ZYMO RESEARCH

# *Quick*-DNA/RNA™ HT

High-throughput, total nucleic acid purification system

## Highlights

- High-throughput, magnetic-bead based purification of total nucleic acid (DNA/RNA) from any biological or clinical sample (e.g., host, plasma, serum, urine, cell culture media, blood, saliva, cellular suspensions, swab, fecal and biopsies).
- High-quality DNA/RNA is ready for Next-Gen sequencing, RT/qPCR, hybridization, etc.

Catalog Numbers:
R2150, R2151

Scan with your smart-phone camera to view the online protocol/video.

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# Table of Contents

# Product Contents

| *Quick*-DNA/RNA™ HT | R2150 (250 preps) | R2151 (1000 preps) |
|---|---|---|
| DNA/RNA Buffer HT | 100 ml | 400 ml |
| Proteinase K (lyophilized) | 20 mg | 60 mg |
| Proteinase K Storage Buffer | 1.2 ml (x3) | 10 ml |
| HT MagBinding Beads | 3 ml | 12 ml |
| MagBead DNA/RNA Wash 1 (concentrate) | 30 ml (x2) | 120 ml (x2) |
| MagBead DNA/RNA Wash 2 (concentrate) | 20 ml (x2) | 80 ml (x2) |
| DNase/RNase-Free Water | 30 ml | 100 ml |
| Instruction Manual | 1 pc | 1 pc |

- **Materials/Equipment Needed (user provided)**
  - ✓ Beta-mercaptoethanol (β-Me)
  - ✓ Isopropanol (99.5-100%)
  - ✓ Ethanol (95-100%)
  - ✓ Nuclease-free water
  - ✓ Vortex Mixer
  - ✓ Magnetic stand or separator
  - ✓ Liquid handler or robotic sample processor

- **Materials Available Separately (not provided)**
  - DNA/RNA Shield™ (2X concentrate) (R1200-25, 25 ml)
  - ZR-96 MagStand (P1005)
  - Collection Plate (C2002; capacity 1.2 ml/well)
  - 96-Well Block (P1001-2; capacity 2 ml/well)
  - Elution Plate (C2003; capacity 0.35 ml/well)
  - Cover Foil (C2007-4; 4 pack)
  - ZR BashingBead Lysis Tubes (S6003-50; 2.0 mm beads), (S6012-50; 0.1 & 0.5 mm beads), (S6014-50; 0.1 & 2.0 mm beads)
  - DNase I Set (E1010; 250 U DNase I (lyophilized) supplied with DNA Digestion Buffer, 4 ml)
  - DNA/RNA Prep Buffer (D7010-2-50, 50 ml)

# Specifications

- **Sample Sources**

  Any biological sample (e.g., swabs, liquids, cells, tissue, etc.), and samples collected/stored in media (e.g., UTM, VTM, saline, PBS, DNA/RNA Shield™, PAXgene, RNAlater, RNAProtect, etc.)

- **Binding Capacity**

  5 µg DNA/RNA per 10 µl **HT MagBinding Beads**

- **Elution Volume**

  ≥ 15 µl **DNase/RNase-Free Water**

- **Purity**

  DNA/RNA is ready for Next-Gen Sequencing, RT/qPCR, etc.

