ZYMO RESEARCH

The Beauty of Science is to Make Things Simple®

Collect. Preserve. Discover.

DNA/RNA Shield™

DNA/RNA Shield™

Innovative Sample Collection & Preservation for Nucleic Acid Analysis

Accomodates Any Sample

DNA/RNA Shield™

Pathogen Inactivation

Inactivates viruses, bacteria, yeast & protists

Break the Cold Chain Not the bank!

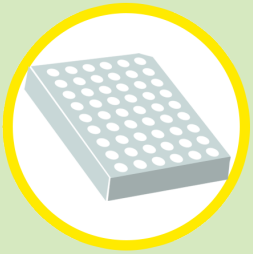
Transport at ambient temperatures

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.[1] 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™.

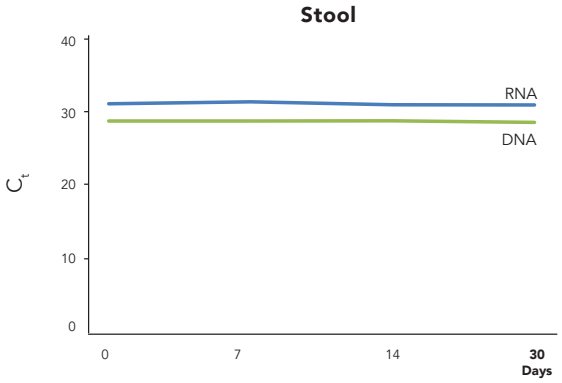
*BashingBeads™ included with some formats

Accommodates Any Sample

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

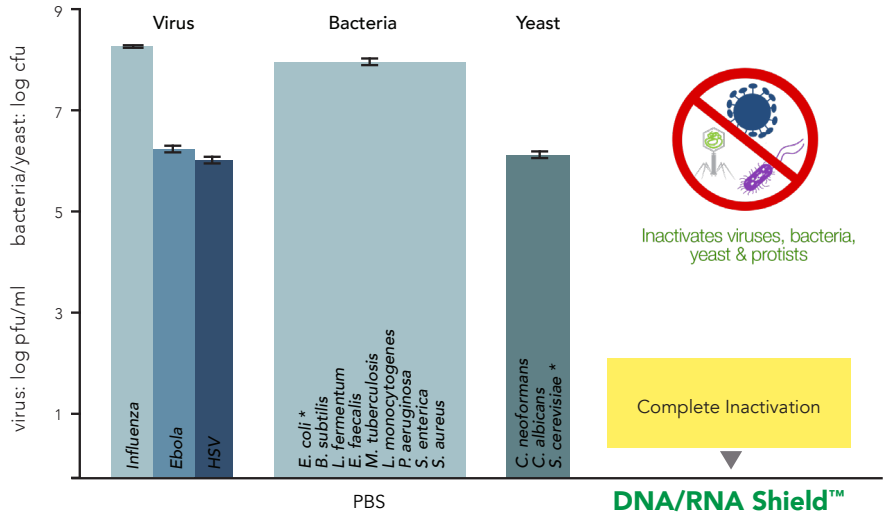
Learn more at www.zymoresearch.com/shield

