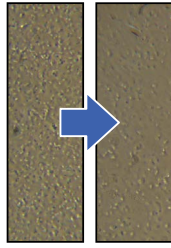


# µT-12 Sample Crushing Example and Holder Usage

## µT-12 Details of sample crushing example and the holders used

### ① E. coli (1 mL of bacterial solution suspended in Buffer)



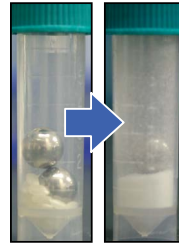
Beads: Zirconia beads  $\phi$ 0.2 mm  
Tube: 2 mL Screw cap microtube  
3200 r/min, 180 s



**Microtube holders for use**  
Versatile, high capacity holder. 1.5/2 mL Screw cap microtubes  $\times$  6

TH-0206

### ③ 1 g raw rice, crushing without Buffer



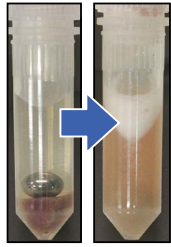
Beads: SUS beads  $\phi$ 10 mm  $\times$  2  
Tube: 5 mL Screw cap freestanding tube  
No solvent. 2000 r/min, 1 min



**Microtube holders for use**  
Large 10 mm diameter beads with high crushing power and about 1 g sample. 5 mL  $\times$  1  
**For crushing Dry matter.**

TH-0501

### ② Pig myocardium 100 mg



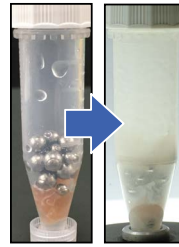
Beads: SUS beads  $\phi$ 5 mm  $\times$  1  
Tube: 2 mL Screw cap microtube  
Solvent 1 mL, 3200 r/min, 30 s



**Microtube holders for use**  
For heat-sensitive samples, pre-cooling the holder in a freezer (up to  $-20^{\circ}\text{C}$ ) before use is recommended. 1.5/2.0 mL  $\times$  3

TH-0203

### ④ 1 g pig belly, crushing with Buffer



Beads: SUS beads  $\phi$ 5 mm  $\times$  8 +  $\phi$ 3 mm  $\times$  10  
Tube: Eppendorf 5 mL Screw cap tube  
Solvent 500  $\mu\text{L}$ , 2000 r/min, 1 min

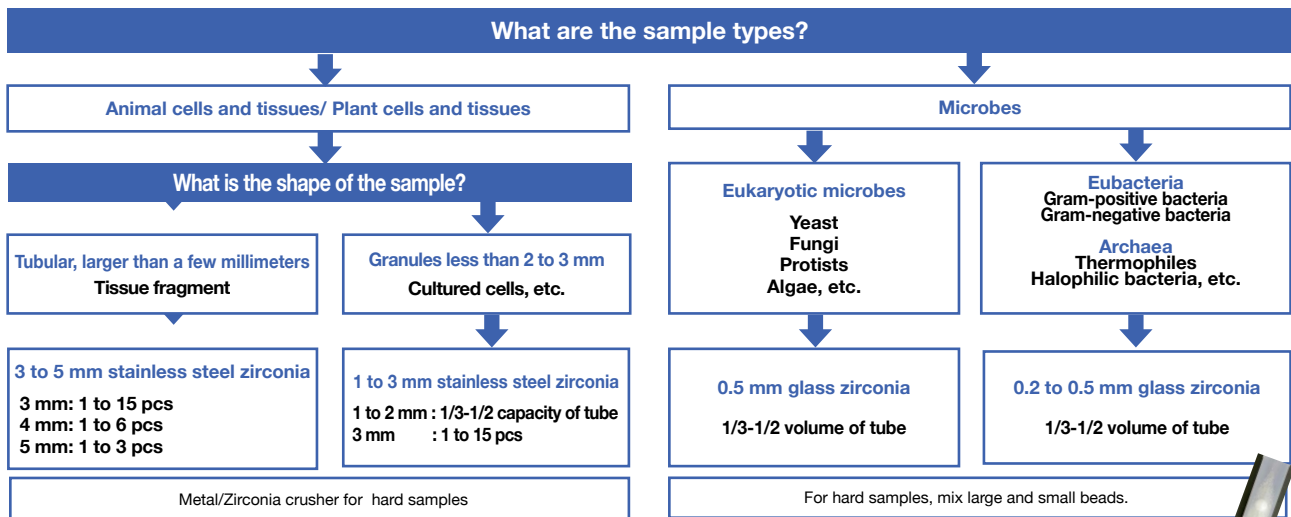


**Microtube holders for use**  
Eppendorf 5 mL Screw cap tube and this holder are recommended **if you want to crush a sample of about 1 g with solvent.**

TH-0501EP

## Selection of Beads and Microtubes for Bead Crushing

### Bead Selection Criteria



#### Stainless steel beads



#### Metal crusher



- The weight is stainless steel > zirconia > glass, and the crushing power increases in that order. 0.2 mm and other fine zirconia beads are expensive. Increase the crushing time when using more affordable glass beads.

