

b.caveTM

Comfortable living spaces together with PCPs/MOFs



OHARA PARAGIUM CHEMICAL co.,LTD.

About OHARA PARAGIUM CHEMICAL

~Creating comfort~

We are a company that continues to thinking about the comfortableness of people and the global environment.

We have been manufacturing and selling textile processing agents since our foundation, and have continued to create comfort through various functional processing agents.

We believe that odour has a strong influence on comfort, and have developed **b.cave™** to improve the discomfort caused by odour.

b.cave™ is an "instant deodorant" that maximises the characteristics of PCP/MOF invented by Kyoto University. PCP/MOF is controlled in various forms using our unique technology and is being developed for a wide range of applications, including sanitation.

Comfort Creation Progress

Contribution to the textile industry by developing various functional processing agents.

1926
Founded

2007
Our first deodorant-
processing agent
PARAFINE NS-100 was launched.

2021
Start of development
of processing agents
using PCP/MOF.

2023
Products incorporating PCP/MOF
are launched as **b.cave™**

2014
Sustainable ECO Finish®
Acquisition of trademark

We are constantly affected by different odours.

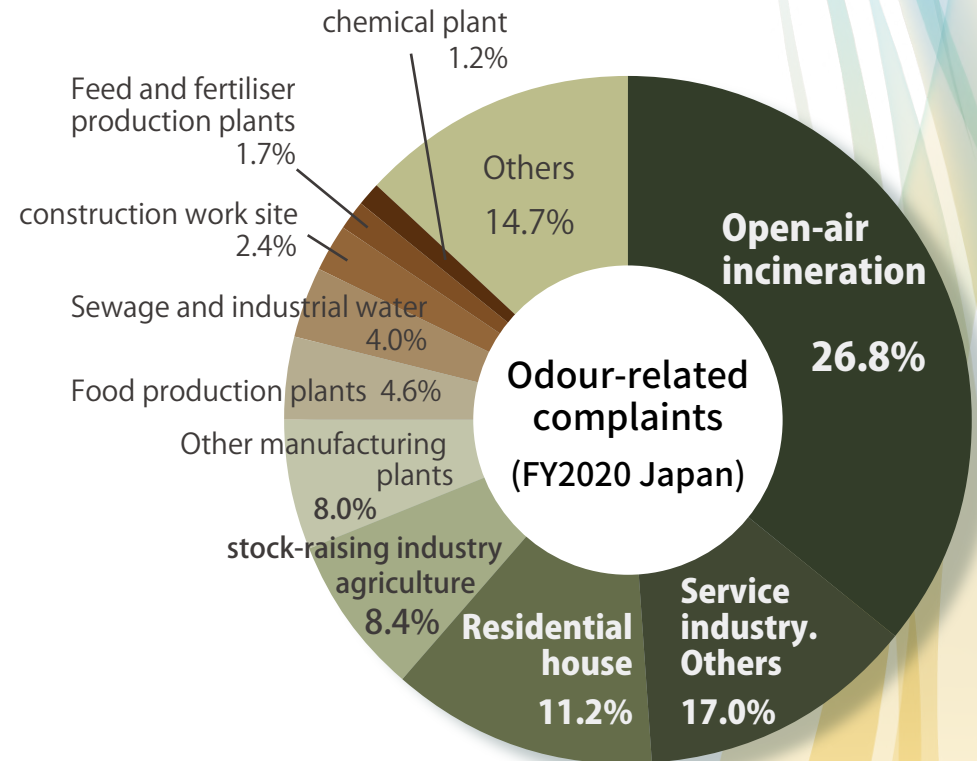
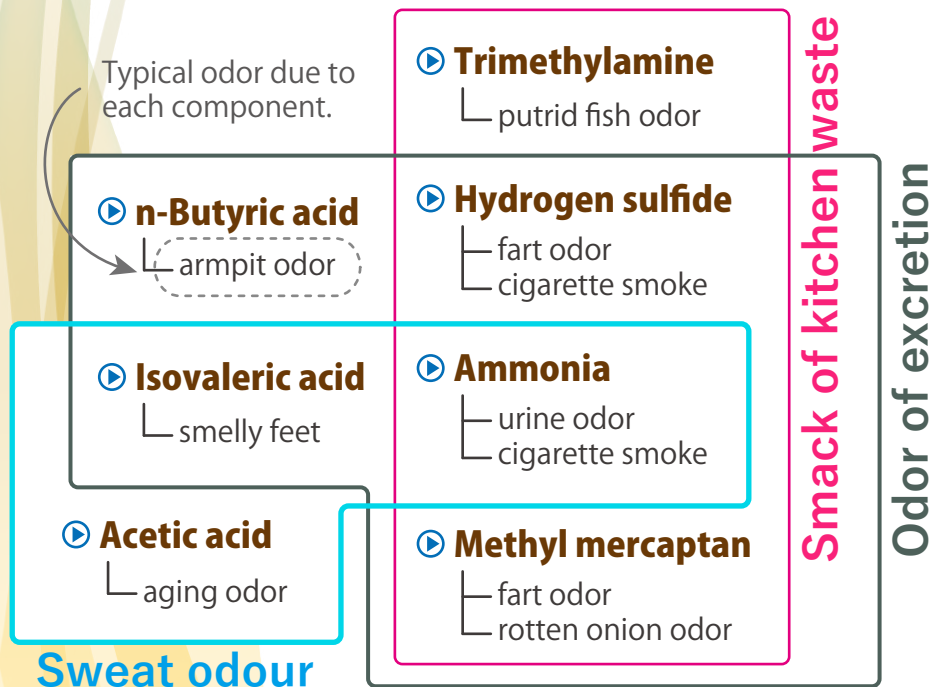
It is estimated that there are more than 400,000 different odour molecules on the planet, and the smells given off by many substances vary according to their combination.

