
DNA/RNA Shield™
DNA/RNA Shield™
Innovative Sample Collection &
Preservation for Nucleic Acid Analysis
Accommodates Any Sample

Pathogen Inactivation
Inactivates viruses, bacteria, yeast & protists

Break the Cold Chain
Not the bank!
Transport at ambient temperatures

Streamlined Purification of DNA & RNA
No reagent removal
Compatible with all purification kits (including Quick-RNA™, Quick-DNA™, etc.)
Fully automatable

Ready for all downstream applications
Next Gen Sequencing  Arrays  (rt)PCR
DNA/RNA Shield™ Overview

Sample collection and preservation stand as the origin of all workflows which use nucleic acids. The methods and technologies used to collect and store samples can profoundly impact analyses and downstream applications of nucleic acids. Compositional changes and bias can occur because of nucleic acid degradation, cellular growth or decay, and the logistics of collection. Current collection and transportation methods require the use of costly cold-chain logistics to prevent or slow down these processes. Without proper storage conditions, the aforementioned can lead to misrepresentation of an analyte's abundance, systematic bias, reduced sensitivity, complete signal loss, poor reproducibility, and an inability to compare results between labs.

RNA is especially vulnerable to degradation due to the ubiquity of RNases and the inherent instability of the RNA phosphoester bond. Even DNA is prone to rapid degradation and complete signal loss. For instance, when detecting H. Pylori in a stool sample, by real-time PCR, it is necessary to store the samples in a preservative or the DNA rapidly degrades.

There are a plethora of other factors within collection and storage that can affect downstream use of nucleic acids. Microbial growth and decay can significantly alter the composition of a sample if the organisms are not inactivated. Compositional changes associated with other collection methodologies, especially if phase separation (e.g. precipitation) is utilized, can also significantly bias downstream analyses. Small nucleic acids (e.g. miRNA) are particularly vulnerable to such biases and/or complete signal loss because of their aberrant behavior when compared to larger nucleic acids. The ease of processing a sample post storage in a preservation solution is critical to cost, throughput, and methodologies that require phase separation and/or reagent removal impose significant and costly challenges for high throughput applications and automation. Another major consideration when choosing a sample stabilization reagent is the logistics and cost of transporting samples potentially containing pathogens.

At Zymo Research, we have made it our goal to standardize sample collection in the clinical/research setting.

Sample Collection Devices

- **Blood Collection Tube**: A sterile evacuated blood collection tube prefilled with DNA/RNA Shield™.
- **Fecal Collection Tube**: A 15 ml tube prefilled with DNA/RNA Shield™ equipped with scoop attached to screwcap for convenient sample collection.
- **Swab Collection Tube**: A sterilized screwcap tube prefilled with DNA/RNA Shield™ (1 or 2 ml) with flocked swab.
- **Collection & Lysis Tubes**: Collect and inactivate samples in lysis tubes prefilled with DNA/RNA Shield™.

*BashingBeads™ included with some formats

Accommodates Any Sample

including cells, tissues, fecal samples, tough-to-lyse samples, soil samples, plants, microorganisms, and bodily fluids

Learn more at www.zymoresearch.com/shield
Viruses, bacteria and yeast are effectively inactivated by DNA/RNA Shield™. Samples containing the infectious agent (virus, bacteria, yeast) were treated for 5 minutes with DNA/RNA Shield™ or mock (PBS). Titer (PFU) was subsequently determined by plaque assay. Validated by: Influenza A - D. Poole and Prof. A. Mehle, Department of Medical Microbiology and Immunology, University of Wisconsin, Madison; Ebola (Kikwit) - L. Avena and Dr. A. Griffiths, Department of Virology and Immunology, Texas Biomedical Research Institute; HSV-1/2 - H. Oh, F. Diaz and Prof. D. Knipe, Virology Program, Harvard Medical School; E. coli, L. fermentum, B. subtilis, S. cerevisiae – Zymo Research.

**Disclaimer:** This graph only displays results from E. coli inactivation. Each microbe was tested independently and were combined into one graph for brevity. Bacterial cultures were grown between $10^8$ - $10^9$ cells and yeast cultures were grown between $10^7$ - $10^8$ cells.

**Nucleic Acid Stabilization at Ambient Temperature for 30 Days**

DNA and RNA in stool is effectively stabilized in DNA/RNA Shield™ at ambient temperature. Graphs show: spike-in DNA and RNA controls from stool purified at the indicated time points and analyzed by (RT)qPCR.