- **Storage Temperature and Stability**

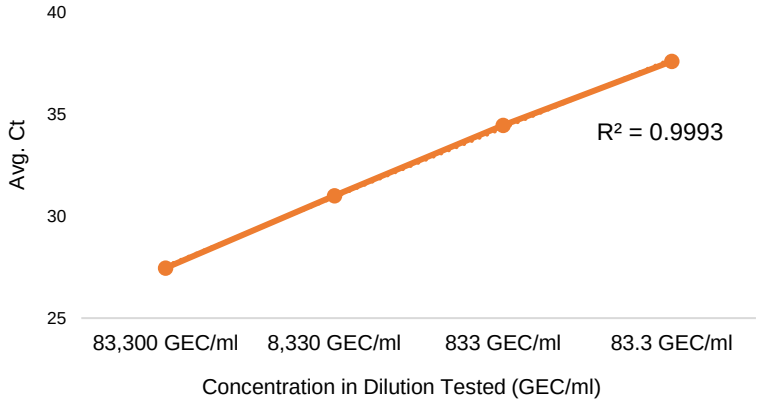
  ✓ Store all components (i.e., buffers/reagents, columns) at room temperature (15-30°C).
  ✓ Expiration dates for each of the unopened components are indicated on the individual component labels. These storage conditions apply to both opened and unopened components.
  ✓ Eluted DNA/RNA can be used immediately or stored frozen (-20/-80°C).

# Product Description

The ***Quick*-DNA/RNA™ HT** kit is intended for rapid, high-throughput nucleic acid extraction (automated or manual) from any biological or clinical sample (e.g., swabs – nasal/nasopharyngeal, oropharyngeal, etc.; biological liquids – blood, plasma, serum, saliva, sputum, cells in suspension, etc.; tissue – needle biopsies, LCM, etc.) and/or samples stored in most collection matrices and devices (e.g., UTM, VTM, DNA/RNA Shield™, RNAlater, RNAProtect, etc.).

The kit is compatible with robotic-type sample processors (i.e, bead movers) in combination with sensitive downstream molecular amplification assays. High-quality DNA/RNA extracted with the ***Quick*-DNA/RNA™ HT** kit can be used for Next-Gen sequencing, RT/qPCR and more.

**Limit of Detection Preliminary Assay from Biological Specimens using Automated Extraction**




| Concentration in Dilution | 83,300 GEC/ml (5,000 GEC/rxn) | 8,330 GEC/ml (500 GEC/rxn) | 833 GEC/ml (50 GEC/rxn) | 83.3 GEC/ml (5 GEC/rxn) | 8.33 GEC/ml (0.5 GEC/rxn) |
|---|---|---|---|---|---|
| Avg. Ct | 27.5 | 31.0 | 34.5 | 37.6 | Not detected |
| Positive, n=5 | 5/5 | 5/5 | 5/5 | 5/5 | 0/5 |

Automated extraction of whole genome viral RNA (i.e., SARS-CoV-2) spiked in sputum/swab samples collected in DNA/RNA Shield™ was performed with the ***Quick*-DNA/RNA™ HT** kit, followed by quantification by RT-qPCR. Preliminary limit of detection (LoD) assay determined the lowest concentration for which 5/5 independent replicates tested positive.

# Protocol

The protocol consists of: (I) Buffer Preparation, (II) Sample Preparation and (III) DNA/RNA Purification.

# (I) Buffer Preparation

- ✓ Add 500 µl beta-mercaptoethanol (user supplied) per 100 ml **DNA/RNA Buffer HT**, (final 0.5% (v/v)).
- ✓ Add 20 ml (R2150) or 80 ml (R2151) of isopropanol to the **MagBead DNA/RNA Wash 1** concentrate.
- ✓ Add 30 ml (R2150) or 120 ml (R2151) of isopropanol to the **MagBead DNA/RNA Wash 2** concentrate.
- ✓ Reconstitute lyophilized **Proteinase K** at 20 mg/ml with **Proteinase K Storage Buffer** and mix by vortexing. Use immediately or store frozen aliquots:
  #R2150 (**20 mg**), add 1.04 ml **buffer**
  #R2151 (**60 mg**), add 3.12 ml **buffer**
- ✓ Optional: To prepare DNA/RNA Shield™ (1X)[1], dilute the 2X concentrate with an equal volume of nuclease-free water (user provided) (1:1) and mix well. Reagent is not provided (available separately, see page 10).

