Freeze Crusher µT-48

Powerful crushing of frozen samples with liquid nitrogen.48 samples can be treated simultaneously. Optimum for extracting hard samples, proteins susceptible to heat denaturation, RNA, etc.

Example of various frozen crushed samples including inanimate objects. --> P.091-092

Features

- Crushing of frozen sample in vessels with liquid nitrogen
- 2mL Microtube or Dedicated metal container are used
- The throughput is 0.2g to 2g (Depends on the vessels)

Applications

- Crushing of Yeast, Mold, Tissue piece of animals and plants
- Crushing of bones, teeth and limbs of small animals
- Crushing of Wire covering and Plastics, Asbestos sample etc.

The procedure of freeze crushing

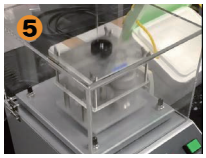
Work gloves are worn when freezing the sample with liquid nitrogen in the photo but use gloves suitable for handling liquid nitrogen in actual use.

Put the specified amount (below) sample and metal crusher into the vessel.

When a vessel requires holder, attach it in the holder.

Soak and freeze in liquid nitrogen until bubbling ceases.

Quickly attach to the µT-48 main unit.



Close the hood, Check the time and shaking speed and Start crushing.

After crushing, take out the crusher and proceed to the next process.

Adapted to various samples with 3 types vessel holders

Adapted to various samples with 3 types vessel holders. Powerful crushing of frozen samples with liquid nitrogen. Living tissues and organs, Hard tissues such as bones etc. and also some inanimate samples such as rubber and plastic can be crushed. Adapted to Marketed 2mL tubes and Dedicated stainless steel crushing vessels.

Recommended shaking speed in each crushing sample.

- Stainless steel strong crushing vessel: Up to 1000r/min
- Metal crusher: Up to 1200 r/min
- Crushing beads: Up to 1600 r/min

Shaking speed more other than above speed might cause breakage of tubes, vessels. Thus, be sure to observe the shaking speed above.

Optional accessories: Vessel holders

❶

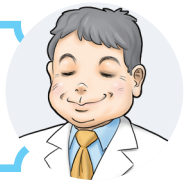
❷

❸

Product Name / Model / Remarks
❶48pcs-Holder for µT-48 TH-0248T 1pc of Holder (Capacity : 48pcs of 2.0mL round bottom Microtubes) and 100pcs of Metal crusher come as a set.
❷3pcs-Holder for µT-48 TH-0203T 4pcs of Holder (Capacity : 3pcs of 2.0mL round bottom Microtubes), 24pcs of Metal crusher and Rack come as a set.
❸Stainless steel-made strong crushing vessel TH-SPT Crushing vessel 4pcs, Dedicated crusher and Rack come as a set. Suitable for samples that cannot be crushed by Microtube with Metal crusher. Larger amount of samples can be crushed than that of Microtube.

USER'S VOICE

Very useful when extracting substances susceptible to denaturation and degradation of RNA and proteins.



Model	µT-48
Crushing method	Vertically reciprocal shaking.
Shaking speed (*1)	0 to 2500 r/min (*1)
Capacity	2.0 mL Microtube: Max. 48pcs (*2)(*3) Stainless steel poweful crushing vessel : Max. 4pcs (*3)
Timer	1 to 999 seconds
Safety devices/ functions	Holder attachment detection switch, Cover opening detection switch
Dimensions	220(W) x 310(D) x 315(H)mm
Weight	Approx. 10.0kg
Power supply	AC100V/1A

(*1) Around 1200r/min should be necessary and sufficient condition to crush the sample in actual use.
(*2) Eppendorf "Safe-Lock Tube 2mL" is recommended.
(*3) Microtube and Stainless poweful crushing vessel are available as an option.

● Protuberances not included in Dimensions. ● Vessels of photo not included.

Example ① Freeze crushing of various samples including inanimate samples.

Embrittlement by freezing enables strong crushing.
The freeze crushing with μT-48 also suitable for Obligatory anaerobe samples.

Freeze Crusher μT-48 --> P.090

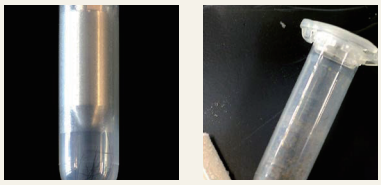
Test results

- •Freezing method　Immerse the vessels with sample and crusher into liquid nitrogen (2.0 mL: Vessel holder) and freeze them.
- •Rushing time　30 sec (Further 30 sec if not completely crushed).
- •Judgment whether sample crushed.　Whether powder form or nearly it (Cut samples to any size that can be put in vessels).
- •Vessels　Safe-Lock tube 2.0mL……Marketed product(Eppendorf made)
  Metal crusher……Included in Optional 48pcs-holder for μT-48 (used in this experiment).
  Stainless steel-made strong crush vessel Vessels ……Optional parts(Dedicated crusher comes with).