**Microbial and Viral Inactivation**

Viruses, bacteria and yeast are effectively inactivated by DNA/RNA Shield™. Samples containing the infectious agent (virus, bacteria, yeast) were treated for 5 minutes with DNA/RNA Shield™ or mock (PBS). Titer (PFU) was subsequently determined by plaque assay. Validated by: Influenza A - D. Poole and Prof. A. Mehle, Department of Medical Microbiology and Immunology, University of Wisconsin, Madison; Ebola (Kikwit) - L. Avena and Dr. A. Griffiths, Department of Virology and Immunology, Texas Biomedical Research Institute; HSV-1/2 - H. Oh, F. Diaz and Prof. D. Knipe, Virology Program, Harvard Medical School; E. coli, L. fermentum, B. subtilis, S. cerevisiae – Zymo Research).

*Disclaimer: This graph only displays results from E. coli inactivation. Each microbe was tested independently and were combined into one graph for brevity. Bacterial cultures were grown between $10^8$ - $10^9$ cells and yeast cultures were grown between $10^7$ - $10^8$ cells.

**Streamlined Purification**

No Reagent Removal. Simple, direct purification using Zymo Research Purification Products*.

*Also compatible with most other commercial products.
DNA/RNA Shield™ Blood Collection Tube

Highlights

- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

Specifications

- A sterile evacuated blood collection tube (10 ml) that is prefilled with 6 ml DNA/RNA Shield™
- The blood draw volume of the tube is 3 ml

Applications

- Gene expression analysis
- miRNA analysis
- Bloodbourne pathogen detection

DNA and RNA in blood is effectively stabilized in DNA/RNA Shield™ at ambient temperature. Graphs show: spike-in DNA and RNA controls from saliva and stool purified at the indicated time points and analyzed by (RT)qPCR. Controls: HSV-1 and HIV (AcroMetrix™, Life Technologies).

Compatible Purification Kits

<table>
<thead>
<tr>
<th>Purification of</th>
<th>DNA</th>
<th>RNA</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire DNA/RNA Shield™ Blood Tube</td>
<td>Quick-DNA/RNA™ Blood Tube Kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3 mL whole blood)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDTA, citrate, heparin blood, etc.</td>
<td>Quick-DNA™ Kits</td>
<td>Quick-RNA™ Whole Blood Kit</td>
<td>Quick-DNA/RNA™ Kit</td>
</tr>
</tbody>
</table>

Learn more and view additional formats at www.zymoresearch.com/shield

Product | Cat. No. | Size
---------|----------|-----
DNA/RNA Shield™ - Blood Collection Tube | R1150 | 50 pack
DNA/RNA Shield™ Fecal Collection Tube

Highlights

- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

Specifications

- A 15 ml tube prefilled with 9 ml of DNA/RNA Shield™
- The tube is equipped with a scoop attached to its screwcap for convenient sample collection
- The tube can collect up to 1 g or 1 ml of fecal specimen

Applications

- Microbiomic analysis
- Gene expression analysis
- miRNA analysis
- Pathogen detection

Specifications

- A 15 ml tube prefilled with 9 ml of DNA/RNA Shield™
- The tube is equipped with a scoop attached to its screwcap for convenient sample collection
- The tube can collect up to 1 g or 1 ml of fecal specimen

Applications

- Microbiomic analysis
- Gene expression analysis
- miRNA analysis
- Pathogen detection

DNA and RNA in stool is effectively stabilized in DNA/RNA Shield™ at ambient temperature. Graphs show: spike-in DNA and RNA controls from saliva and stool purified at the indicated time points and analyzed by (RT)qPCR. Controls: HSV-1 and HIV (AcroMetrix™, Life Technologies).