1 DNA/RNA Shield™ is a sample collection medium for storage and preservation of nucleic acids. It also inactivates pathogens and prevents viral infectivity. Specimens stored and transported in DNA/RNA Shield™ can be processed directly without reagent removal, using standard laboratory operating procedures, for the detection of nucleic acids with molecular amplification assays.

# (II) Sample Preparation

✓ Perform all steps at room temperature (15-30°C).

**Sample Input** – Depending on the sample type, up to 200 µl can be processed per prep (see examples below).

| **Swabs** | | |
|---|---|---|
| Nasal/Nasopharyngeal | Oropharyngeal | Buccal/cheek |
| Vaginal | Fecal | |

Stored in UTM, VTM, saline, PBS, DNA/RNA Shield™, etc.

Optional - To inactivate, store and preserve samples at room temperature, add 100 µl DNA/RNA Shield™ (2X concentrate)[1] to 100 µl sample (1:1). Mix well[2].

| **Liquids (I)** | | |
|---|---|---|
| Plasma | Serum | CSF |
| Cells in suspension | | |

Optional - To inactivate, store and preserve samples at room temperature, add 100 µl DNA/RNA Shield™ (2X concentrate)[1] to 100 µl sample (1:1). Mix well[2].

| **Liquids (II)** | | |
|---|---|---|
| Whole blood | Saliva | Sputum |
| Urine | | |

Recommended: To inactivate, lyse and preserve samples at room temperature, add 100 µl DNA/RNA Shield™ (2X concentrate)[1] to 100 µl sample (1:1). Mix well[2], centrifuge debris and process the cleared supernatant.

| **Tissue** | |
|---|---|
| Tissue (< 5 mg) | Feces (< 20 mg) |

LCM, needle biopsy or samples stored in media/device.

Recommended: To inactivate, lyse and preserve samples at room temperature, add 200 µl DNA/RNA Shield (1X)[1,3] and homogenize[4]. Mix well, centrifuge debris and process the cleared supernatant.

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1 At this point, samples in DNA/RNA Shield™ can be stored at ambient temperature (4-30°C) for a month, 7 days at 35°C, or long-term (> 1 year) at -20°C or below.
2 For all buffer additions and incubation steps, **mix well** for ≥1 minute by pipetting the beads up and down and/or by shaking (vortexing) at ~1,300 rpm. Optimization may be required.
3 To prepare DNA/RNA Shield™ (1X), dilute the **2X concentrate** with an equal volume of nuclease-free water (user provided) (1:1) and mix well.
4 For efficient homogenization of tough-to-lyse tissue samples, bead-beat with ZR BashingBead Lysis Tubes (S6003, S6012, S6014), sold separately.

**(II) Sample Preparation** (continued)

## Proteinase K Treatment (optional)

✓ At this point, protein-rich samples e.g., plasma, serum, saliva, sputum, tissue, can be treated.

1. Add 1% **Proteinase K** (v/v) at 20 mg/ml[1] directly to a liquid sample. Mix well[2].
2. Incubate at room temperature for 15 minutes.

   Note: Up to 5% Proteinase K can be added to protein-rich samples (e.g., tissue). For example: Add 2-10 µl Proteinase K (20 mg/ml) to each 200 µl sample.

Transfer up to **200 µl** of the prepared sample into a new tube/well and proceed to **DNA/RNA Purification, page 7**.

1 For automation platforms with "dead volume" liquid handler dispensing, the lyophilized Proteinase K can be reconstituted to a working concentration of 4-20 mg/ml.
2 For all buffer additions and incubation steps, **mix well** for ≥1 minute, by pipetting the beads up and down and/or by shaking (vortexing) at ~1,300 rpm. Optimization may be required.

# (III) DNA/RNA Purification

✓ Perform all steps at room temperature (15-30°C).