Chicken thigh

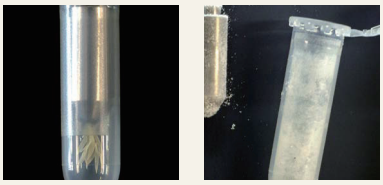
Vessels :Safe-Lock tube 2.0 mL
Sample volume : 0.1 g
Shaking speed :1200 r/min
Crushed with:Metal crusher

Human hair



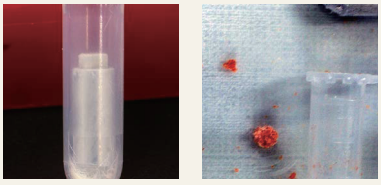
Vessels :Safe-Lock tube 2.0 mL
Sample volume :0.1 g
Shaking speed : 1200 r/min
Crushed with:Metal crusher

Human nails



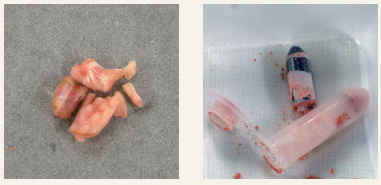
Vessels :Safe-Lock tube 2.0 mL
Sample volume :0.2 g
Shaking speed : 1200 r/min
Crushed with:Metal crusher

Mouse skin (with body hair)



Vessels :Safe-Lock tube 2.0 mL
Sample volume :0.2 g,
Shaking speed : 1200 r/min
Crushed with:Metal crusher

Mouse heart



Vessels :Safe-Lock tube 2.0 mL
Sample volume :0.2 g
Shaking speed : 1200 r/min
Crushed with:Metal crusher

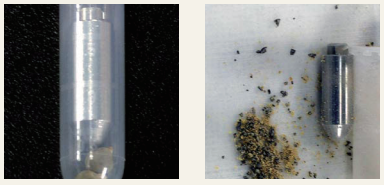
Mouse tail

Vessels :Stainless steel-made strong crush vessel
Sample volume :1g
Shaking speed : 1000r/min
Crushed with:Dedicated crusher

Hypocotyl of Radish

Vessels :Safe-Lock tube 2.0 mL
Sample volume :0.2 g
Shaking speed : 1200 r/min
Crushed with:Metal crusher

Okra seeds

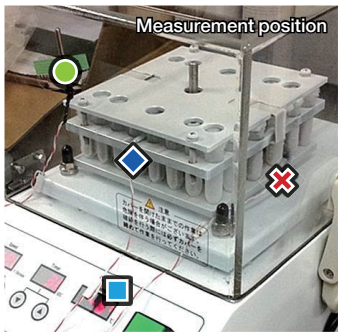


Vessels :Safe-Lock tube 2.0 mL
Sample volume :2
Shaking speed : 1200 r/min
Crushed with:Metal crusher

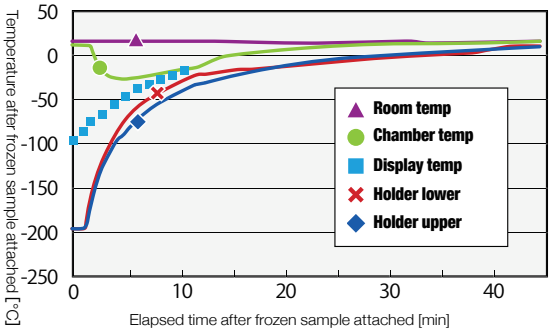
Hard rubber (Polychloroprene)

Vessels :Stainless steel-made strong crush vessel
Sample volume :2g
Shaking speed : 1000r/min
Crushed with:Dedicated crusher

Frozen sample/Holder temperature (Reference)



Attached 48pcs-holder for 2mL tube TH-0248T with 48 tubes and Metal crusher that was frozen with liquid nitrogen to the unit. Then measured temperature change of each part while shaking at 1200r/min. The cryogenic temp. was completely kept for 30 to 60 sec required for crushing. The display temp indicates the temp of the stage top surface on which the holder placed.



● Protuberances not included in Dimensions. ● Vessels of photo not included.

Example ② Freeze crushing of various samples including inanimate samples

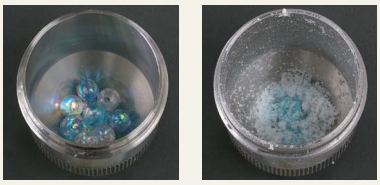
Freeze crushing of Plastic samples using Freeze crusher μT-48 with Stainless steel-made strong crush vessel.

