BULLET BLENDER®

REFERENCE GUIDE

RS18-0551C

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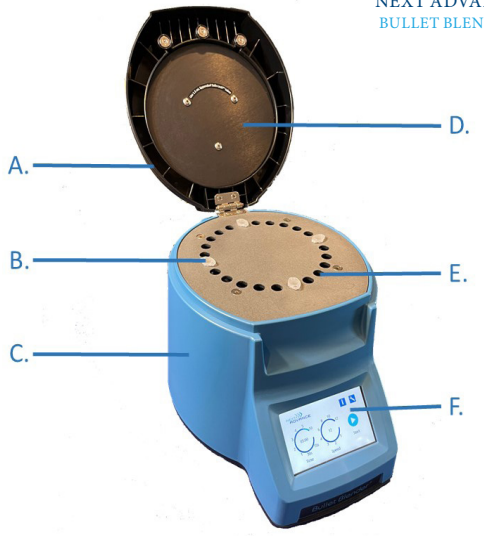
GENERAL OPERATION

BULLET BLENDER® USER GUIDE

PARTS OF THE BULLET BLENDER

PART NAMES

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



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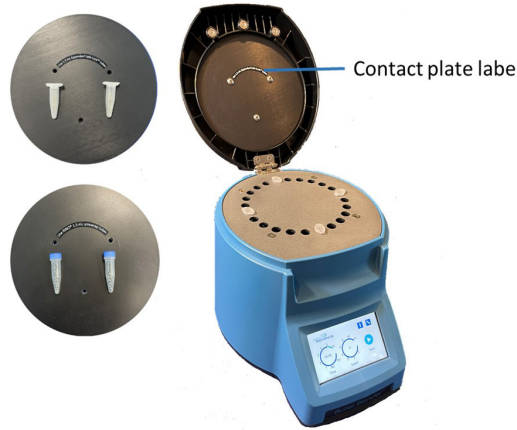
NOTES

Bullet Blenders are fitted with a contact plate that matches a specific kind of sample tube. Some models come with more than one contact plate, which allows you to use different tube types.

Contact plates are labeled with the corresponding tube type. Using the incorrect contact plate may result in poor homogenization or prevent the cover from fully closing.



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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, spacing your samples allows for better consistency.

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BULLET BLENDER STORM PRO

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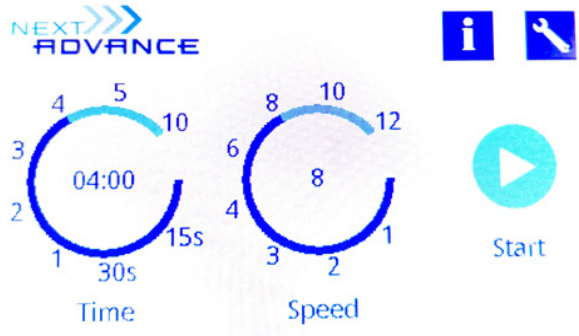
BULLET BLENDER® USER GUIDE
ADJUSTING THE SPEED & DURATION

NOTES

Set the desired speed and time by adjusting the values 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.

