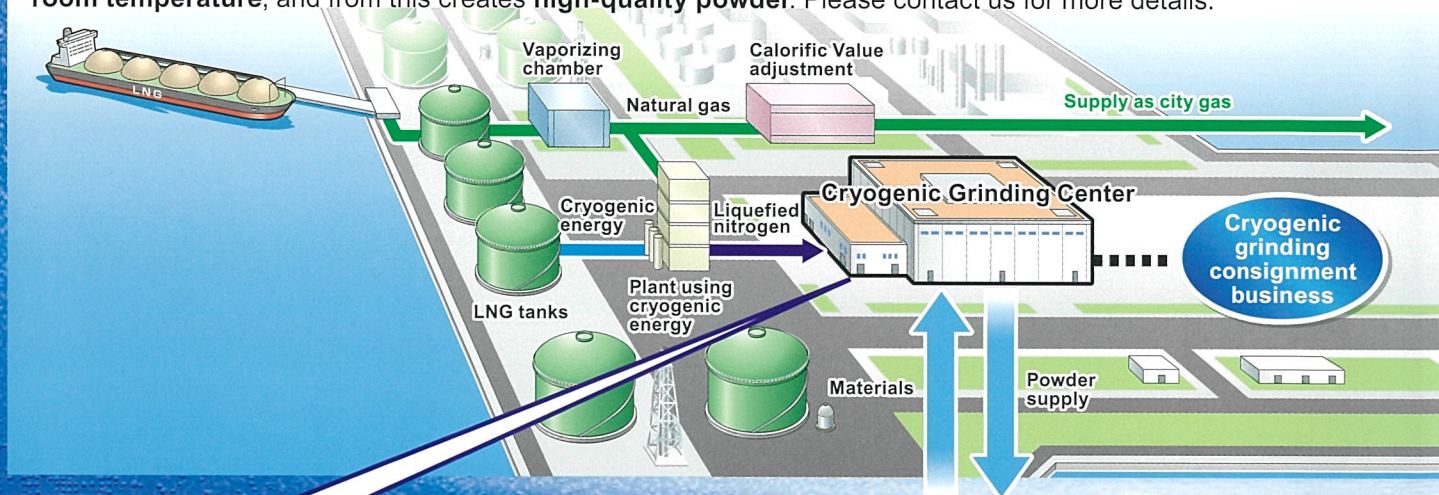
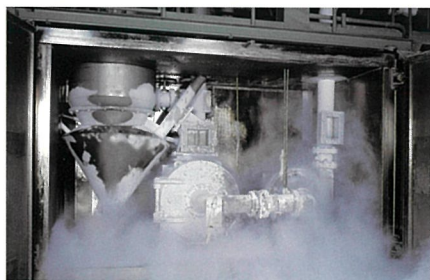


# Cryogenic Grinding Consignment Business

Osaka Gas Liquid Group efficiently produces liquefied nitrogen by exploiting the cryogenic energy of LNG (-160°C) imported by Osaka Gas. Using above liquefied nitrogen, Osaka Gas Liquid engages in the **cryogenic grinding consignment business**; the Company freezes and grinds **plastics and foods, which are difficult to grind at room temperature**, and from this creates **high-quality powder**. Please contact us for more details.



## Exploiting liquefied nitrogen (-196°C)



The Company conducts cryogenic grinding consignment business by optimally exploiting the cryogenic energy of liquefied nitrogen (-196°C) to produce high-quality powder.

## Our customers



Canned Chu-Hi



Various plastics

Photo by courtesy of Suntory Spirits Limited

## Grinding examples

### • Foods

Item	Particle size distribution	Features
Toasted sesame seeds	High quality sesame tofu and soup 180~300µm	Taste, flavor, and smooth texture
Pork bones and chicken bones	Instant soups 60~100µm	Very smooth texture, flavor and taste
Azuki beans	Pudding, ice-cream Average 25µm	Very smooth texture
Raisins	Confectionery 15~60µm	Sharp acidity
Hamo [conger eel] bones and crab legs	Fish cake (kamaboko) 50~150µm	Very smooth texture, flavor and taste
Bonito shavings and dried sardines	Japanese soup broth (For Udon noodles and others) 30~100µm	Flavor and rich taste

10µm (0.01mm)      100µm (0.1mm)      1000µm (1mm)

### • Plastics

Item	Particle size distribution	Applications
Polypropylene	300~1000µm	- Electrostatic powder coatings
Polyester	50~1000µm	- Fluid-dip coatings - Coating agents
Polyamide	50~500µm	- Plastic additives - Composite materials
Polyacetal	300~1000µm	- Hot-melt adhesives - Recycling
Polyurethane	100~1000µm	- Improved dispersibility - Industrial cleaning agents
Elastomer	100~1000µm	etc.

