FRONTIER LAB

For grinding, agitating and dispersing samples

Cryogenic Mill < IQ MILL-2070 >

Japanese patent No. 7064786

Easy operation

Quick, effective and quiet grinding

Energy saving sample cooling kit included

Lightweight 12 kg

< Small portable IQ MILL-2070 >

Perfect for sample pretreatment

- Specifically designed for grinding, agitating, and dispersing samples -

In sample pretreatment, grinding samples into fine powders is a time-consuming and labor-intensive task. The newly developed IQ MILL-2070 makes this a simple process. Especially in microanalysis, grinding samples is a required pretreatment for sample uniformity, homogeneity, and reproducibility. Various methods have been devised, but they have problems such as a large amount (e.g., 5 L) of liquid nitrogen consumption, a grinding time of more than ten minutes, and a noise level of 90 dB during that time. The "IQ MILL-2070" is a benchtop grinding, agitating, and dispersing device that uses a special high elastic belt* to achieve a rapid reciprocating torsional motion to solve these problems. (*Japanese patent No. 7064786)

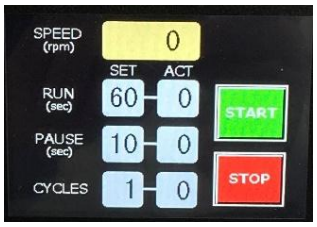
IQ MILL-2070 features

1 Simple operation

- **Grinding samples by simple operation**

  Required settings are only : Grinding speed, Grinding time, Number of cycles, and Pause time. All of these settings can be easily done through the rotary knob and touch panel.

Setting grinding speed



Touch panel operation

Setting grinding parameters

2 Fast and efficient grinding

- **Grinding up to three samples at a time in the same program**

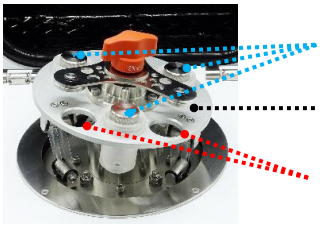
  Equipped with a holder that holds up to three sample containers for efficient grinding.

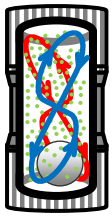
- **Powerful impact and shear grinding capabilities bring significant reduction of grinding time**

  Rapid reciprocating torsional motion enables sample grinding in a short period of time.

- **Quiet operation**

  Noise level during grinding is only around 55 dB and will not interfere with conversation.



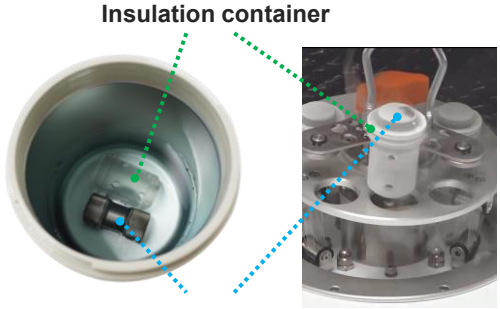


Rapid reciprocating torsional motion of a grinding ball in a sample container

3 Energy saving sample cooling kit included (grindable even at room temperature)

- **Low liquid N2 consumption of 300 mL (one sample container with sample and a grinding ball)**

  The standard sample cooling kit includes cooling container, tongs, and a cooling holder.



Sample cooling kit

Cooling container

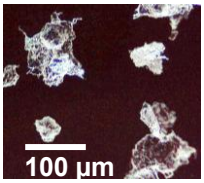
tongs

Cooling holder

Synthetic/ Biopolymer grinding applications

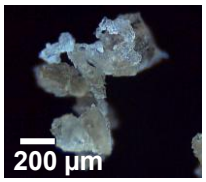
Low density polyethylene
0.48 g
(Extremely hard to grind)

3000 rpm for 30 sec
Cryogenic grinding
2 cycles, 1 repetition



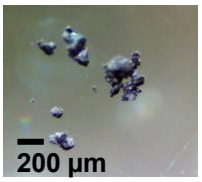
Polyisoprene
0.53 g
(Extremely hard to grind)

2500 rpm for 10 sec
Cryogenic grinding
1 cycle, 1 repetition



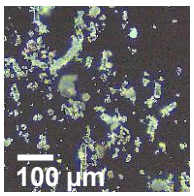
O-ring
0.35 g
(Hard to grind)

3000 rpm for 10 sec
Cryogenic grinding
1 cycle, 1 repetition
(Grinding rod used)



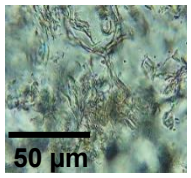
Electric circuit board
2.1 g

2500 rpm for 30 sec
Room temp. grinding
10 cycles, 1 repetition



Bark of moso bamboo shoot
(Hard to grind)

2000 rpm for 10 sec
Room temp. wet grinding
2 cycles, 1 repetition
*Buffer solution used