Compatible Purification Kits

<table>
<thead>
<tr>
<th>Purification of</th>
<th>DNA</th>
<th>RNA</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microbiomic samples (including feces, soil, water, etc.)</td>
<td>ZymoBIOMICS® DNA Kit</td>
<td>ZymoBIOMICS® RNA Kit</td>
<td>ZymoBIOMICS® DNA/RNA Kit</td>
</tr>
<tr>
<td>Fecal Samples</td>
<td>Quick-DNA™ Plus Kit</td>
<td>Quick-RNA™ Plus Kit</td>
<td>—</td>
</tr>
<tr>
<td>Viral Samples</td>
<td>Quick-DNA™ Viral Kit</td>
<td>Quick-RNA™ Viral Kit</td>
<td>Quick-DNA/RNA™ Viral Kit</td>
</tr>
</tbody>
</table>

Learn more and view additional formats at www.zymoresearch.com/shield
DNA/RNA Shield™ Lysis Tubes

Highlights

- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

Specifications

- A 2 ml tube prefilled with 1 ml of DNA/RNA Shield™
- Contains ultra-high density BashingBeads™ for homogenization

Applications

- Microbiomic analysis
- Gene expression analysis
- miRNA analysis
- Pathogen detection

Without DNA/RNA Shield™ - Composition Changes

With DNA/RNA Shield™ - Accurate Composition

Microbial Composition of Stool is Unchanged After One Month at Ambient Temperature with DNA/RNA Shield™

Stool samples suspended in DNA/RNA Shield™ and stored at room temperature were compared to stool without reservative for one month. They were sampled at the indicated time points and processed with ZymoBIOMICS® DNA Mini Kit. The extracted DNA was then subjected to microbial composition profiling via 16S rRNA gene targeted sequencing. Samples stored with DNA/RNA Shield™ had a constant microbial composition while the samples stored without shifted dramatically.

Compatible Purification Kits

<table>
<thead>
<tr>
<th>Purification of</th>
<th>DNA</th>
<th>RNA</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Fluids, Cells, soft tissue, easy to lyse samples</td>
<td>Quick-DNA™ Plus Kit</td>
<td>Quick-RNA™ Plus Kit</td>
<td>Quick-DNA/RNA™ Kit</td>
</tr>
<tr>
<td>Microbiomic samples (including feces, soil, water, etc.)</td>
<td>ZymoBIOMICS® DNA Kit</td>
<td>ZymoBIOMICS® RNA Kit</td>
<td>ZymoBIOMICS® DNA/RNA Kit</td>
</tr>
<tr>
<td>Viral Samples</td>
<td>Quick-DNA™ Viral Kit</td>
<td>Quick-RNA™ Viral Kit</td>
<td>Quick-DNA/RNA™ Viral Kit</td>
</tr>
<tr>
<td>Fecal/Soil Samples</td>
<td>Quick-DNA™ Fecal/Soil Microbe Kit</td>
<td>Quick-RNA™ Plus Kit</td>
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</table>

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<table>
<thead>
<tr>
<th>Product</th>
<th>Cat. No.</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA/RNA Shield™ - Lysis Tube (Microbe)</td>
<td>R1103</td>
<td>50 tubes</td>
</tr>
<tr>
<td>DNA/RNA Shield™ - Lysis Tube (Microbe) with Swab</td>
<td>R1104</td>
<td>50 tubes/50 swabs</td>
</tr>
<tr>
<td>DNA/RNA Shield™ - Lysis Tube (Tissue)</td>
<td>R1105</td>
<td>50 tubes</td>
</tr>
</tbody>
</table>
DNA/RNA Shield™ Swab & Collection Tube

Highlights

- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

Specifications

- Contains a sterile nylon swab with short (80 mm) breakpoint
- Prefilled with DNA/RNA Shield™ (1 or 2 ml) and sterilized
- Ideal for the general collection of swab samples (i.e., nose, mouth, throat)

Applications

- Mouth, nose, and throat sample collection
- Environmental sample collection
- Pathogen inactivation and detection

Graphs show: spike-in DNA and RNA controls from saliva and stool purified at the indicated time points and analyzed by (RT)qPCR. Controls: HSV-1 and HIV (AcroMetrix™, Life Technologies).

DNA and RNA in saliva is effectively stabilized in DNA/RNA Shield™ at ambient temperature.

