds when combined with bleach. Do NOT add bleach or acidic solutions directly to the sample-preparation waste.

Prevention of RNase Contamination

RNase can be introduced accidentally during RNA purification. Wear disposable gloves always, because skin often contains bacteria and molds that can be a source of RNase contamination. Use sterile, disposable plastic wares and automatic pipettes to prevent cross-contamination of RNase from shared equipment.

Product Description

Hybrid-R™ is a complete kit with ready-to-use reagent for the isolation of total RNA from tissue samples or cultured cells.

This kit utilizes the lysis method of RiboEx™ which has a powerful ability of lysis and the purification method based on glassfiber membrane technology. A fast and convenient procedure of Hybrid-R™ takes only 30 min for complete preparation of pure RNA.

Samples are homogenized in RiboEx™, a monophasic solution containing phenol and guanidine salt, which rapidly lyses cells and inactivates nucleases. Addition of chloroform in lysate brings about a separation of the homogenate into aqueous and organic phases. RNA locates in the aqueous phase while DNA and protein remain in the interphase and organic phase. The aqueous phase including RNA is mixed with Buffer RB1, RNA binding buffer, and then binds to a mini column. After washing with Buffer SW1 and RNW, RNA is eluted in Nuclease-free water.

Hybrid-R™ is suitable for RNA preparation from 100 mg tissues or 1×10^7 cultured cells. The maximum yield reaches 500 μg per 100 mg tissues. The purified RNA is suitable for isolation of Poly A RNA, Northern blotting, dot blotting, in vitro translation, cloning, RT-PCR, RNase protection assays, and other analytical procedures.

PROTOCOL FOR

Hybrid-R™

1. Homogenize ~100 mg tissue samples in 1 ml RiboEx™. Homogenize ~1x10^7 cells in 1 ml RiboEx™.

Tissue samples

Homogenize ~100 mg of tissue samples in 1 ml RiboEx™ using homogenizer. The sample volume should not exceed 10% (w/v) of the volume of RiboEx™ used for homogenization.

Handling fresh tissue

Immediately after dissection, inactivate RNases by any one of the following treatments.

* Homogenize in RiboEx™ immediately.
* Freeze rapidly in liquid nitrogen.
* Submerge in a tissue storage buffer to protect RNA from RNases.

Cell samples

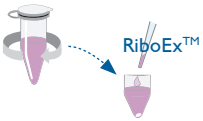
Cells grown in monolayer

Pour off media, add 1 ml RiboEx™ per 10 cm^2 of culture dish area. Pass the cell lysate several times through a pipette. An insufficient amount of RiboEx™ may result in contamination of the isolated RNA with DNA.

Cells grown in suspension

Pellet cells by centrifugation, then lyse in 1 ml RiboEx™ per ~1 x 10^7 animal cells, or 1 x 10^7 bacterial cells, by repetitive pipetting or vortexing.

* Do not wash cells before lysing with RiboEx™ as this may contribute to mRNA degradation.



2. Incubate the homogenate for 5 min at room temperature.

This step allows nucleoprotein complexes to completely dissociate.

Homogenized samples can be stored at -70°C for at least one month.

3. *(Optional:)* Centrifuge at 12,000 x g for 10 min at 4°C and transfer the supernatant to a fresh tube.

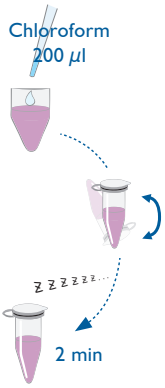
This optional step is only required for homogenate with high contents of proteins, fats, polysaccharides or extracellular materials such as muscles, fat, tissue, and tuberous parts of plants.

The resulting pellet contains extracellular membranes, polysaccharides, and high molecular weight DNA, while the supernatant contains RNA.

Fat tissue samples will form a layer on top of the aqueous phase, therefore, remove and discard this layer.

4. Add 200 µl chloroform per 1 ml RiboEx™. Shake vigorously for 15 sec and incubate for 2 min at room temperature.

Alternatively, 100 µl BCP (1-bromo-3-chloropropane) can be used in place of chloroform.