Freeze Crusher μT-48 --> P.090

Results and Examination

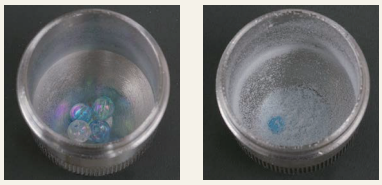
We tried some crushing of samples such as polystyrene, polypropylene and polycarbonate that were well known. Each result is as follows.

Polystyrene ①: Fair



Sample shape and volume :
ϕ 6 mm ball shaped, 1g
Shaking speed : 1000 r/min
Crushing time : 300 sec

Polystyrene ②: Fair



Sample shape and volume :
ϕ 6 mm ball shaped, 0.4g
Shaking speed : 1000 r/min
Crushing time : 300 sec

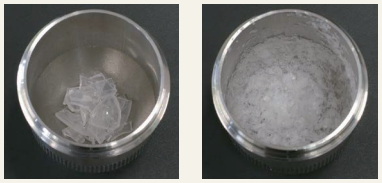
Polystyrene ③: Excellent

Sample shape and volume :
10 mm square chip shaped, 0.5 g
Shaking speed : 1000 r/min
Crushing time : 180 sec

Polypropylene ①: Good

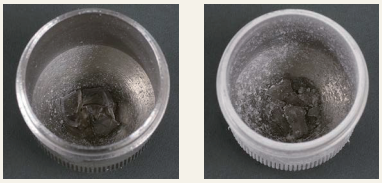
Sample shape and volume :
10 mm square chip shaped, 0.5g
Shaking speed : 1000 r/min
Crushing time : 150 sec

Polypropylene ②: Good ?



Sample shape and volume :
10 mm square chip shaped, 0.5 g
Shaking speed : 1100 /min
Crushing time : 300 sec

Polycarbonate : Poor



Sample shape and volume :
10 mm square chip shaped, 0.5 g
Shaking speed : 1000r /min
Crushing time : 300 sec

Polystyrene were able to be powdered completely (③). However, in case of ϕ6mm ball- shaped sample, there were large fragments remained at certain rate even after trying with different amount and crushing time (①②). It seems that ball-shaped sample remain uncrushed if it is stuck in upward of the crusher.
The result suggests that the shape of sample is better to be chip like shape(or tablet like shape) Polypropylene was crushed into fine fragments although it was not crushed into powder (①).
In order to improve (although the shaking speed limit is exceeded when using a strong crushing container), when it is performed at 1100 r / min for 5 minutes, it becomes fine but braided piece of cotton (②). At this stage, it becomes difficult to collect unless suspended in a solvent. Polycarbonate proved to be difficult to crush. Even if the shaking speed was reduced to 1100 r / min or reducing sample amount, the result of this experiment was that only a small amount of powder was produced and the chip shape remained almost unchanged.

Freeze crushing procedure when using stainless steel-made strong crushing vessel

Adjustable plier is useful for taking in and out of Stainless steel-made strong crushing vessel (referred to as crushing vessel) into liquid nitrogen. Be sure wear leather gloves when touching frozen crushing vessel or the vessel holder that has become cold by contacting the frozen vessel. Be sure ventilate the room well when using liquid nitrogen as there is risk to get Anoxia unknowingly because the vaporized liquid nitrogen becomes huge volume of nitrogen gas.

Pour liquid nitrogen into a styrofoam container. *1

Put the weighed sample * 2 into the crushing vessel.

Put the dedicated crusher into the crushing vessel and close the lid tightly.

Submerse the crushing vessel in liquid nitrogen completely with the adjustable plier etc.

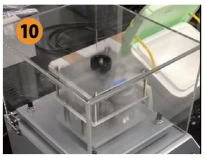
Close the lid of styrofoam container and wait until the liquid nitrogen boiled.

Take out the crushing vessel with *3 adjustable plier etc. when the boiling settles down.

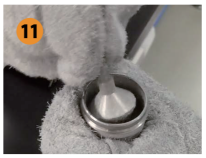
Place the crushing vessel that taken out and take it by gloved hand.

Place the crushing vessel on the unit and put the lid of mounting rack.

Secure the lid of rack with the black-colored knob.



Shaken at prescribed speed and time.



After the shaking is complete open the lid and check inside it. *4

Completed if the sample is crushed satisfactory. *5

*1. Desirable to use the minimum-sized polystyrene foam container that the required number crushing vessels can be immersed to minimize the amount used of liquid nitrogen.
*2. The processing capacity of the crushing vessel is 1.2g per 1pc while better to make it to 0.5g per 1pc for plastic samples (Up to 1g polystyrene easily that can be crushed by freezing).
*3.Wait for at least 2 minutes after the boiling is settled out to freeze the sample in the crushing vessel sufficiently.
*4.The crushed sample might stick to the crusher so tap it with the inner wall of vessel to drop it.
*5. If the crushing is insufficient return the crusher to the unit to freeze it again and shaken.

● Protuberances not included in Dimensions. ● Vessels of photo not included.