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

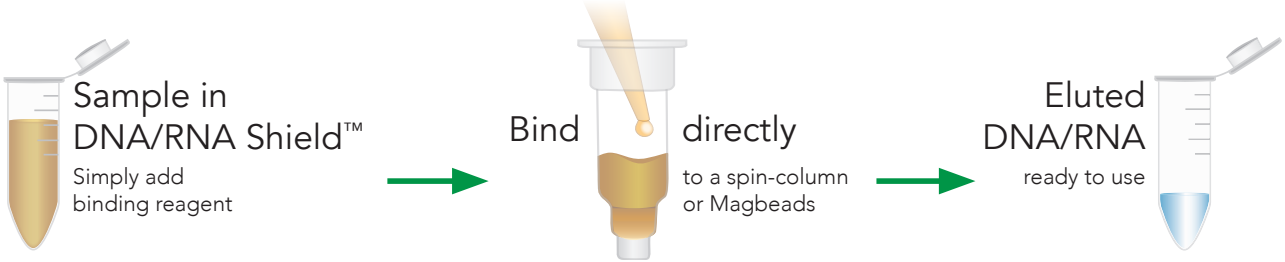


Viruses, bacteria and yeast are effectively inactivated by DNA/RNA Shield™. Samples containing the infectious agent (virus, bacteria, yeast) were treated for 5 minutes with DNA/RNA Shield™ or mock (PBS). Titer (PFU) was subsequently determined by plaque assay. Validated by: Influenza A - D. Poole and 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 yest 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

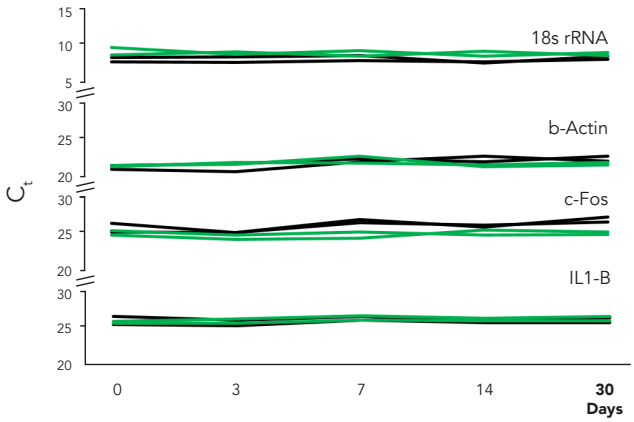
- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

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

Purification of	DNA	RNA	Both
Entire DNA/RNA Shield™ Blood Tube (3 mL whole blood)	*Quick*-DNA/RNA™ Blood Tube Kit		
EDTA, citrate, heparin blood, etc.	*Quick*-DNA™ Kits	*Quick*-RNA™ Whole Blood KIt	*Quick*-DNA/RNA™ Kit

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

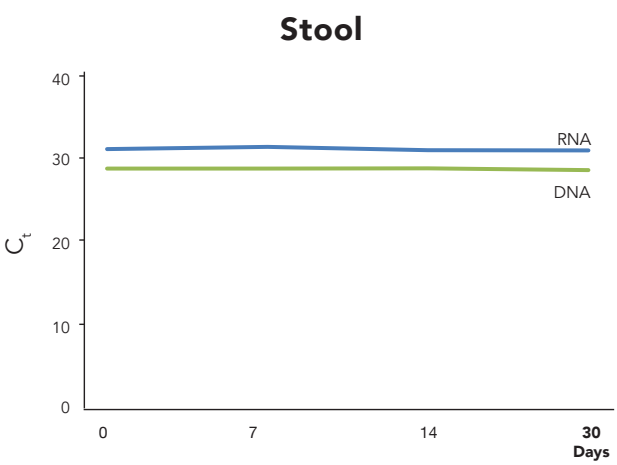
- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

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



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

Purification of	DNA	RNA	Both
Microbiomic samples (including feces, soil, water, etc.)	ZymoBIOMICS® DNA Kit	ZymoBIOMICS® RNA Kit	ZymoBIOMICS® DNA/RNA Kit
Fecal Samples	*Quick*-DNA™ Plus Kit	*Quick*-RNA™ Plus Kit	—
Viral Samples	*Quick*-DNA™ Viral Kit	*Quick*-RNA™ Viral Kit	*Quick*-DNA/RNA™ Viral Kit

Product	Cat. No.	Size
DNA/RNA Shield™ - Fecal Collection Tube	R1101	10 pack

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)