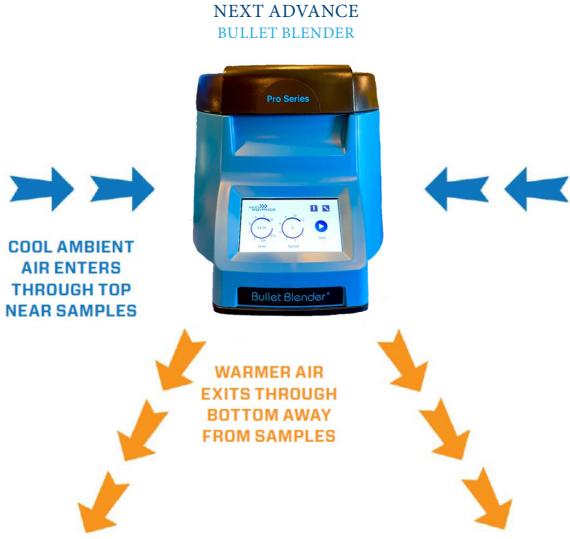


BULLET BLENDER® USER GUIDE
AIR COOLING

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



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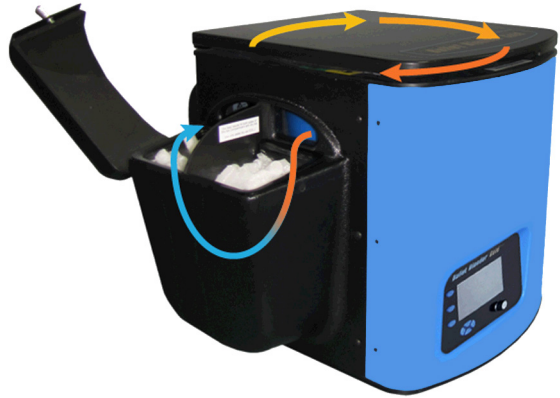
4 °C COOLING: OVERVIEW

NOTES

Bullet Blender Gold 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.



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BULLET BLENDER GOLD

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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:

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BULLET BLENDER GOLD

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SAMPLE PREPARATION & HANDLING

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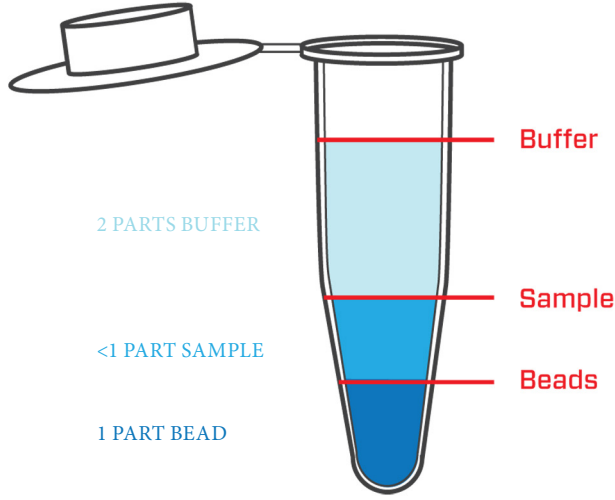
PROPER FILL PROPORTION

NOTES

Proportions are volumetric.

Always keep the bead-to-buffer ratio the same. The amount of sample must be less than or equal to half of the buffer volume. Low sample to buffer ratios are fine.

Different ratios may be required for certain sample types. See specific protocols on our website for details.



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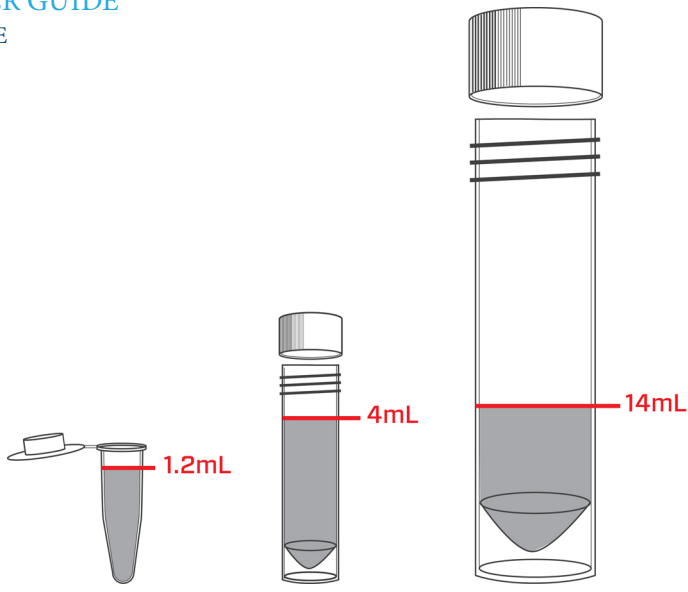
MAXIMUM TOTAL VOLUME

NOTES

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

Some sample types homogenize more efficiently with smaller tube loads.

*Volumes shown are for total bead, buffer, and sample volumes



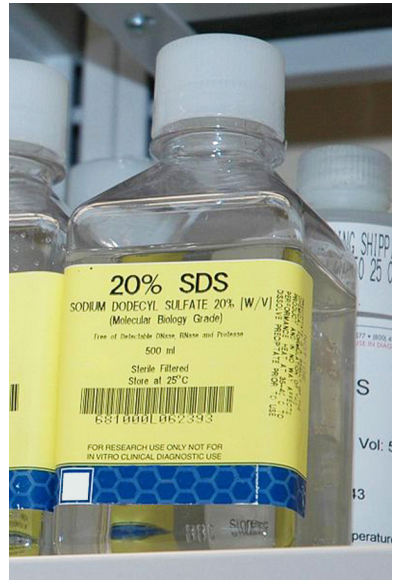
1.5-2 mL Tubes | 5 mL Tubes | 50 mL Tubes

BULLET BLENDER® USER GUIDE
USE OF DETERGENT

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).