5. Centrifuge at 12,000 x g for 15 min at 4°C and transfer the aqueous phase to a fresh tube.

The mixture will be separated into three phases; a lower layer, an interphase, and a colorless upper aqueous layer. The upper aqueous layer is about 50% of the volume of RiboEx™ used for homogenization.

Centrifugation at temperatures >8°C may cause some DNA to partition in the aqueous phase.

6. Add 1 volume of Buffer RB1 to the sample and mix thoroughly by inverting.
Do not centrifuge.

7. Transfer up to 700 µl of the mixture to a Column Type F (mini).

8. Centrifuge at ≥10,000 x g for 30 sec at room temperature.

Discard the pass-through and reinsert the mini column back into the same tube.

9. Repeat step 7~8 using the remainder of the sample.

Discard the pass-through and reinsert the mini column back into the same tube.

10. Add 500 µl Buffer SW1 to the mini column.

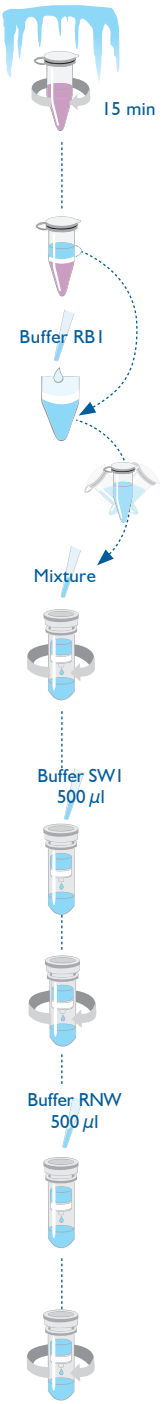
11. Centrifuge at ≥10,000 x g for 30 sec at room temperature.

Discard the pass-through and reinsert the mini column back into the same tube.

12. Add 500 µl Buffer RNW to the mini column.

13. Centrifuge at ≥10,000 x g for 30 sec at room temperature.

Discard the pass-through and reinsert the mini column back into the same tube.



14. **Centrifuge at ≥10,000 x g for an additional 1 min at room temperature to remove residual wash buffer. Transfer the mini column to a new 1.5 ml microcentrifuge tube (provided).**

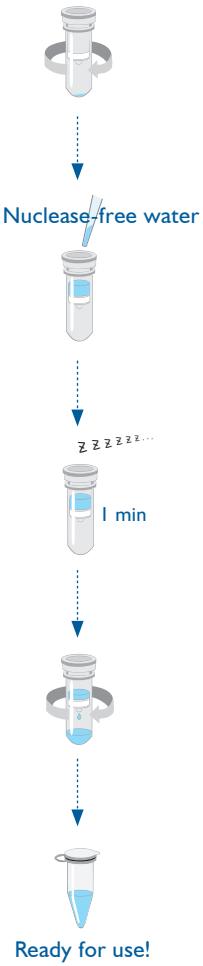
Residual ethanol may interfere with downstream reactions. Care must be taken at this step for eliminating the carryover Buffer RNW.

15. **Add 50~100 µl Nuclease-free water to the center of the membrane in the mini column. Let it stand for 1 min.**

16. **Centrifuge at ≥10,000 x g for 1 min at room temperature.**

Purified RNA can be stored at 4°C for immediate analysis and can be stored at -70°C for long term storage.

The purified RNA is free of DNA and proteins, and A_{260}/A_{280} will be between 1.8 and 2.2.