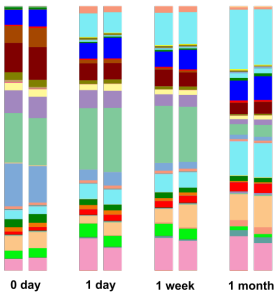
Specifications

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

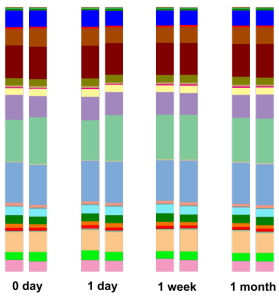
Applications

- 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

Purification of	DNA	RNA	Both
Biological Fluids, Cells, soft tissue, easy to lyse samples	*Quick*-DNA™ Plus Kit	*Quick*-RNA™ Plus Kits	*Quick*-DNA/RNA™ Kit
Microbiomic samples (including feces, soil, water, etc.)	ZymoBIOMICS® DNA Kit	ZymoBIOMICS® RNA Kit	ZymoBIOMICS® DNA/RNA Kit
Viral Samples	*Quick*-DNA™ Viral Kit	*Quick*-RNA™ Viral Kit	*Quick*-DNA/RNA™ Viral Kit
Fecal/Soil Samples	*Quick*-DNA™ Fecal/Soil Microbe Kit	*Quick*-RNA™ Plus Kit	–

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

Product	Cat. No.	Size
DNA/RNA Shield™ - Lysis Tube (Microbe)	R1103	50 tubes
DNA/RNA Shield™ - Lysis Tube (Microbe) with Swab	R1104	50 tubes/50 swabs
DNA/RNA Shield™ - Lysis Tube (Tissue)	R1105	50 tubes

DNA/RNA Shield™ Swab & Collection Tube

Highlights

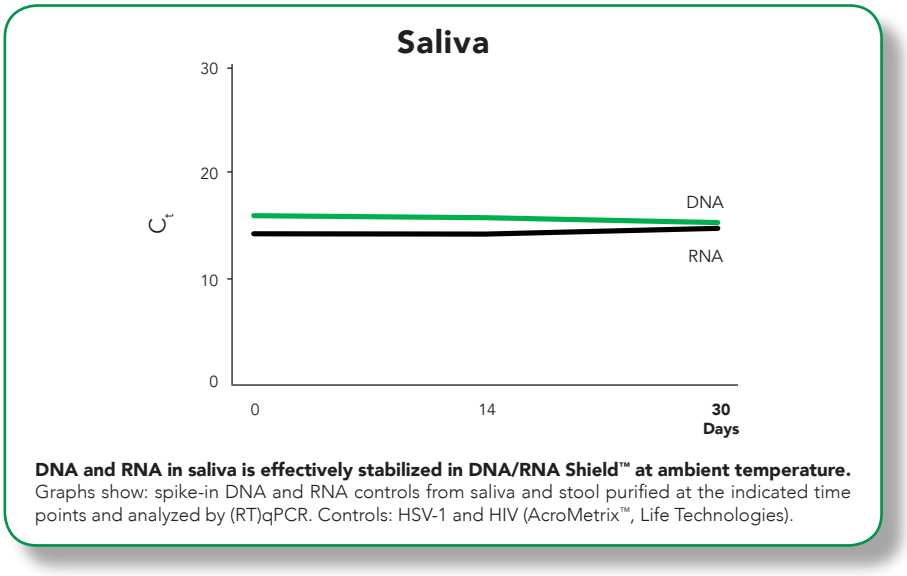
- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

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



DNA and RNA in saliva 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

Purification of	DNA	RNA	Both
Biological Fluids, Cells, soft tissue, easy to lyse samples	*Quick*-DNA™ Plus Kit	*Quick*-RNA™ Plus Kit	*Quick*-DNA/RNA™ Kit
Microbiomic samples (including feces, soil, water, etc.)	ZymoBIOMICS® DNA Kit	ZymoBIOMICS® RNA Kit	ZymoBIOMICS® DNA/RNA Kit
Viral Samples	*Quick*-DNA™ Viral Kit	*Quick*-RNA™ Viral Kit	*Quick*-DNA/RNA™ Viral Kit
Fecal/Soil Samples	*Quick*-DNA™ Fecal/Soil Microbe Kit	*Quick*-RNA™ Plus Kit	–