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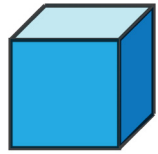
CUTTING A SAMPLE PROPERLY

NOTES

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

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

GOOD



BAD

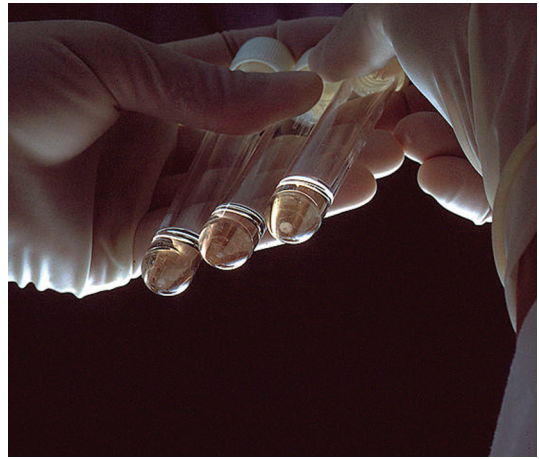
EXAMPLE:
CITRUS LEAVES

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.



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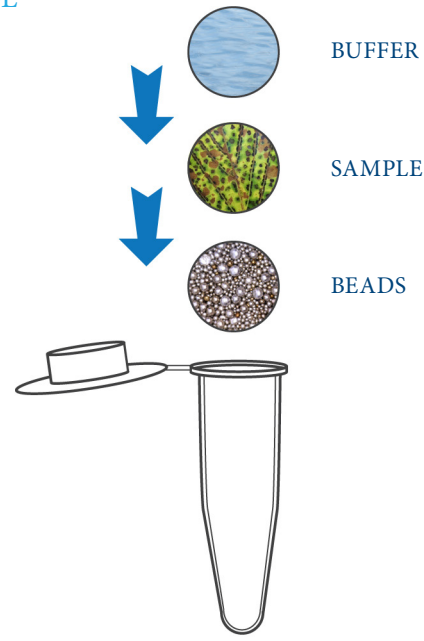
ALTERING TUBES

NOTES

Altering homogenization tubes will likely reduce the efficiency of homogenization.

Parafilm should not be used on tubes going into your instrument. Using parafilm will reduce the ability of the tube to oscillate in the Bullet Blender, thereby hindering homogenization.



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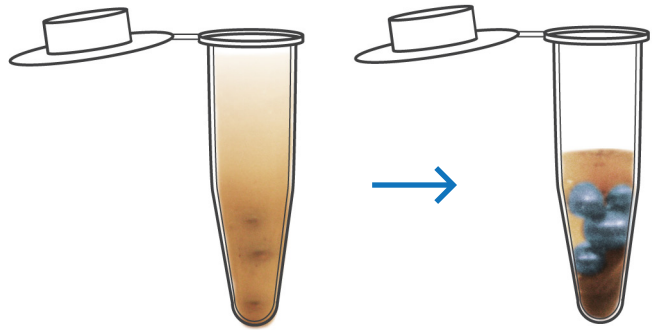
NOTES

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



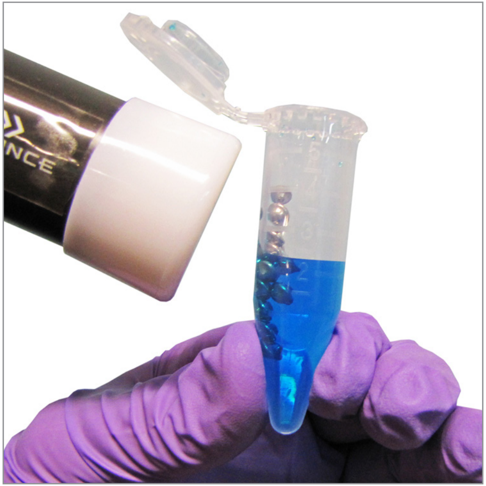
BEFORE AFTER

REMOVAL OF BEADS WITH MAGNETIC WAND

NOTES

Some types of stainless steel beads can be retrieved with a Next Advance Magnetic Wand, leaving only the homogenate in the tube.