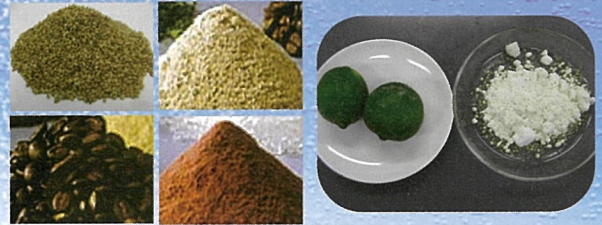
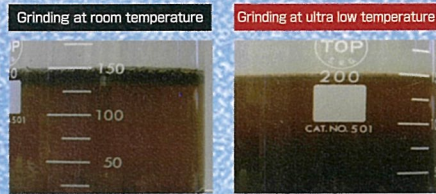
10µm (0.01mm)      100µm (0.1mm)      1000µm (1mm)



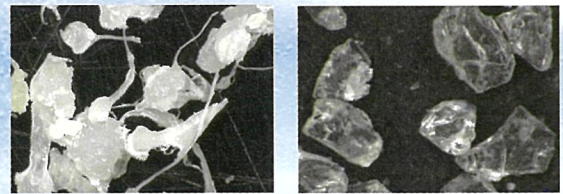
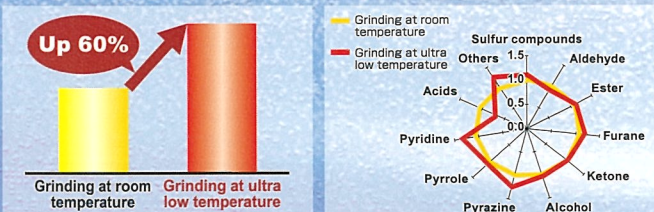
## Features of cryogenic grinding

- 1 Prevents deterioration, degradation, and oxidation of products due to grinding heat **Foods**
- 2 Quick water penetration and excellent water dispersion **Foods**
- 3 Easier grinding of oily or wet substances, which are difficult to crush at room temperature **Foods**

### Five minutes after stopping agitation



- 4 Enriched flavor and reduced loss of total volatile component amounts potentially caused by grinding heat **Foods**
- 5 Reduced torn areas (fibrous foreign materials) on fractured surfaces, which is common in grinding at room temperature **Plastics**



- 6 Increased grinding efficiency, increased production, and eliminated bottlenecks **Foods** **Plastics**
- 7 Finer particle size than grinding at room temperature due to brittle effect **Foods** **Plastics**

## We are ready to meet your requirements

We are still in the research stage, so we do not have sufficient funds.

We can offer you our small-lot, low-cost test grinding. Please contact us.

Do you have some samples of cryogenic grinding?

We have ground sesame seeds and ground coffee for your tasting.

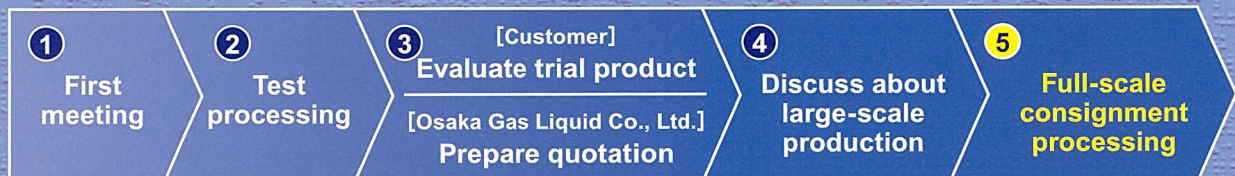
Can you grind "XXX" (specifically)?

We have grinding results for about 800 materials and we can inform you after checking the data.

We would like to outsource production on a one-off basis.

We accept orders with no restrictions on quantity (from several kilograms to thousands of kilograms).

## Steps to outsource cryogenic grinding



 **OSAKA GAS LIQUID Co., Ltd.**

Cryogenic Grinding Center (food factory)

3-7 Takasago, Takaishi City, Osaka 592-0001, Japan  
TEL. 072-269-2981 FAX. 072-269-2982

Cryogenic Grinding Center (plastics factory)

4 Chikko Hamadera-cho, Nishi-ku, Sakai City, Osaka 592-8351, Japan  
(within Senboku LNG Terminal I, Osaka Gas Co., Ltd.)  
TEL. 072-268-3171 FAX. 072-268-0019

cryogenic grinding Osaka Gas Liquid