Further grinding applications

Synthetic polymers

- High density polyethylene
- Low density polyethylene
- Polypropylene
- Polystyrene
- Polycarbonate
- Polyvinyl chloride
- Polyvinylidene chloride
- Polyetheretherketone
- Acrylonitrile butadiene styrene copolymer
- Silicone rubber
- Polymethyl methacrylate
- Polyisoprene (natural rubber)
- Ethylene-vinyl acetate copolymer
- Polyethylene terephthalate
- Polytetrafluoroethylene
- Copy paper Others

Biopolymers

- Boar canines (teeth)
- Fox, raccoon, raccoon dog (teeth)
- Shellfish
- Bark of moso bamboo
- Hemp cord
- Wood chip
- Cotton
- Dried squid
- Beef jerky
- Shell string
- Sea squid
- Seaweed stem
- Almond seed (shell)
- Almond seed (edible part)
- Candy
- Leaves of houseplants, and others

Inorganics (room temp. grinding)

Ceramic	(Moh hardness*:9)
Quartz	(Moh hardness:7)
Sand	(Moh hardness: 6 ~ 7)
Teacup	(Moh hardness: ca. 5)

* Ref. Moh hardness of diamond: 10

Ceramic (SS grinding rod 12 used)

Quartz (SS grinding rod 12 used)

Visit our website for further information.

https://www.frontier-lab.com/assets/file/products/IQMILL_Appbook_E.pdf

Sample container and Grinding ball

A wide variety of containers and grinding media are available for your specific needs!

Sample container

Product	Material	Volume	Sample amt.
Sample container S-SS set *1	Carbide stainless steel	2 mL	5 mg ~ 50 mg *2
Sample container L-SS set	Carbide stainless steel	7 mL	0.05 g ~ 1 g *2
Sample container L-Ti set *1	Titanium	7 mL	0.05 g ~ 1 g *2
Sample container LL-Ti set *1	Titanium	20 mL	1 g ~ 2.5 g *2

*1 Option *2 The recommended sample amount depends on the sample type.

Sample container S-SS set


Sample container L-SS set


Sample container L-Ti set


Sample container LL-Ti set

Sample container related accessories

Product	Material	Function
Insulation container	Polycarbonate	Keeps sample container cool
Insert tube	Polycarbonate	Suppresses metal particle generation


Insulation container


Insert tube

Grinding media

Product	Material	Dimension
Zr grinding ball	Zirconia (ZrO_2)	1*, 2*, 3*, 5, 6, 10, 12 mmΦ
WC grinding ball	Tungsten carbide (WC)	1*, 2*, 3*, 5, 6, 10, 12 mmΦ
Al grinding ball *	Alumina (Al_2O_3)	15 mmΦ
SS grinding rod 12	Carbide stainless steel (SUS)	12 mmΦ, L: 20 mm
Zr grinding rod 12 *	Zirconia (ZrO_2)	12 mmΦ, L: 20 mm
WC grinding rod 12 *	Tungsten carbide (WC)	12 mmΦ, L: 20 mm
Ti grinding rod 12 *	Titanium (Ti)	12 mmΦ, L: 20 mm
Grinding rod 12 set *	SUS, ZrO_2, WC, Ti	12 mmΦ, L: 20 mm

* Option


Zr grinding ball


WC grinding ball


Al grinding ball

Grinding rod 12 set

Specifications

Grinding methods	Cryogenic grinding, Room temperature dry grinding, Room temperature wet grinding	
Grinding setting	Rotation speed (rpm)	50 to max. 3000 (stepless)
	Rotation time (sec)	10 to 60 (10 sec step)
	Pause time between cycles (sec)	0 to 600 (10 sec step)
	Number of cycles (repetitions)	1 to 20 (1 cycle step)
Safety feature	Hazardous operation prevention by magnetic microswitch.	
Dimension, weight	W 270 x D 340 x H 300 (mm), 12 kg	
Power (50/60 Hz)	AC 100 - 120 V or 200 - 240 V (450 VA)	
Standard accessory	Sample container (stainless steel), Insulation container, Insert tube, Cooling container, Tongs, Cooling holder, Sieve set, Grinding balls (tungsten carbide, zirconia), SS Grinding Rod 12	

Noise level during grinding: 55 dB* (1 g of PS pellets ground with a 12 mmΦ Zr grinding ball at 3,000 rpm) *Level comparable to normal conversation.

Product lineup

Product	Product number	Contents
Cryogenic Mill IQ MILL-2070	IQ-2070-100 or IQ-2070-200	Main unit, Sample container L-SS set 1 ea., Grinding balls, SS grinding rod 12 5 ea., Insulation container 2 ea., etc.
Cryogenic Mill IQ MILL-2070 With sample container L-SS starter kit	IQ-2070-100SKS or IQ-2070-200SKS	Main unit, Sample container L-SS set 3 ea., Grinding balls, SS grinding rod 12 5 ea., Insulation container 4 ea., etc.
Sample container L-SS starter kit	IQ1-2062	Sample container L-SS set 2 ea., Insulation container 2 ea., etc.