NEXT ADVANCE
MAGNETIC WAND



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.

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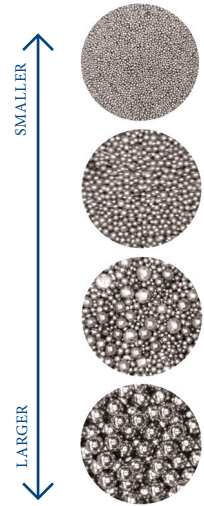
BULLET BLENDER® USER GUIDE

BEAD SELECTION: SIZE

NOTES

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.

Refer to your protocol or contact customer support for bead recommendations.



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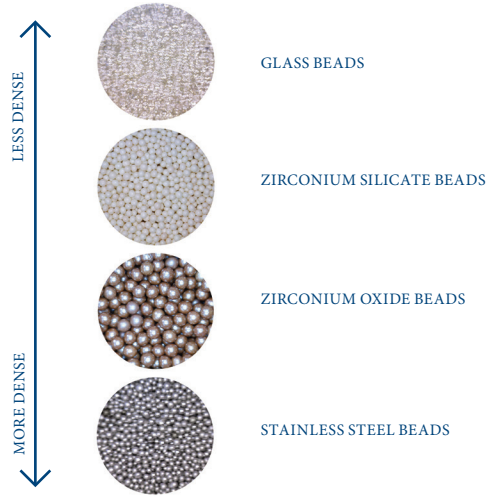
BEAD SELECTION: MATERIAL

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.



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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 (BBY5M).

STAINLESS STEEL UFO BEADS

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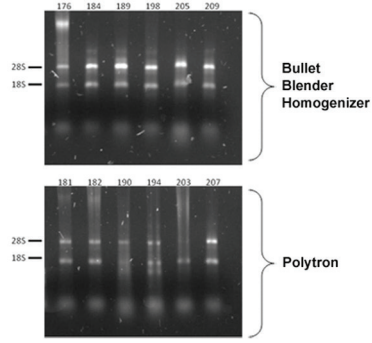
CONSIDERATIONS BY ANALYTE

BULLET BLENDER® USER GUIDE
CONSIDERATIONS: RNA

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

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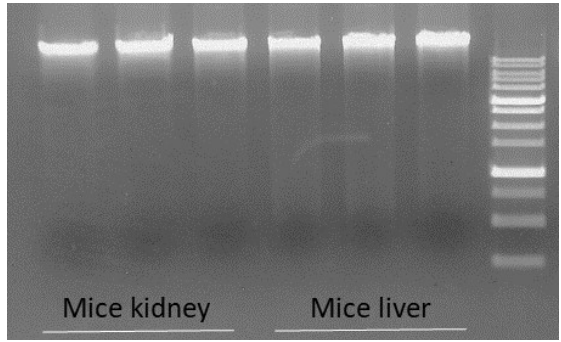
NOTES

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

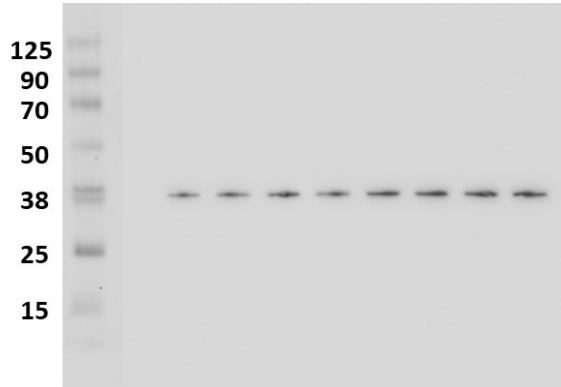
Full length chromatin can be extracted using the Bullet Blender at lower speeds.



NOTES

It is especially important to avoid foaming.