1. Add 400 µl **DNA/RNA Buffer HT** to each 200 µl sample[1] (2:1) and mix well[2].
2. Add 10 µl **HT MagBinding Beads** and mix well[2] for 10 minutes.
3. Transfer the plate/tube to a magnetic stand[3] until beads have pelleted, then aspirate[4] and discard the cleared supernatant.
4. Add 250 µl **MagBead DNA/RNA Wash 1** and mix well[2]. Pellet the beads[3,4] and discard the supernatant.
5. Add 250 µl **MagBead DNA/RNA Wash 2** and mix well[2]. Pellet the beads[3,4] and discard the supernatant.
6. Add 250 µl ethanol (95-100%) and mix well[2]. Pellet the beads[3,4] and discard the supernatant.
7. Add 250 µl of ethanol (95-100%) and mix well[2]. Then transfer the sample (beads and liquid) to a new plate/tube (not provided). Pellet the beads[3,4] and discard the supernatant.

   Optional: At this point, DNase I treatment can be performed (see Appendices, page 8).
8. Dry the beads for 10 minutes.
9. To elute DNA/RNA from the beads, add 30 µl **DNase/RNase-Free Water** and mix well[2].

   Alternatively, for highly concentrated DNA/RNA use ≥ 15 µl volume.
10. Transfer the plate/tube to a magnetic stand[3] until beads have pelleted, then aspirate[4] and dispense the eluted DNA/RNA to a new plate/tube.

    The eluted DNA/RNA[5] can be used immediately or stored frozen.

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1 Up to 200 µl sample (including the volume of DNA/RNA Shield™, if added) can be processed per prep.
2 For all buffer additions and incubation steps, **mix well** for ≥1 minute, by pipetting the beads up and down and/or by shaking (vortexing) at ~1,300 rpm. Optimization may be required.
3 Use a strong-field magnetic stand or separator (e.g., ZR-96 MagStand, P1005; sold separately) until beads have pelleted.
4 Some beads will adhere to the sides of the well. When removing the supernatant, aspirate slowly to allow these beads to be pulled to the magnet as the liquid level is lowered.
5 It is recommended to titrate the DNA/RNA eluate for downstream applications (i.e., RT/qPCR, etc.).

# Appendices

## Automation Scripts

The ***Quick*-DNA/RNA™ HT** (R2150, R2151) is compatible with automated platforms*. For automation scripts and related technical support, email automation@zymoresearch.com. In the subject line, please include "Automation Scripts", instrument used and the product catalog number.

## DNase I Treatment

✓ For DNA-free RNA, DNase I treatment can be performed using DNase I Set (E1010; 50 reactions) and DNA/RNA Prep Buffer (D7010-2-50), materials sold separately.

For each sample to be treated, prepare **DNase I Reaction Mix** in an RNase-free tube (not provided) and mix by gentle inversion:

| **DNase I Reaction Mix** | |
|---|---|
| Nuclease-free water (user provided) | 40 µl |
| **DNA Digestion Buffer** | 5 µl |
| **DNase I** (reconstituted; 1 U/µl)[1] | 5 µl |

1. Add 50 µl **DNase I Reaction Mix** to the beads and mix gently for 10 minutes.
2. Add 500 µl **DNA/RNA Prep Buffer** and mix well[2] for 10 minutes. Pellet the beads[3,4] and discard the supernatant.
3. Add 250 µl ethanol (95-100%) and mix well[2]. Pellet the beads[3,4] and discard the supernatant.
4. Add 250 µl of ethanol (95-100%) and mix well[2]. Then transfer the sample (beads and liquid) to a new plate/tube (not provided). Pellet the beads[3,4] and discard the supernatant.
5. Proceed with step 8 in DNA/RNA Purification, page 7.

*For automation platforms with "dead volume" liquid handler dispensing, additional reagents are available separately.

1 Prior to use, reconstitute lyophilized 250 U DNase I (E1009-A) to 1U/µl (final concentration) with 275 µl nuclease-free water (user provided), mix by gentle inversion and store frozen aliquots.

