

Viral RNA/DNA Purification Kit

SPIN COLUMN

INSTRUCTION FOR USE



REF

Version 3. GE-009.12.25

GE-009



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Description of the kit

Intended use

The Viral RNA/DNA Purification Kit using spin columns is designed for the efficient extraction of high-quality viral nucleic acids from sputum, nasopharyngeal, oral, and urogenital swabs, broncho-alveolar lavage, plasma and serum, saliva, urine, and seminal fluids, and milk.¹ This kit employs a specialized column matrix and buffers that selectively capture viral RNA/DNA. It effectively removes contaminants such as salts, proteins, and other organic matter. The extraction process is flexible, supporting both vacuum and positive pressure protocols for increased efficiency in various laboratory workflows. The viral RNA/DNA is immediately ready for use in various diagnostic procedures, such as RT-qPCR, PCR, and Next-Generation Sequencing.

The kit components

- The kit composition is described in “Table 1. The buffers and components of the kit.”
- Instructions for Use (IFU) – detailed guidelines for high-quality viral RNA/DNA purification methodology which could be easily adapted to the various automated systems and samples.
- Material Safety Data Sheet (MSDS) – the documents contain information about hazard identification, first aid measures, firefighting, accidental release measures, handling and storage, exposure control, and personal protection.

Table 1. The buffers and components of the kit

Viral RNA/DNA Purification Kit		50 rxn	250 rxn	500 rxn
Solution A	Lysis/Binding Buffer	15 ml	74 ml	74 ml × 2
Solution W1 (conc.)	Wash Buffer 1	8 ml	21 ml × 2	28 ml × 3
Solution W2 (conc.)	Wash Buffer 2	5 ml	14 ml × 2	18 ml × 3
Solution E	Elution Buffer	11 ml	53 ml	105 ml
Proteinase K	Enzyme, Lyophilized Powder	5 mg	25 mg	25 mg × 2
Proteinase K Storage Buffer	Storage Buffer for Enzyme	0.3 ml	1.5 ml	1.5 ml x 2
Carrier RNA	Synthetic Oligo Mix Lyophilized Powder	25 µg	125 µg	125 µg × 2
G-Spin/Columns	Silica Spin Columns with Collections	50	250	500
Collection Tubes	Collection Tubes (2 ml)	100	500	1000

¹ The kit can be also used for isolation of total viral nucleotides from animal liquid samples.

Reagents Preparation

Solution W1

Wash Buffer 1 comes as a concentrate. Before the first use, add the required volume of molecular biology grade ethanol ($\geq 95\%$) as indicated in “Table 2. Preparation of Solution Wash 1”. If the labels of Solution W1 indicate that ethanol has already been added by the manufacturer, omit this step

Table 2. Preparation of Solution Wash 1

No. Reactions	Solution W1	Ethanol $\geq 95\%$	Final Volume
50	8 ml	23 ml	31 ml
250	21 ml \times 2	59 ml (In each bottle)	80 ml \times 2 bottles
500	28 ml \times 3	77 ml (In each bottle)	105 ml \times 3 bottles

Solution W2

Wash Buffer 2 comes as a concentrate. Before the first use, add the required volume of molecular biology grade ethanol ($\geq 95\%$) as indicated in “Table 3. Preparation of Solution Wash 2”. If the labels of Solution W2 indicate that ethanol has already been added by the manufacturer, omit this step.

Table 3. Preparation of Solution Wash 2

No. Reactions	Solution W2	Ethanol $\geq 95\%$	Final Volume
50	5 ml	26 ml	31 ml
250	14 ml \times 2	66 ml (In each bottle)	80 ml \times 2 bottles
500	18 ml \times 3	87 ml (In each bottle)	105 ml \times 3 bottles

Carrier RNA

Carrier RNA is supplied as a lyophilized powder. Before using it for the first time, add the appropriate amount of Solution E (Elution Buffer) as indicated in “Table 4. Preparation of Carrier RNA.” Aliquoted Carrier RNA should be stored at -20°C . Do not freeze-thaw Carrier RNA more than five times.

