BulletBlender

QUICK USER GUIDE

rev. 15D4

BULLET BLENDER® USER GUIDE: TABLE OF CONTENTS

GENERAL OPERATION

BULLET BLENDER® USER GUIDE

PARTS OF THE BULLET BLENDER

PART NAMES

A. Cover
B. Sample Tube
C. Enclosure
D. Gasket
E. Sample Plate
F. Operator Panel

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

GASKET FOR TUBE TYPE

NOTES

Bullet Blenders are fitted with a gasket that matches a specific kind of sample tube. Some machines have more than one gasket, which allows you to use different tube types.

Gaskets are labelled. Using the incorrect gasket may result in poor homogenization or prevent the cover from fully closing.

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

PLACEMENT OF TUBES

NOTES

There are no restrictions as to which holes to place your sample tubes in.

You do not need to balance your tubes as you would in a centrifuge.

However, you may get better results if you space them evenly.

NEXT ADVANCE
BULLET BLENDER STORM

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

ADJUSTING THE SPEED & DURATION

NOTES

Set the desired speed and time by adjusting the dials on the front of the instrument.

Homogenizing tougher tissue requires longer durations at full speed, while mixing or cell dissociation requires lower speeds. Suggested speeds and times for different tissues are available on the Next Advance Website.

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

AIR COOLING

NOTES

Air Cooling™, found on most Bullet Blender models, draws ambient air past tubes to reduce heating. Using the Bullet Blender in a cold room draws cold air past the sample tubes for better cooling.

When Gold or Gold Plus models are used without dry ice, operate them with the dry ice compartment open, so that they can draw in ambient air.

BULLET BLENDER® USER GUIDE

4 °C COOLING: OVERVIEW

NOTES

Bullet Blender Gold and Gold Plus units cool samples by blowing air past dry ice.

The flow rate of the air is adjusted based on temperature sensor data and run cycle parameters, which ensures that samples do not freeze and will stay within a few degrees of 4 °C.

NEXT ADVANCE
BULLET BLENDER GOLD

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

4 °C COOLING: SELECTING DRY ICE

NOTES

We recommend using 5/8” (1.5 cm) dry ice pellets.

Very fine pellets may block airflow and prevent proper cooling.

Larger chunks of dry ice have less surface area, so they are not as efficient.

USE

5/8” PELLET

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

4 °C COOLING: DRY ICE FILL AMOUNT

NOTES

Overfilling the machine may block airflow.

Underfilling will result in inadequate cooling.

For proper fill volume, refer to fill line inside of interior bucket or to the image displayed.

PROPER FILL PROPORTION:

NEXT ADVANCE
BULLET BLENDER GOLD

NEXT ADVANCE

SAMPLE PREPARATION & HANDLING

BULLET BLENDER® USER GUIDE

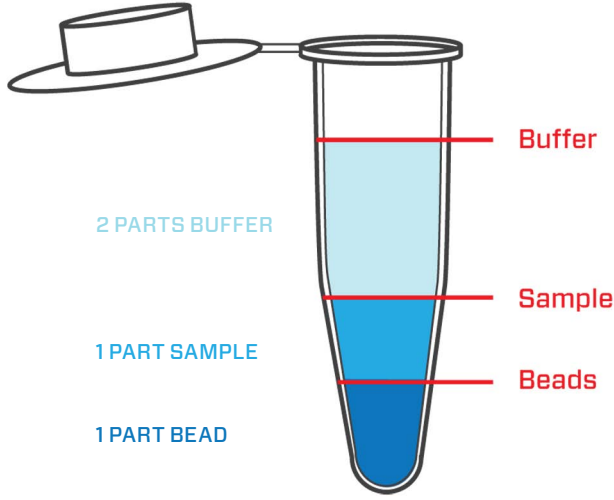
PROPER FILL PROPORTION

NOTES

Proportions are volumetric.

Always keep the bead-to-buffer ratio the same. Reduce the amount of sample if desired.