<table>
<thead>
<tr>
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<th>Both</th>
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<tbody>
<tr>
<td>Biological Fluids, Cells, soft tissue, easy to lyse samples</td>
<td>Quick-DNA™ Plus Kit</td>
<td>Quick-RNA™ Plus Kit</td>
<td>Quick-DNA/RNA™ Kit</td>
</tr>
<tr>
<td>Microbiomic samples (including feces, soil, water, etc.)</td>
<td>ZymoBIOMICS® DNA Kit</td>
<td>ZymoBIOMICS® RNA Kit</td>
<td>ZymoBIOMICS® DNA/RNA Kit</td>
</tr>
<tr>
<td>Viral Samples</td>
<td>Quick-DNA™ Viral Kit</td>
<td>Quick-RNA™ Viral Kit</td>
<td>Quick-DNA/RNA™ Viral Kit</td>
</tr>
<tr>
<td>Fecal/Soil Samples</td>
<td>Quick-DNA™ Fecal/Soil Microbe Kit</td>
<td>Quick-RNA™ Plus Kit</td>
<td>–</td>
</tr>
</tbody>
</table>

Learn more and view additional formats at www.zymoresearch.com/shield
DNA/RNA Shield™ Reagent

Highlights

- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

**Accommodates Any Sample**

including cells, tissues, fecal samples, tough-to-lyse samples, soil samples, plants, microorganisms, and bodily fluids

**Custom Fill in Any Device**

Contact us with any custom needs at busdev@zymoresearch.com

**Compatible Purification Kits**

<table>
<thead>
<tr>
<th>Purification of</th>
<th>DNA</th>
<th>RNA</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Fluids, Cells, soft tissue, easy to lyse samples</td>
<td>Quick-DNA™ Plus Kit</td>
<td>Quick-RNA™ Plus Kits</td>
<td>Quick-DNA/RNA™ Kit</td>
</tr>
<tr>
<td>Microbiomic samples (including feces, soil, water, etc.)</td>
<td>ZymoBIOMICS® DNA Kit</td>
<td>ZymoBIOMICS® RNA Kit</td>
<td>ZymoBIOMICS® DNA/RNA Kit</td>
</tr>
<tr>
<td>Viral Samples</td>
<td>Quick-DNA™ Viral Kit</td>
<td>Quick-RNA™ Viral Kit</td>
<td>Quick-DNA/RNA™ Viral Kit</td>
</tr>
<tr>
<td>Blood Samples</td>
<td>Quick-DNA™ Plus Kit</td>
<td>Quick-RNA™ Whole Blood Kit</td>
<td>Quick-DNA/RNA™ Plus Kit</td>
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**Product**

<table>
<thead>
<tr>
<th>Product</th>
<th>Cat. No.</th>
<th>Size</th>
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</thead>
<tbody>
<tr>
<td>DNA/RNA Shield™ Reagent</td>
<td>R1100-50</td>
<td>50 ml</td>
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<tr>
<td>DNA/RNA Shield™ Reagent (2X concentrate)</td>
<td>R1200-25</td>
<td>25 ml</td>
</tr>
<tr>
<td>DNA/RNA Shield™ Reagent</td>
<td>R1200-125</td>
<td>125 ml</td>
</tr>
</tbody>
</table>

Learn more and view additional formats at www.zymoresearch.com/shield
Urine Conditioning Buffer™ (UCB™)

Highlights

- Effectively preserves DNA and RNA in urine at ambient temperatures.
- Facilitates pelleting of both cellular and cell-free nucleic acids from large volume urine samples.
- Inhibits microbial growth during long-term (cold-free) storage of urine samples.

Compatible with Quick-DNA™ Urine Kits

Superior Preservation

UCB™ provides superior preservation vs. conventional methods. Urine (with or without UCB™) was preserved using different storage conditions: Room Temperature (RT), -20°C, and -80°C. HeLa cells were spiked into urine before starting the RNA experiment. After two weeks of storage, total DNA (yellow) and total RNA (green) were purified using the Quick-DNA™ Urine Kit and a custom RNA extraction protocol by Zymo Research, respectively. Corresponding fold change of preserved nucleic acids was obtained from qPCR analysis. Experiment was performed in technical duplicates.

Reliable at Any Temperature

UCB™ preserves DNA in urine stored at different temperatures. Urine added with UCB™ was stored at different temperatures (4°C, Room Temperature (RT), and 37°C) and analyzed over a period of 26 days. At each time point, total DNA was isolated from samples using the Quick-DNA™ Urine Kit. Corresponding Ct values were obtained from qPCR analysis. Experiment was performed in technical duplicates.

Product | Cat. No. | Size
--- | --- | ---
Urine Conditioning Buffer (UCB) | D3061-1-140 | 140 ml

Learn more and view additional formats at www.zymoresearch.com/shield
The BEAUTY of SCIENCE is to Make Things SIMPLE®