Table 4. Preparation of Carrier RNA

No. Reactions	Carrier RNA	Solution E	Final Volume
50	25 μg	0.25 ml	0.25 ml \times 1 vial
250	125 μg	1.25 ml	1.25 ml \times 1 vial
500	125 μg \times 2	1.25 ml (In each vial)	1.25 ml \times 2 vials

Proteinase K

Proteinase K is supplied as a lyophilized powder. Before using it for the first time, add the appropriate amount of Proteinase K Storage Buffer, as indicated in “Table 5. Preparation of Proteinase K enzyme”. Aliquoted Proteinase K should be stored at -20 °C.

Table 5. Preparation of Proteinase K enzyme

No. Reactions	Proteinase K	Proteinase K Storage Buffer	Final Volume
50	5 mg	0.25 ml	0.25 ml x 1 vial
250	25 mg	1.25 ml	1.25 ml x 1 vial
500	25 mg x 2	1.25 ml (In each vial)	1.25 ml x 2 vials

Recommended Sample Pretreatment

This kit facilitates the extraction of RNA and DNA from viruses. Based on the required RNA/DNA quantity and considering the various specimen types, the yield can be optimized by increasing the sample volume from 200 µL to 250 µL, without modifying the buffer concentrations in the subsequent steps.

Swabs

Allow the sample to liquefy at room temperature for 20–30 minutes (use the minimum time needed until pipettable). In case of high viscosity, dilute the sample 1:1 with 1X PBS (or add buffer until workable). Vortex the mixture vigorously at the highest setting for 15–20 seconds, then transfer 200 µl of the sample into a 1.5 ml microcentrifuge tube and proceed immediately to the extraction step.

Sputum

Viscous sputum should be liquefied prior to purification. Samples can be homogenized using bead-beating instruments with OxBeads Zirconia beads (OXBB-001), 1,000 µL of 1× PBS buffer, and 10 mM DTT (final concentration). If OxBeads Zirconia beads are not available, sputum can be liquefied by vortexing in 1× PBS with 10 mM DTT; however, in low-titer samples, this may affect the outcome.

Bronchoalveolar Lavage (BAL)

BAL samples are typically low in viscosity and can be processed directly. Vortex the sample briefly to ensure homogeneity. If debris or mucus is visible, centrifuge at 1000 × g for 1 minute and use the clear supernatant for purification.

Saliva

Rinse mouth thoroughly with water at least 30 minutes before collection. Collect saliva and keep on ice. If viscosity is normal: take 200 µl directly into the extraction step. If highly viscous: add cold PBS 1:1 (or until clear /pipettable), then take 200 µl into the extraction step.

Plasma/Serum

Centrifuge the blood samples at 1500-2000 g for 10–15 minutes at room temperature to separate the plasma or serum from the cellular components. After centrifugation, carefully transfer the plasma or serum layer into a new microcentrifuge tube using a pipette, ensuring that no cellular material is carried over.

Urine

Centrifuge 2 ml urine samples at 2250 g for 15 minutes before processing. After centrifugation, re-suspend the resulting pellet in 200 μ l of 1X PBS buffer, and transfer 200 μ l to 1.5 ml microcentrifuge tube.

Seminal fluid

Vortex the samples vigorously for no more than 15-20 seconds, and then transfer the clarified sample into a 1.5 ml microcentrifuge tube.

Milk

Depending on sample quality, centrifugation at 11,000 \times g for 2 to 10 min may be required. The supernatant should be collected by carefully pushing aside the top layer disc.

The List of Materials to be Supplied by the User

Table 5. Equipment and Reagents to be Supplied by the User

Equipment	Consumables
Thermo-block or thermomixer	Ethanol \geq 95%
Centrifuge and Mini-centrifuge	RNase-free 1.5 ml microcentrifuge tubes
Vortex	0.5 - 10 μ l pipette tips with filter
Pipette 0.5 - 10 μ l	10 – 100 μ l pipette tips with filter
Pipette 20 - 200 μ l	20 – 200 μ l pipette tips with filter
Pipette 100 - 1000 μ l	100 - 1000 μ l pipette tips with filter

Instructions for Manual Purifications

The sample should be stored according to “Interim Guidelines for Collecting and Handling of Clinical Specimens (Centers for Disease Control, CDC)”. Before analysis, ensure the samples do not contain inhibiting mucus and sediments.