Different ratios may be required for certain sample types. See specific protocol for details.



NEXT ADVANCE

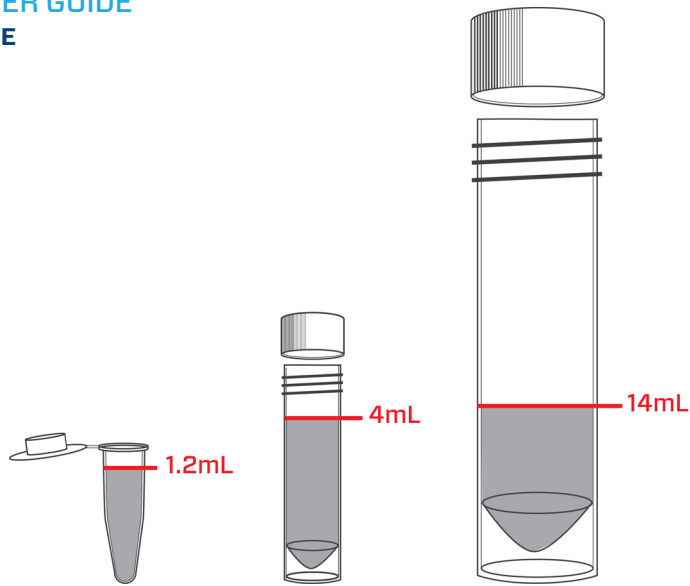
BULLET BLENDER® USER GUIDE

MAXIMUM TOTAL VOLUME

NOTES

Overloading the tube will result in poor homogenization and can cause tube leakage.

Some sample types homogenize more efficiently with smaller tube loads.

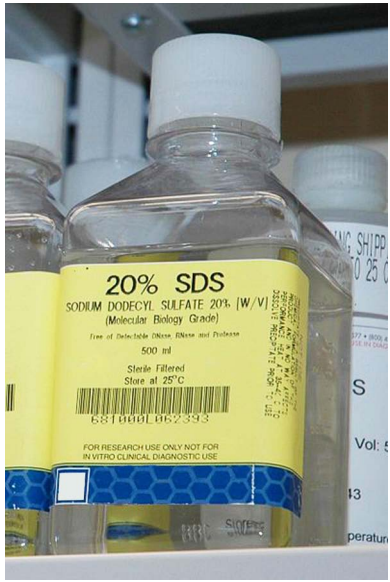


NEXT ADVANCE

NOTES

Homogenizing samples in buffer containing detergent may result in excessive sample foaming.

We recommend adding detergent after homogenization. Foaming may also be reduced by lowering the homogenization speed, or by increasing the sample volume (if compatible with your experimental protocol).



NEXT ADVANCE

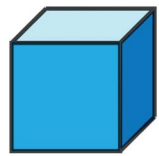
BULLET BLENDER® USER GUIDE

CUTTING A SAMPLE PROPERLY

NOTES

Long, thin samples will homogenize faster than cube-shaped or round samples.

To better homogenize tough samples, cut your sample into thin strips.



EXAMPLE:
CITRUS LEAVES

GOOD

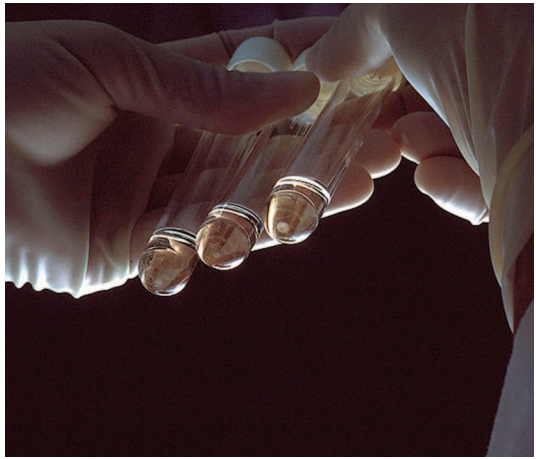
BAD

NEXT ADVANCE

NOTES

Cells should be pelleted and then resuspended in the recommended volume of buffer before homogenization.