Product	Cat. No.	Size
DNA/RNA Shield™ - Collection Tube	R1102	50 pack (1 ml fill)
DNA/RNA Shield™ - Swab & Collection Tube	R1106	10 pack (1 ml fill)
	R1107	50 pack (1 ml fill)
	R1108	10 pack (2 ml fill)
	R1109	50 pack (2 ml fill)

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

DNA/RNA Shield™ Reagent

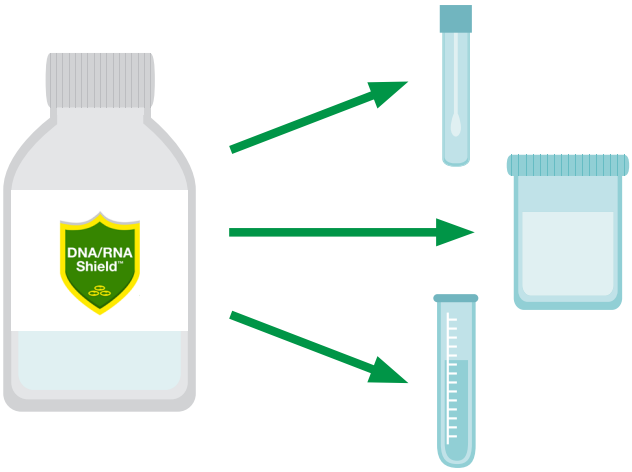
Highlights

- 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

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

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

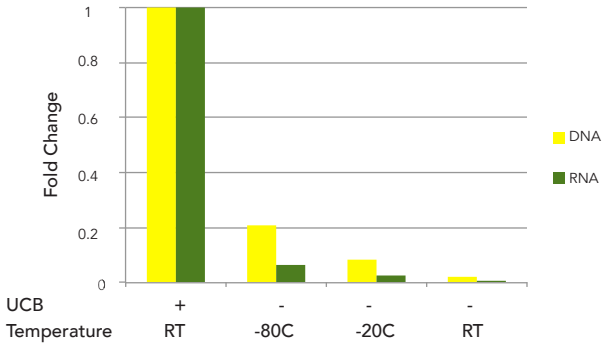
Product	Cat. No.	Size
DNA/RNA Shield™ Reagent	R1100-50	50 ml
	R1100-250	250 ml
DNA/RNA Shield™ Reagent (2X concentrate)	R1200-25	25 ml
	R1200-125	125 ml

Urine Conditioning Buffer™ (UCB™)

Highlights

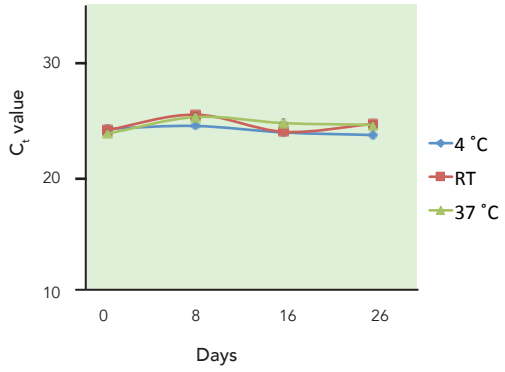
- Effectively preserves DNA and RNA in urine at ambient temperatures.
- Facilitates pelleting of both cellular and cell-free nucleic acids from large volume urine samples.
- Inhibits microbial growth during long-term (cold-free) storage of urine samples.

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 in to 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

ZYMO RESEARCH

The Beauty of Science is to Make Things Simple®

The **BEAUTY** *of* **SCIENCE** *is to Make Things* **SIMPLE**®

info@zymoresearch.com www.zymoresearch.com Toll Free: (888) 882-9682