Before starting the procedure, prepare the solutions according to the solution preparation guide (Table 2-5). Solution A may form precipitates upon storage. Warm it up to 56 °C until the residues have fully dissolved. The mixture of Solution A and Carrier RNA can be prepared in advance and is stable at 2-8°C for up to 72 h (for one reaction, add 5 µl of Carrier RNA to 280 µl of Solution A). Preheat Solution E at 56°C before starting the procedure.

Stage ▼	Description
Lysis ►	<ol style="list-style-type: none"> 1. Add 5 µl of prepared Proteinase K to a 1.5 ml tube, then add 200–250 µl of sample and mix by pulse-vortexing. 2. Add 280 µl of Solution A and 5 µl of Carrier RNA. Mix by pulse-vortexing for 15 sec. Note: If the Solution A and Carrier RNA mix are prepared in advance, transfer 285 µl of the mix into the sample tube. 3. Incubate the sample for 15 min at 56°C in a thermomixer at 1,400 rpm. Alternatively, incubate in a thermo-block and vortex periodically at 5 min intervals and spin down. 4. Cool down the sample at Room Temperature (RT). Add 200 µl of ≥ 95% cold ethanol, invert gently 30 times, and spin down.
Binding ►	<ol style="list-style-type: none"> 5. Transfer 680-730 µl of lysate into a G-spin/column and centrifuge at 8,000 rpm for 2 min. Place the G-spin/column into a new 2 ml collection tube, and discard the tube containing the filtrate;
Washing ►	<ol style="list-style-type: none"> 6. Wash the G-spin/column with 600 µl of Solution W1 and centrifuge at 13,000 rpm for 2 min. Place the G-spin/column into a new 2 ml collection tube, and discard the tube containing the filtrate; 7. Wash the G-spin/column with 600 µl of Solution W2, centrifuge at 13,000 rpm for 2 min. Discard the flow-through. 8. Remove residual wash buffer by centrifuging at 13,000 rpm for 2 min. Discard the collection tube.
Elution ►	<ol style="list-style-type: none"> 9. Transfer the G-spin/column into a new 1.5 ml microcentrifuge tube. 10. Add 50-200 µl of preheated (56°C) Solution E to the G-spin/column, ensuring the membrane's entire surface is hydrated. Avoid touching the membrane with the pipette tip. 11. Incubate the samples for 3 min at RT. 12. Elute the RNA/DNA by centrifuging at 13,000 rpm for 1 min.

Troubleshooting RNA/DNA purification

Table 6. Possible causes and solutions for problems that may occur during RNA/DNA preparation

Problem	Possible Cause	Corrective Action
Low Yield	Incorrect preparation or storage of buffers and reagents	Prepare the Lysis/Binding Buffer and Carrier RNA mix immediately before use and ensure that it is homogeneous. Store reagents according to the recommended conditions.
	Incomplete lysis of the sample	Ensure thorough mixing of the sample with the lysis buffer and Carrier RNA, incubate for the recommended time and temperature.
	Incomplete elution	Use a pre-heated elution buffer as indicated in the protocol and ensure the membrane is fully wetted.
Purified nucleic acid is degraded	Improper handling or storage of the sample	Follow the sample collection and storage instructions carefully. Process samples as soon as possible or store them under recommended conditions.
	RNase/DNase contamination	Always wear gloves; use RNase/DNase-free tips and tubes. Keep all reagents tightly sealed.
	Improper storage of eluted nucleic acid	Store eluates on ice if used immediately, or at -80°C for long-term storage. Avoid repeated freeze-thaw cycles.
Inhibition of downstream applications (e.g., PCR, RT-PCR, qPCR, NGS)	Excess sample material or improper elution volume	Optimize input sample amount. Adjust the elution buffer volume (increase or decrease as needed).
	Residual salts, ethanol, or contaminants in the eluate	Ensure wash steps are performed correctly. Completely dry the column before elution to prevent ethanol carryover.