Total packed volume of cells should be 300 uL or less for microcentrifuge tube models, 1 mL or less for 5 mL tube models, and 3.5 mL or less for 50 mL tube models.



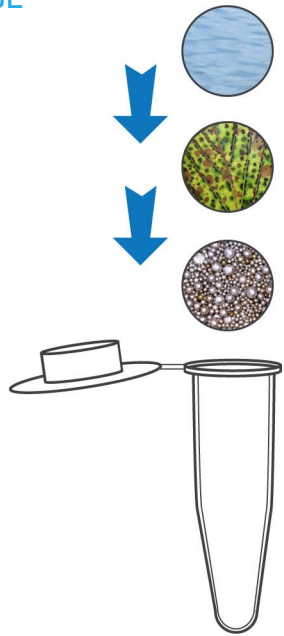
BULLET BLENDER® USER GUIDE

HOW TO LOAD A SAMPLE

NOTES

For most samples, add the beads to the tube, then the sample, and then the buffer. This prevents sample from being trapped in the narrow bottom of the tube, which can impair homogenization.

Special case: When using an 11 mm bead in the Bullet Blender 5 Storm, add the sample first and then place the bead on top of it.



3. BUFFER

2. SAMPLE

1. BEADS

NOTE:
DO NOT WRAP TUBE IN PARAFILM.

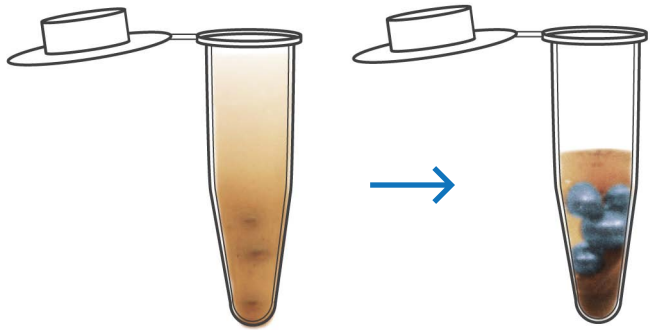
NEXT ADVANCE

NOTES

Soluble targets (protein, DNA, RNA, etc.) can be retrieved from the supernatant after centrifugation.

If you require whole homogenate, remove the beads with a Next Advance Magnetic Wand or carefully remove as much of the homogenate as possible from around the beads with a pipette.

CENTRIFUGATION



BEFORE **AFTER**

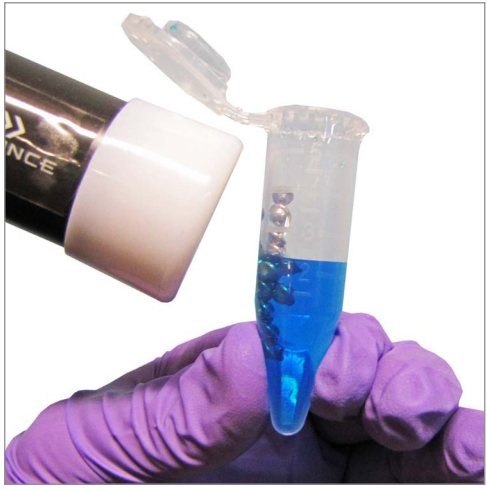
NEXT ADVANCE

REMOVAL OF BEADS WITH MAGNETIC WAND

NOTES

If using stainless steel beads, you can retrieve beads with a Next Advance Magnetic Wand, leaving only the homogenate in the tube.

NEXT ADVANCE
MAGNETIC WAND



NEXT ADVANCE

BEAD SELECTION

NOTES

Bead Lysis Kits are a convenient all-in-one solution: beads are pre-loaded into homogenization tubes. Just add sample and buffer.

Choose bead kits based on your sample type and size.