Troubleshooting Guide

Facts	Possible Causes	Suggestions
Low or no yield	**Poor quality of starting material**	Process the sample immediately after harvest from animal. Thaw the frozen sample directly in RiboEx™.
	Sample not homogenized completely	Make sure no particulate matter remains. Be sure to incubate for 5 min at room temperature after homogenization.
	Some aqueous phase left	Perform second extraction with the remaining aqueous phase.
	Incorrect elution conditions	Add Nuclease-free water to the center of the mini column membrane and perform incubation for 1 min before centrifugation.
Degradation of RNA	**Sample manipulated too much before the addition of RiboEx™**	Process the sample immediately after harvest from animal. For cultured cell, minimize washing steps. Add RiboEx™ directly to plates for a good result. Do not trypsinize cells.
	Improper storage of RNA	Store isolated RNA at -70°C, do not store at -20°C.
	Reagent or disposable is not RNase-free	Make sure to use RNase-free products only.
Low A_{260}/A_{280} (<1.6)	**Aqueous phase was contaminated with the phenol phase**	Avoid carryover when transferring the aqueous phase to a fresh tube.

Facts	Possible Causes	Suggestions
Low A_{260}/A_{280} (<1.6)	**Sample not completely homogenized with RiboEx™**	Use 1 ml RiboEx™ for up to 100 mg tissue or up to 1 x 10^7 cells. Be sure to incubate sample for 5 min at room temperature after homogenization.
Contamination of DNA	**The interphase was co-transfered by mistake**	Be sure not to transfer any of the interphase (containing DNA) to the aqueous phase.
	Insufficient RiboEx™ used	Use 1 ml RiboEx™ for up to 100 mg tissue or up to 1 x 10^7 cells.
	Temperature was too high during centrifugation	The phase separation should be performed at 4°C to allow optimal phase separation and removal of genomic DNA from the aqueous phase.
Cells not detached completely from flask after addition of RiboEx™	**This can be seen with some strongly adherent cells**	After addition of RiboEx™, let cells sit 2~3 min. Scrape cells with a scraper. Incubate for several minutes. Collect and repeatedly pipette cells over flask surface. Then transfer homogenate to a tube.
RNA does not perform well in downstream application	**Residual ethanol remains in eluate**	To remove any residual ethanol included in Buffer RNW from mini column membrane, centrifuge again (Page 13, step 14).

APPENDIX I. Total RNA purification method using RiboEx™ solution only (Manual method)

Hybrid-R™ is simplified method of RiboEx™, manual method, using mini column. Therefore, RiboEx™, lysis buffer of Hybrid-R™, can be used for total RNA purification, independently. This method gives an improved yield up to 30% but the purity will be reduced slightly. Moreover, the whole experimental time will be extended over 1 hour because of the prolonged precipitation and washing steps.

As your experimental purpose, you can use the appropriate method. The procedure of total RNA purification using RiboEx™ is shown below.

Materials Not Provided

* Nuclease-free water
* Equipment for homogenizing solid tissue
* RNase-free centrifuge tubes
* Chloroform or 1-bromo-3-chloropropane (BCP)
* Absolute isopropanol (ACS grade or better)
* Absolute ethanol (ACS grade or better)
* High salt precipitation solution for plant (0.8 M sodium citrate and 1.2 M NaCl)

Protocol for RNA isolation

1. Homogenize 50~100 mg tissue samples in 1 ml RiboEx™.
Homogenize 5~10 x 10^6 cells in 1 ml RiboEx™.

Tissue samples

Homogenize tissue samples in 1 ml RiboEx™ per 50~100 mg of tissue using homogenizer. The sample volume should not exceed 10% of the volume of RiboEx™ used for homogenization.

Handling fresh tissue

Immediately after dissection, inactivate RNases by any one of the following treatments.

* Homogenize in RiboEx™ immediately.
* Freeze rapidly in liquid nitrogen.
* Submerge in a tissue storage buffer to protect RNA from RNase.

Cell samples

Cells grown in monolayer

Pour off media, add 1 ml RiboEx™ per 10 cm^2 of culture dish area. Pass the cell lysate several times through a pipette. An insufficient amount of RiboEx™ may result in contamination of the isolated RNA with DNA.

Cells grown in suspension

Pellet cells by centrifugation, then lyse in 1 ml RiboEx™ per 5~10 x 10^6 animal, plant, or yeast cells, or per 1 x 10^7 bacterial cells, by repetitive pipetting or vortexing.