Precautions for Users




- The kit is intended to be used by laboratory and healthcare professionals. It is not intended for self-testing and near patient testing.
- Any serious incident that has occurred in relation to the device shall be reported to the manufacturer and the competent authority of the Member State in which the user and/or the patient is established.
- Handle all biological samples as potentially infectious and avoid direct contact.
- Follow relevant national biosafety regulations and WHO and CDC guidelines for specimen collection and processing.

- Trained professionals should only use the kit in a diagnostic or research laboratory with appropriate equipment and safety standards.
- Review the safety data sheets (MSDS) provided with the kit.
- Use designated laboratory equipment, consumables, and personal protective equipment in each room.
- Follow Good Laboratory Practices by wearing protective clothing, gloves, goggles, and a mask. Avoid eating, drinking, smoking, or applying cosmetics in the working area.
- Do not mix reagents from different sources or kits.
- Clean equipment and surfaces regularly with appropriate bleach concentration or equivalent decontaminants that remove nucleic acids, followed by 70% ethanol.

Chemical Safety

The components of the kit with hazardous content and handling instructions are summarized in “Table 7. Hazardous content and handling instructions”. Wear gloves, goggles and protective equipment and follow the safety instructions given in the table.

Table 7. Hazardous content and handling instructions

Component	GHS symbol	Category	Statements
Solution A		Acute Toxicity (Oral) – Category 4 Acute Toxicity (Dermal) – Category 4 Skin Corrosion/Irritation – Category 1B Hazardous to the Aquatic Environment (Chronic) – Category 3	Hazard Statements: H302, H312, H314, H412 Precautionary Statements: P260, P273, P280, P303 + P361 + P353, P304 + P340 + P312, P305 + P351 + P338 + P310, P301 + P312 + P330, P363
	GHS05, GHS07		
Solution W 1		Acute Toxicity (Oral) – Category 4 Skin Corrosion/Irritation – Category 2 Serious Eye Damage/Eye Irritation – Category 2A	Hazard Statements: H302, H315, H319 Precautionary Statements: P264, P270, P280, P301 + P312, P302 + P352, P305 + P351 + P338, P330, P332 + P313, P337 + P313, P362 + P364
	GHS07		
Proteinase K		SKIN IRRITATION – Category 2 EYE IRRITATION – Category 2 RESPIRATORY SENSITIZATION – Category 1	Hazard Statements: H315; H317; H319; H334; H335 Precautionary Statements: P260, P285, P304 + P341, P342 + P311
	GHS07, GHS08		

Hazard Statements

- H302 Harmful if swallowed
H312 Harmful in contact with skin

H314	Causes severe skin burns and eye damage
H315	Causes skin irritation
H317	May cause an allergic skin reaction
H319	Causes serious eye irritation
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335	May cause respiratory irritation
H412	Harmful to aquatic life with long lasting effects

Precaution Statements

P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P264	Wash hands thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P285	In case of inadequate ventilation, wear respiratory protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P303 + P361 + P353	IF ON SKIN (or hair): Remove immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor if you feel unwell.
P304 + P341	IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor.
P342 + P311	If experiencing respiratory symptoms: Call a POISON CENTER or doctor.
P362 + P364	Take off contaminated clothing and wash it before reuse.

Disposal

Dispose of used kit reagents, human clinical samples, and sealed amplification plates as laboratory clinical waste according to local, state, and federal regulations.

Version History

Instruction for Use Version 3. GE-009. December 2025, EN.

Quality Control System

The Kit is in accordance with 2017/746-EN Medical Device Regulations and Medical devices - Quality management systems ISO 13485:2016

Technical support

For technical support, please contact our dedicated Technical Support Team at: Tel: +995 599 374 374; Email: info@oxgen.ge.

Trademarks and Disclaimers

OxGEN Solutions is a trademark of OxGEN, LLC. AM 2021 11324.

Explanation of Symbols



Attention



Lot Number



Catalogue Number



Production Date



Refer to the Operating Instructions



Shelf life



If the Package Is Damaged “Do Not Use It”



Manufacturer Information



EC Representative



Temperature limit