NEXT ADVANCE

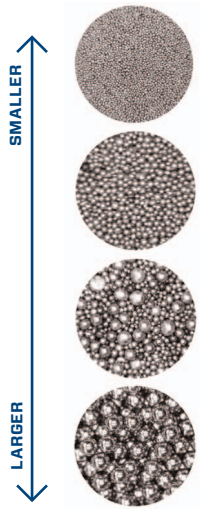
BULLET BLENDER® USER GUIDE

BEAD SELECTION: SIZE

NOTES

Use beads that are approximately the same size as the sample you are trying to homogenize. Small beads are excellent for bacterial cultures or other cell suspensions, and larger beads are good for cut-up tissue.

Using beads that are too large for the tube (e.g, 4.8 mm beads in a microcentrifuge tube) can result in inefficient homogenization and tube failure.



NEXT ADVANCE

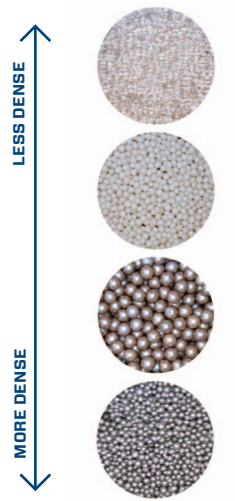
BULLET BLENDER® USER GUIDE

BEAD SELECTION: MATERIAL

NOTES

Use denser beads for tougher samples.

Lighter beads, such as glass, can be used for soft samples. Denser beads such as zirconium oxide or stainless steel provide more homogenizing power.



NEXT ADVANCE

BEAD SELECTION: SPECIALTY BEADS

NOTES

Use special bead types to homogenize difficult samples.

For resilient samples that contain a lot of connective tissue or fibers, consider using “UFO” beads. The sharper edges of these beads are excellent for cutting up tough samples.

To crush dry grains into powder, use large stainless steel beads (6 or 11 mm) in the Bullet Blender Storm 5.

STAINLESS STEEL UFO BEADS

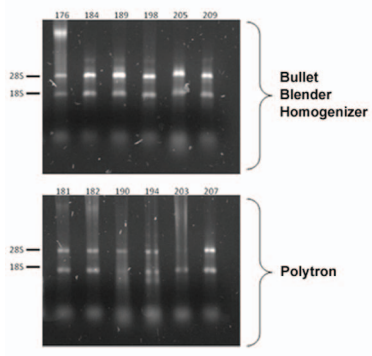
NEXT ADVANCE

CONSIDERATIONS BY ANALYTE

NOTES

If it is important to keep your samples cold, consider Storm or Gold models with air cooling and dry ice cooling.

Use RNase-free beads and tubes to limit sample degradation. Consider RNAse-free Bead Lysis Kits to reduce handling.



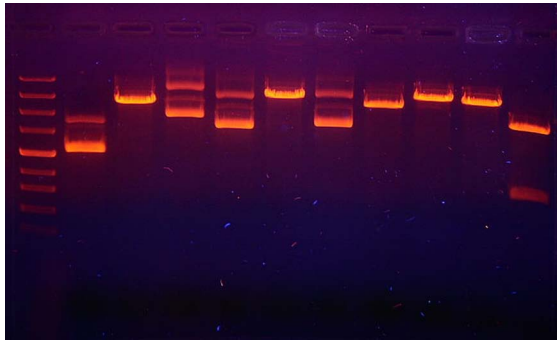
Sample	ng/uL
176	8290,0
184	7785,0
189	10157,0
198	555,0
205	2013,0
209	1150,0
181	731,0
182	882,0
190	727,0
194	166,0
203	461,0
207	136,9

CONSIDERATIONS: DNA

NOTES

The Bullet Blender does not cause excessive shearing of DNA during processing.

Full length chromatin can be extracted using the Bullet Blender at lower speeds.