* Do not wash cells before lysing with RiboEx™ as this may contribute to mRNA degradation.

2. **Incubate the homogenate for 5 min at room temperature.**

   This step allows nucleoprotein complexes to completely dissociate.

   Homogenized samples can be stored at -70°C for at least one month.

3. ***(Optional :)*** **Centrifuge at 12,000 x g for 10 min at 4°C and transfer the supernatant to a fresh tube.**

   This optional step is only required for homogenate with high contents of proteins, fats, polysaccharides or extracellular materials such as muscles, fat, tissue, and tuberous parts of plants. The resulting pellet contains extracellular membranes, polysaccharides, and high molecular weight DNA, while the supernatant contains RNA.

   Fat tissue samples will form a layer on top of the aqueous phase, therefore, remove and discard this layer.

4. **Add 200 μl chloroform per 1 ml RiboEx™. Shake vigorously for 15 sec, incubate for 2 min at room temperature.**

   Alternatively, 100 μl BCP (1-bromo-3-chloropropane) can be used in place of chloroform.

5. **Centrifuge at 12,000 x g for 15 min at 4°C, then transfer the aqueous phase to a fresh tube.**

   The mixture separates into a lower layer, an interphase, and a colorless upper aqueous layer. The upper aqueous layer is about 50% of the volume of RiboEx™ used for homogenization. Centrifugation at above 8°C may cause some DNA to partition in the aqueous phase.

6. **Add 500 μl absolute isopropanol per 1 ml RiboEx™ used for the initial homogenization and gently mix the solution by inverting, 5~10 times.**

   Proteoglycan and polysaccharide contamination

   To RNA precipitate from tissue with high content of proteoglycans and/or polysaccharides

(after step 5), these contaminating compounds from the isolated RNA are removed by the modified method.
Add to the aqueous phase 400 μl isopropyl alcohol and 100 μl of a high salt precipitation solution (0.8 M sodium citrate and 1.2 M NaCl) per 1 ml RiboEx™. After mixing this solution, proceed with the step 7.

This modified precipitation effectively precipitates RNA and maintains proteoglycans and polysaccharides in a soluble form. This procedure should only be used if the sample is known to have a high content of proteoglycans and polysaccharides. To isolate pure RNA from plant material containing a very high level of polysaccharides, the modified precipitation should be combined with an additional centrifugation of the initial homogenate.

7. **Incubate samples for 10 min at room temperature.**

8. **Centrifuge at 12,000 x g for 10 min at 4°C, and discard the supernatant.**
   Carefully remove the supernatant without disturbing the pellet.
   Precipitated RNA forms a gel-like or white pellet on the side and bottom of the tube.
   To increase yield, store sample for 30 min~overnight at -20°C.

9. **Add 1 ml 75% ethanol per 1 ml RiboEx™ to wash the RNA pellet.**
   The RNA precipitate can be stored in 75% ethanol at 4°C for one week, or at -20°C for at least one year.

10. **Centrifuge at 7,500 x g for 5 min. Carefully discard the supernatant, ethanol, and air-dry the RNA pellet for 5 min.**
    The RNA pellet is very loose at this point and care must be taken to avoid missing the pellet.
    Do not completely dry the RNA pellet as this will greatly decrease its solubility.
    Ethanol should be completely removed to perform perfect downstream application.

11. **Dissolve RNA in DEPC-treated water or in 0.5% SDS solution by incubating for 10~15 min at 56°C.**
    The resuspension volume is applied to samples. For example, enough resolution volume is 50~100 μl per 1 ml reaction for E. coli, cultured cell, or plant, or 300~500 μl per 1 ml reaction for tissue. For immediate analysis, store at 4°C and for long term storage, store at -70°C. For best results in RT-PCR, dissolve the RNA in DEPC-treated water not included EDTA. The final precipitation of total RNA will be free of DNA and proteins, and will have a A_{260}/A_{280} ratio of 1.8 to 2.2.