- Stainless steel beads and metal crushers, and zirconia crushers are sold separately.
- Use commercially available glass and zirconia beads.
- The number of beads is an example for 2 mL tubes. For 5 mL tubes, increase the bead volume as needed.

# Data on the temperature of samples when crushing

## Data on the heat generation of samples when crushing in $\mu$ T-12

### Data on the heat generation of samples when crushing in $\mu$ T-12

In Crushing of samples with beads in  $\mu$ T-12, we found that the sample temp. did not rise even when the sample of RT was broken. The heat generation can be further reduced by pre-cooling the sample and/or the sample below RT can be kept with the holder for cold storage (TH-0203) after crushing it.



Vessels	Bead types and Shaking conditions	Temperature inside the vessels before shaking	Vessel temperature inside after shaking for each holder	
<b>2.0 mL Screw cap Microtube</b>	$\phi$ 3 mm zirconia $\times$ 15 water 0.5 mL Shaking for 60 seconds at 3200 r/min	<b>+23.5°C</b>	6 pcs-holder	<b>+27.8°C</b>
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	<b>+22.5°C</b>
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	<b>+16.3°C</b>
	$\phi$ 3 mm stainless steel $\times$ 15 water 0.5 mL Shaking for 60 seconds at 3200 r/min	<b>+23.5°C</b>	6 pcs-holder	<b>+25.8°C</b>
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	<b>+23.2°C</b>
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	<b>+17.0°C</b>
	$\phi$ 5 mm stainless steel $\times$ 2 water 0.5 mL Shaking for 60 seconds at 3200 r/min	<b>+23.0°C</b>	6 pcs-holder	<b>+25.1°C</b>
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	<b>+22.9°C</b>
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	<b>+17.5°C</b>
	Metal crusher $\times$ 1 no solvent Shaking for 30 seconds at 2500 r/min	<b>+23.3°C</b>	6 pcs-holder	<b>+29.3°C</b>
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	<b>+24.3°C</b>
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	<b>+19.2°C</b>
<b>5.0 mL Screw cap Test tube</b>	$\phi$ 5 mm stainless steel $\times$ 15 water 2.0 mL Shaking for 60 seconds at 2500 r/min	<b>+23.3°C</b>	<b>+25.4°C</b>	

•The sample temp. before and after shaking measured with thermocouple in each condition. •After shaking, the sample temp. with stainless steel beads rose about 2°C and that with zirconia beads and Metal crusher rose about 4°C and 6°C respectively. •The sample temp. was almost constant before and after shaking when using 3 pcs-holder for cold storage with sufficient pre-cooling in a refrigerator (4°C). •The sample temp. dropped by about 5°C on average compared to before shaking when using 3 pcs-holder for cold storage that was fully precooled in the freezer (-10°C). •Do not cool the 3 pcs-holder for cold storage at temp below -20°C. It may cause the screws get loosen from metal shrinkage. •Do not use tubes that have been cooled directly at negative temp. The tubes will be easily broken.

## About 2 mL recommended tubes

- 1 SARSTEDT made 72.693 for less than  $\phi$ 3 mm beads (Crushing of Bacteria and Yeast).
- 2 Scientific Specialties Inc. (US) made 2641-0B for  $\phi$ 4 to 5 mm beads or Metal crushers (Animals and Plants cell and Rigid samples). SARSTEDT 72.693 could be used for low speed. See the right page for details.

### [Impact-resistant tubes for use with $\phi$ 4 to 5 mm beads and metal crushers]

#### Shatter Resistant 2.0 mL Tube & Cap Made by Scientific Specialties Inc. (US)



The strength test of this impact-resistant tube resulted in no damage even if it was shaken with  $\phi$ 5 mm Stainless steel beads and Metal crushers in  $\mu$ T-01/ $\mu$ T-12, as long as it is within the speed limit. (See the "Details for Scientific Specialties-made Microtubes" on the right page.)

In fact, this tube is slightly difficult to tell whether the sample can be crushed well due to its white translucent color.

Therefore, SARSTEDT 72.693 is recommended if you prefer a tube that is highly visible inside. Please note that SARSTEDT has a speed limitation. (See the "Limitation on SARSTEDT 72.693 on the right page.)

This tube is recommended for the crushing of rigid tissue or plant seeds.

## $\mu$ T-12 About 5 mL recommended tubes



TH-0501

### Optional holders for $\mu$ T-12

•QSP Transport Tube 5 mL (580-GRD-Q) is recommended as a 5 mL freestanding tube for TH-0501. For dry matter. up to 2200 r/min for 1  $\times$   $\Phi$ 10 mm SUS bead, up to 2000 r/min for 2 beads.



TH-0501EP

•Use the dedicated TH-0501EP holder for Eppendorf 5 mL tubes.

The maximum diameter of beads that can reach the tip of the tube is 3 mm. When crushing, use beads with a diameter of 3 mm or less, or mix beads of different sizes.