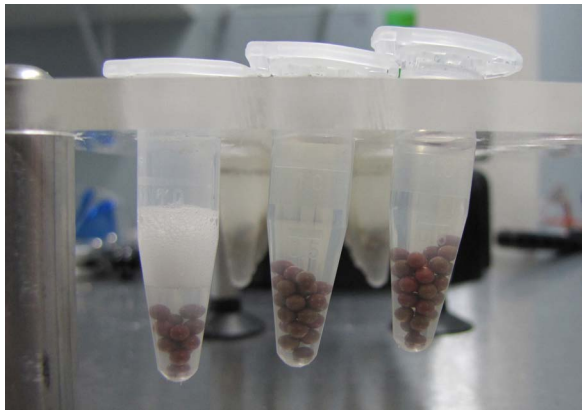
NEXT ADVANCE

CONSIDERATIONS: PROTEIN

NOTES

It is especially important to avoid foaming.

Storm or Gold model Bullet Blenders provide extra cooling, which is useful for samples containing heat-labile proteins.

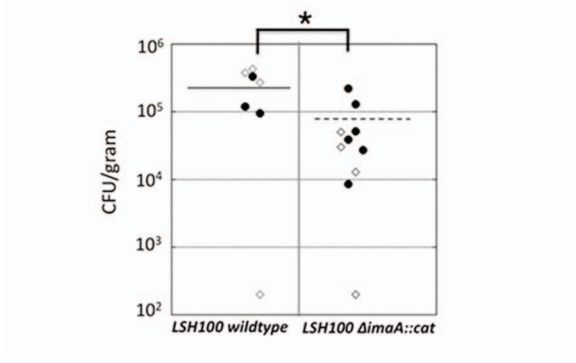


NEXT ADVANCE

NOTES

Bullet Blenders can be used to isolate bacteria and viruses from infected tissue and plant material.

Specific protocols vary by sample and analyte. Check our protocol webpage for examples.

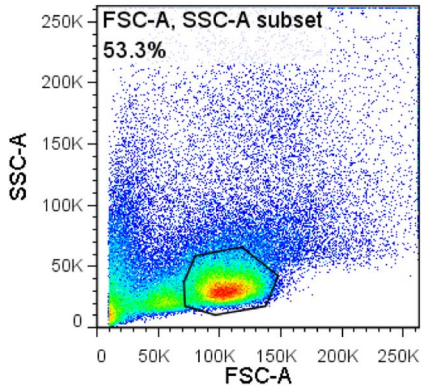


NOTES

Use large dense beads. Homogenize samples at low speeds.

There will be some loss of viability. Tougher samples have greater loss.

Use of a digestion buffer (e.g., containing collagenase) may aid in dissociation.



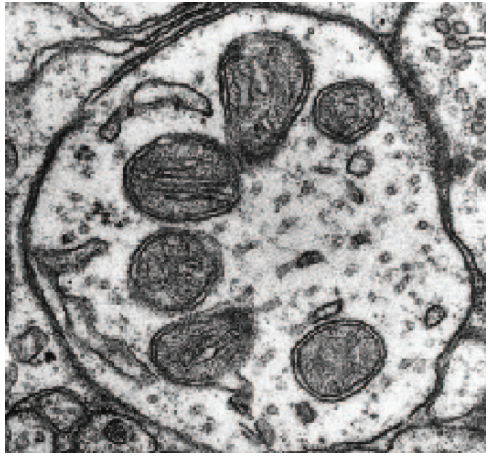
NEXT ADVANCE

ORGANELLES (E.G. NUCLEUS, MITOCHONDRIA, CHLOROPLASTS)

NOTES

Some organelles, such as mitochondria, can be isolated from cells using a Bullet Blender.

To minimize damage to the organelles, use the gentlest conditions that still result in cell lysis.



NOTES

The Bullet Blender can be used to generate consistent nano scale particles or liposomes ranging from 50 - 100 nm.

Particle size of nanoparticles can be decreased by increasing homogenization time.

NOTES

Coarsely-ground material can be made into finer powders in a Bullet Blender, and it can also be used to break up clumps.

Even suspensions can be created by running the Bullet Blender at a high speed.