APPENDIX 2. Confirmation of RNA yield and purity by UV absorbance

Concentration of RNA

The concentration of RNA can be determined by using the absorbance of spectrophotometer at 260 nm. For the convenient measurement, we recommend using the NanoDrop which can also reduce your RNA sample and time. If not, you need to dilute the RNA samples to measure the concentration through traditional spectrophotometer. The value of A_{260} should be between 0.15 and 1.00. Be sure to calibrate the spectrophotometer with the same solution used for dilution. An absorbance of 1 at 260 nm is about 40 μg RNA/ml at a neutral pH. Therefore, the concentration of RNA was calculated by the formula shown below.

A_{260} x dilution factor x 40 = RNA μg/ml

Purity of RNA

To confirm the RNA purity, you should read the ratio of A_{260}/A_{280}. Pure RNA is in the range of 1.8~2.2.

APPENDIX 3. Formaldehyde agarose gel electrophoresis (Denaturing gel method)

A denaturing agarose gel is routinely used for the assessment of the quality of an RNA preparation. After preparation, RNA forms secondary structure via intramolecular base pairing. Therefore, it is very difficult to get the exact result of electrophoresis because of migrating inaccuracy. However, the denaturing gel denatures the secondary structure of RNA and makes an accurate migration. To confirm the RNA band, the gel should be transferred to a UV transilluminator after electrophoresis. Mainly, two RNA bands are shown. In case of animal sample, the 28S and 18S rRNA bands are confirmed on the gel. If they are intact, the RNA bands should be sharp and the intensity of upper band should be about twice that of the lower band.

Prepare the denaturing gel

1. Put 1 g agarose in 72 ml water and heat to dissolve thoroughly.
2. Cool to 60°C.
3. Add 10 ml of 10 X MOPS buffer, 18 ml of 37% formaldehyde, and 1 μl of a 10 mg/ml ethidium bromide (EtBr).
4. Mix well then pour the gel into the gel tray and cool to solidify it.
5. Transfer the solidified gel from tray to tank, and add enough 1 X MOPS running buffer to cover the gel.

Prepare the RNA sample

1. Make the mixture.
   x μl RNA (up to 20 μg)
   2 μl 10 X MOPS electrophoresis buffer
   4 μl Formaldehyde
   10 μl Formamide
2. Incubate the mixture for 15 min at 65°C.
3. Chill the sample for 5 min in ice.
4. Add 2 μl of 10 X formaldehyde gel-loading dye to the mixture.
5. Load the mixture in a denaturing gel which is covered with a sufficient 1 X MOPS electrophoresis buffer.
6. Run the gel and confirm the RNA band on transilluminator.
   Occasionally, gel destaining may be needed to increase the visibility of the bands of RNA in dH_2O for several hours.

Composition of buffers

- 10 X MOPS buffer
  0.2 M MOPS
  20 mM Sodium acetate
  10 mM EDTA
  pH to 7.0 with NaOH

- 10 X formaldehyde gel-loading dye
  50% Glycerol
  10 mM EDTA
  0.25% (w/v) Bromophenol blue
  0.25% (w/v) Xylene cyanol FF

*** Caution**

When working with these chemicals, always use gloves and eye protector to avoid contact with skin and cloth. Especially, formaldehyde and ethidium bromide (EtBr) should be handled in a fume hood.

Ordering Information

GeneAll® *Hybrid-Q™* *for rapid preparation of plasmid DNA*

Products	Scale	Size	Cat. No.	Type
Plasmid Rapidprep	mini	50	100-150	spin
		200	100-102	

GeneAll® *Exprep™* *for preparation of plasmid DNA*

Products	Scale	Size	Cat. No.	Type
Plasmid SV	mini	50	101-150	spin / vacuum
		200	101-102	
	Midi	26	101-226	spin / vacuum
		50	101-250	
		100	101-201	