2 For all buffer additions and incubation steps, **mix well** for ≥1 minute, by pipetting the beads up and down and/or by shaking (vortexing) at ~1,300 rpm. Optimization may be required.

3 Use a strong-field magnetic stand or separator (e.g., ZR-96 MagStand, P1005; sold separately) until beads have pelleted.

4 Some beads will adhere to the sides of the well. When removing the supernatant, aspirate slowly to allow these beads to be pulled to the magnet as the liquid level is lowered.

# Troubleshooting Guide

| Problem | Possible Causes and Suggested Solutions |
|---|---|
| **RNA degradation** | To prevent RNA degradation:<br><br>Immediately collect and lyse fresh sample into a stabilization reagent (i.e., DNA/RNA Shield™) to ensure nucleic acid stability. Homogenized samples in DNA/RNA Shield™ can be stored frozen for later processing. |
| **Low nucleic acid content and/or low sensitivity in downstream application** | Incomplete deproteinization due to high-protein content in the sample (blood, plasma/serum, tissue etc.):<br><br>- Increase the volume of DNA/RNA Shield™ to the sample.<br><br>- Perform Proteinase K treatment (see Sample Preparation, page 6).<br><br>Increase binding time:<br><br>At all binding steps, increase binding time for an additional ≥10 minutes (e.g., 30 minutes). Depending on the amount of biomass, more time may be required to allow nucleic acids to be sufficiently bound to beads.<br><br>Inefficient washing of beads:<br><br>-Shaking/Mixing: Mix well for ≥1 minute, by pipetting up and down and/or by shaking (vortexing) at high speed. Make sure that the beads are resuspended throughout the bind, wash and elution steps. Optimization may be required.<br><br>Increase eluate input:<br><br>- Titrate the DNA/RNA eluate for downstream applications (i.e., RT/qPCR). |
| **DNA contamination** | To remove DNA:<br><br>- Perform DNase I treatment during the purification (page 7) or perform DNase I treatment post-purification (#R1082), then clean-up the treated sample. |

For technical assistance, please contact 1-888-882-9682 or email tech@zymoresearch.com

# Ordering Information

| Product Description | Catalog No. | Size |
|---|---|---|
| ***Quick*-DNA/RNA™ HT** | R2150 | 250 preps |
| ***Quick*-DNA/RNA™ HT** | R2151 | 1000 preps |

| Individual Kit Component | Catalog No. | Amount |
|---|---|---|
| **DNA/RNA Buffer HT** | R2150-1-100 | 100 ml |
| **Proteinase K Set** supplied w/ Storage Buffer | D3001-2-20<br>D3001-2-60 | 20 mg<br>60 mg |
| **MagBead DNA/RNA Wash 1** (concentrate) | R2130-1-30<br>R2130-1-120 | 30 ml<br>120 ml |
| **MagBead DNA/RNA Wash 2** (concentrate) | R2130-2-20<br>R2130-2-80 | 20 ml<br>80 ml |
| **HT MagBinding Beads** | R2150-2-3<br>R2150-2-12 | 3 ml<br>12 ml |
| **DNase/RNase-Free Water** | W1001-30<br>W1001-100 | 30 ml<br>100 ml |
| **DNA/RNA Shield™** (2X concentrate) | R1200-25<br>R1200-125 | 25 ml<br>125 ml |

# Notes

# Notes


**100% satisfaction guarantee on all Zymo Research products, or your money back.**

Zymo Research is committed to simplifying your research with quality products and services. If you are dissatisfied with this product for any reason, please call 1(888) 882-9682.

Integrity of kit components is guaranteed for up to one year from date of purchase.
Reagents are routinely tested on a lot-to-lot basis to ensure they provide the highest performance and reliability.

This product is for research use only and should only be used by trained professionals. It is not for use in diagnostic procedures. Some reagents included with this kit are irritants. Wear protective gloves and eye protection. Follow the safety guidelines and rules enacted by your research institution or facility.

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