To finely grind material, use large stainless steel beads. To break up clumps, large stainless steel or zirconium oxide beads may be used.

CONSIDERATIONS BY SAMPLE TYPE

NOTES

Our experienced staff of molecular biologists have worked to provide you with a set of optimized protocols for the homogenization of various tissue, cell types, and organisms so you can spend less time troubleshooting and more time getting results.

The QR code links to the protocol page on our website.

NEXT ADVANCE

NOTES

Generally larger animals have “tougher” organs, so you may need to increase homogenization cycle times beyond protocol reccomendations.

Connective tissue within your sample will take longer to homogenize.

PLANT MATTER

NOTES

For tough, fibrous plant tissue, consider using “UFO” beads, which are excellent for chopping fibers.

Some plant material homogenizes more efficiently if buffer volume is reduced.

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

DRIED GRAINS, NUTS AND BEANS

NOTES

Some samples may need pre-crushing using the Next Advance Stomper. See specific protocol for details.

The Bullet Blender 5 Storm with an 11 mm stainless steel bead is the best choice for most samples of this type.

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

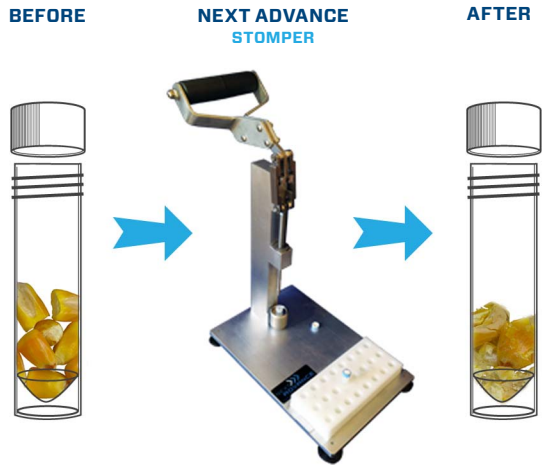
PRE-CRUSHING WITH THE STOMPER

NOTES

Hard samples like dried corn, soybeans and shells can be pre-crushed right in the sample tube.

Place the tube in the holder of the Next Advance stomper and pull the handle to crush.

Disposable shields can be used to prevent any cross-contamination.



NEXT ADVANCE

NOTES

Small soft organisms, like fruit flies and nematodes, can be homogenized in the same way tissue samples are.

1. Place the samples into the tube dry, or spin them down at low speed and remove the supernatant if they were cultured in growth media.

2. Add beads and buffer, flick the tubes lightly to resuspend if the samples are pelleted, and homogenize.

NOTES

Heavy-bodied insects, such as fruit flies, can be homogenized in the same way as animal tissue.

Some insects, such as small ticks, can float on the buffer surface. To homogenize these samples, perform one run with just beads and sample, and then add buffer and re-homogenize to finish.

BULLET BLENDER® USER GUIDE

HAIR

NOTES

Do not densely pack hair into the sample tube. Overloading the tube will cushion the bead impacts and prevent good homogenization.

Hair is best homogenized dry. Buffer can be added after homogenization. Use 2.0 mm zirconium oxide beads and run at top speed.

NEXT ADVANCE

BULLET BLENDER® USER GUIDE

DEHYDRATED SAMPLES

NOTES

Dehydrated samples can be homogenized dry, to form a powder, or wet. For best results with wet homogenization, rehydrate the sample fully before processing.

Efficiency will be improved if the sample is cut into thin strips before homogenization.

NEXT ADVANCE

TISSUE FROZEN IN LIQUID NITROGEN

NOTES

Immerse the frozen tissue in cold buffer and allow it to thaw, then treat it as you would any other sample.

If the tissue was dehydrated before it was frozen, you can pulverize the tissue by homogenizing with beads only (no buffer), then adding the cold buffer and running again to complete the homogenization.

NOTES

The Bullet Blender has been used in a wide variety of applications for many years. Check our publication reference section to see if previous studies similar to yours are available. The Bullet Blender has been cited in more than 500 publications!

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