GeneAll® *Exfection™* *for preparation of transfection-grade plasmid DNA*

Products	Scale	Size	Cat. No.	Type
Plasmid LE *(Low Endotoxin)*	mini	50	111-150	spin / vacuum
		200	111-102	
	Midi	26	111-226	spin / vacuum
		100	111-201	
Plasmid EF *(Endotoxin Free)*	Midi	20	121-220	spin
		100	121-201	

GeneAll® *Expin™* *for purification of fragment DNA*

Products	Scale	Size	Cat. No.	Type
Gel SV	mini	50	102-150	spin / vacuum
		200	102-102	
PCR SV	mini	50	103-150	spin / vacuum
		200	103-102	
CleanUp SV	mini	50	113-150	spin / vacuum
		200	113-102	
Combo GP	mini	50	112-150	spin / vacuum
		200	112-102	

GeneAll® *Exgene™* *for isolation of total DNA*

Products	Scale	Size	Cat. No.	Type
Tissue SV	mini	100	104-101	spin / vacuum
		250	104-152	
	Midi	26	104-226	spin / vacuum
		100	104-201	
	MAXI	10	104-310	spin / vacuum
		26	104-326	
Tissue Plus SV	mini	100	109-101	spin / vacuum
		250	109-152	
	Midi	26	109-226	spin / vacuum
		100	109-201	
	MAXI	10	109-310	spin / vacuum
		26	109-326	

GeneAll® *Exgene™* *for isolation of total DNA*

Products	Scale	Size	Cat. No.	Type
Blood SV	mini	100	105-101	spin / vacuum
		250	105-152	
	Midi	26	105-226	spin / vacuum
		100	105-201	
	MAXI	10	105-310	spin / vacuum
		26	105-326	
Cell SV	mini	100	106-101	spin / vacuum
		250	106-152	
	MAXI	10	106-310	spin / vacuum
		26	106-326	
Clinic SV	mini	100	108-101	spin / vacuum
		250	108-152	
	Midi	26	108-226	spin / vacuum
		100	108-201	
	MAXI	10	108-310	spin / vacuum
		26	108-326	
Genomic DNA micro		50	118-050	spin
Plant SV	mini	100	117-101	spin / vacuum
		250	117-152	
	Midi	26	117-226	spin / vacuum
		100	117-201	
	MAXI	10	117-310	spin / vacuum
		26	117-326	
Soil DNA mini	mini	50	114-150	spin
Stool DNA mini	mini	50	115-150	spin
Viral DNA/RNA	mini	50	128-150	spin
FFPE Tissue DNA	mini	50	138-150	spin
		250	138-152	

GeneAll® *GenEx™* *for isolation of total DNA without spin column*

Products	Scale	Size	Cat. No.	Type
GenEx™ Blood	Sx	100	220-101	solution
		500	220-105	
	Lx	100	220-301	solution
GenEx™ Cell	Sx	100	221-101	solution
		500	221-105	
	Lx	100	221-301	solution
GenEx™ Tissue	Sx	100	222-101	solution
		500	222-105	
	Lx	100	222-301	solution

Products	Scale	Size	Cat. No.	Type
GeneAll® *GenEx™* *for isolation of total DNA without spin column*				
GenEx™ Plant	Sx	100	227-101	solution
	Mx	100	227-201	
	Lx	100	227-301	
GenEx™ Plant Plus	Sx	100	228-101	solution
	Mx	50	228-250	
	Lx	20	228-320	
GeneAll® *DirEx™* series *for preperation of PCR-template without extraction*				
DirEx™		100	250-101	solution
DirEx™ *Fast*-Tissue		96 T	260-011	solution
DirEx™ *Fast*-Cultured cell		96 T	260-021	solution
DirEx™ *Fast*-Whole blood		96 T	260-031	solution
DirEx™ *Fast*-Blood stain		96 T	260-041	solution
DirEx™ *Fast*-Hair		96 T	260-051	solution
DirEx™ *Fast*-Buccal swab		96 T	260-061	solution
DirEx™ *Fast*-Cigarette		96 T	260-071	solution
GeneAll® RNA series *for preperation of total RNA*				
RiboEx™	mini	100	301-001	solution
		200	301-002	
Hybrid-R™	mini	100	305-101	spin
Hybrid-R™ Blood RNA	mini	50	315-150	spin
Hybrid-R™ miRNA	mini	50	325-150	spin
RiboEx™ LS	mini	100	302-001	solution
		200	302-002	
Riboclear™	mini	50	303-150	spin
Riboclear™ Plus	mini	50	313-150	spin
Ribospin™	mini	50	304-150	spin
Ribospin™ II	mini	50	314-150	spin
		300	314-103	
Ribospin ™ vRD	mini	50	302-150	spin
Ribospin ™ vRD Plus	mini	50	312-150	spin
Ribospin ™ vRD II	mini	50	322-150	spin
Ribospin ™ Plant	mini	50	307-150	spin
Ribospin™ Seed/Fruit	mini	50	317-150	spin
Ribospin™ Pathogen/TNA	mini	50	314-150	spin
		250	314-152	
Allspin™	mini	50	306-150	spin
RiboSaver™	mini	100	351- 001	solution