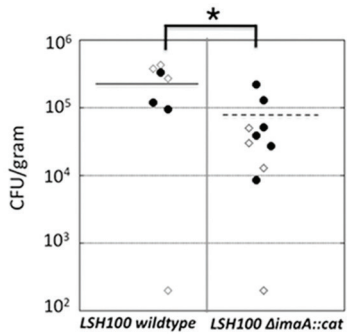
All of our models have a 4 °C cooling option to keep your samples cool during homogenization and prevent protein degradation.



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.

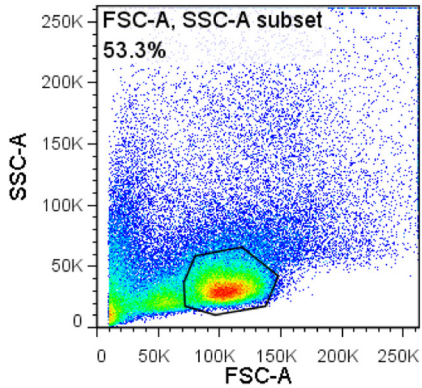


NOTES

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.



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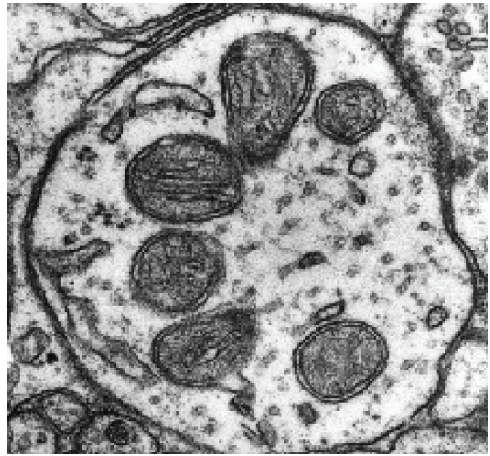
ORGANELLES (E.G. NUCLEUS, MITOCHONDRIA, CHLOROPLASTS)

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.



BULLET BLENDER® USER GUIDE
NANO PARTICLES/LIPOSOMES

NOTES

The Bullet Blender can be used to generate consistent nano scale particles or liposomes.

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

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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.

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BULLET BLENDER® USER GUIDE
ORGAN TISSUE

NOTES

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

Connective tissue may remain unhomogenized in your samples but this does not reduce quality or yield.

BULLET BLENDER® USER GUIDE
PLANT MATTER

NOTES

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

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

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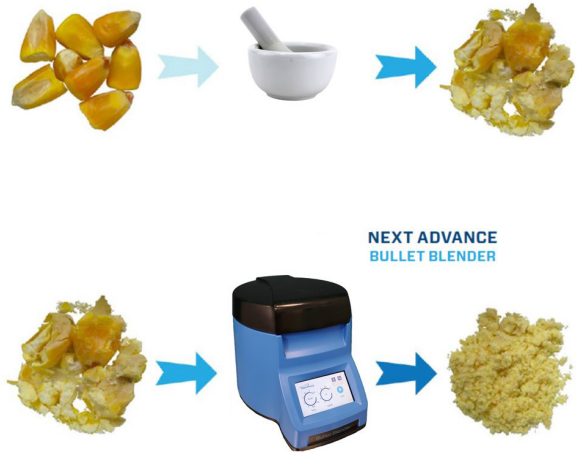
BULLET BLENDER® USER GUIDE

DRIED GRAINS, NUTS AND BEANS

NOTES

Hard samples may need pre-crushing. See specific protocol for details.

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



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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.

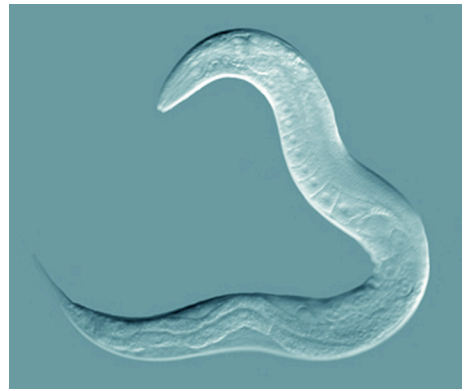
BULLET BLENDER® USER GUIDE
SMALL ORGANISMS

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 centrifuge them 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.

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NOTES

Tough resilient samples include skin, umbilical cord, tendon, etc...

Shave skin samples to remove the hair.

Slice the sample into thin strips. Homogenize using stainless steel UFO beads.

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

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 1000 publications!

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