Products	Scale	Size	Cat. No.	Type
GeneAll® *AmpONE™* *for PCR amplification*				
Taq DNA polymerase		250 U	501-025	(2.5 U/μl)
		500 U	501-050	
		1,000 U	501-100	
Taq Premix		20 μl x 96 tubes	526-200	solution
		50 μl x 96 tubes	526-500	
GeneAll® *AmpMaster™* *for PCR amplification*				
Taq Master mix		0.5 ml x 2 tubes	541-010	solution
		0.5 ml x 10 tubes	541-050	solution
GeneAll® *HyperScript™* *for Reverse Transcription*				
Reverse Transcriptase		10,000 U	601-100	solution
RT Master mix		0.5 ml × 2 tubes	601-710	solution
One-step RT-PCR Master mix		0.5 ml × 2 tubes	602-110	solution
One-step RT-PCR Premix		20 μl × 96 tubes	602-102	solution
GeneAll® RealAmp™ *for qPCR amplification*				
SYBR qPCR Master mix (2X, Low ROX)		200 rxn 2 ml	801-020	solution
		500 rxn 5 ml	801-050	
SYBR qPCR Master mix (2X, High ROX)		200 rxn 2 ml	801-021	solution
		500 rxn 5 ml	801-051	

Products	Size	Cat. No.	Type
GeneAll® Protein series			
ProtinEx™ Animal cell/tissue	100 ml	701-001	solution
PAGESTA™ Reducing 5X SDS-PAGE Sample Buffer	1 ml × 10 tubes	751-001	solution
GeneAll® STEADi™ *for automatic nucleic acid purification*			
12 Instrument		GST012	system
24 Instrument		GST024	system
Genomic DNA Cell/Tissue	96	401-104	kit
Genomic DNA Blood	96	402-105	kit
Total RNA	96	404-304	kit
Viral DNA / RNA	96	405-322	kit
CFC Seed DNA/RNA	96	406-C02	kit
Genomic DNA Plant	96	407-117	kit
Soil DNA	96	408-114	kit
GeneAll® GENTi™ 32 *Ultimately flexible automatic extraction system*			
Automatic extrantion equipment		GTI032	system
Genomic DNA	48	901-048	tube
	96	901-096	plate
Viral DNA/RNA	48	902-048	tube
	96	902-096	plate
Whole Blood Genomic DNA	48	903-048	tube
	96	903-096	plate

Products	Scale	Size	Cat. No.	Type
GeneAll® GENTi™ 32 ADVANCED *Ultimately flexible automatic extraction system*				
Automatic extrantion equipment			GTI032A	system
Genomic DNA		48	901-048A	tube
		96	901-096A	plate
Viral DNA/RNA		48	902-048A	tube
		96	902-096A	plate
Blood DNA		48	903-048A	tube
		96	903-096A	plate
Plant DNA/RNA		48	904-048A	tube
		96	904-096A	plate
LMO		48	906-048A	tube
		96	906-096A	plate


Note

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GeneAll

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2023.07