While pleasant smells soothe our minds, some odours can be off-putting and harmful to our health.

In some environments, the effects of odours are unavoidable and are a serious problem for modern society.

Dealing with unpleasant odours is becoming an essential factor in improving quality of life, including comfort and safety.

[Examples of odours by the 7 major odour components and their combinations.]



From 'Results of the Survey on the Enforcement Status of the Law for the Prevention of Malodorous Odours, etc. in 2020 Ministry of the Environment

About PCP/MOF

PCP: Porous Coordination Polymer / MOF: Metal Organic Framework

PCP/MOF stands for "porous coordination polymer/metal-organic structure," a jungle gym-like combination of **metal ions** and **organic ligands** with numerous pores.

PCP/MOF has brought a breakthrough in the field of materials science as a **new material for "porous materials"** that can design the size and properties of pores depending on the type of **ligand** and can also utilize the functions of **metal ions**.

A three-dimensional structure with aligned pores with metal ions as vertices adsorbs various molecules to the pores.

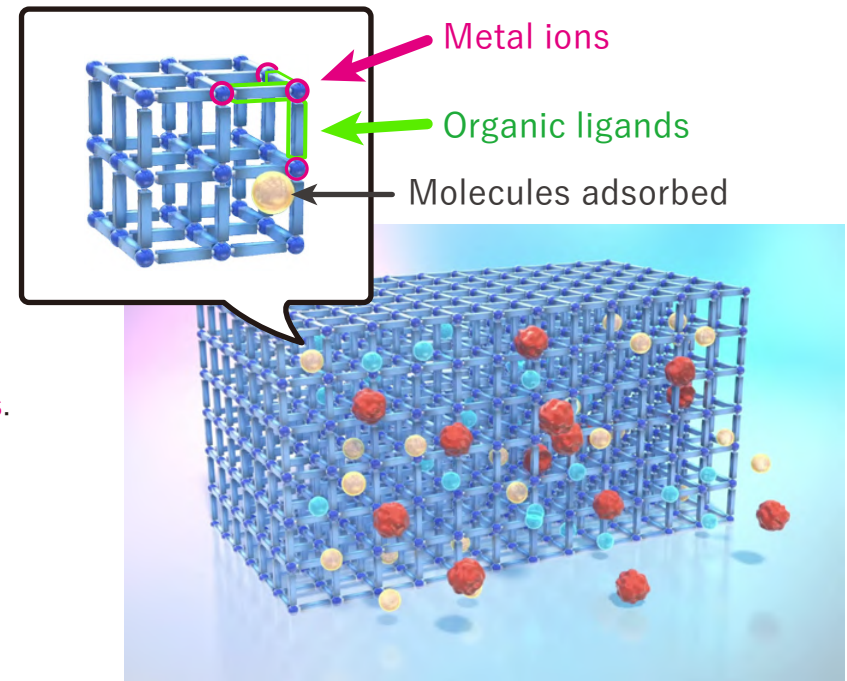
This superior adsorption capacity allows many times more molecules to be taken up than activated carbon.

We focused on the structure of PCP/MOF and discovered that it has an amazing ability to instantaneously eliminate various odors as a deodorant.

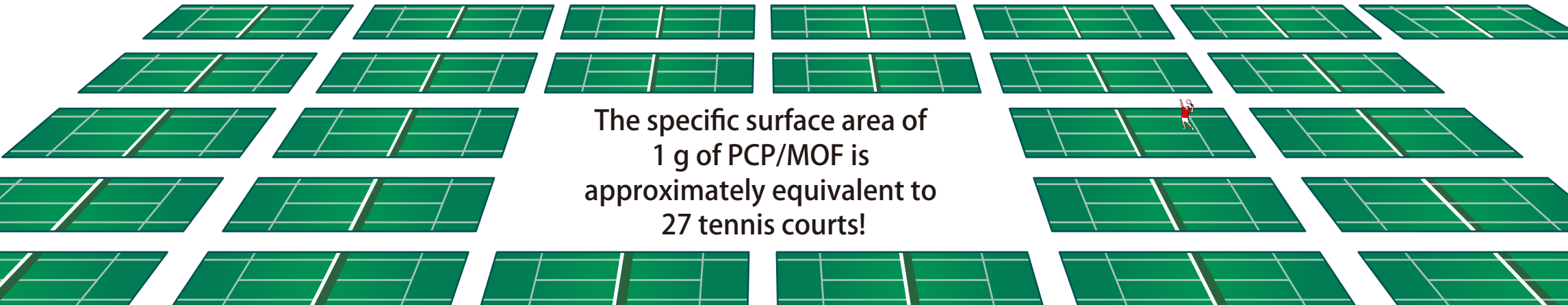
Ohara Palladium Chemical's PCP/MOF product **b.cave™** has the advantage of **being able to be processed into various easily handled forms** such as pellets, sheets, and processing coatings **without reducing the performance of PCP/MOF** through our unique technology.

The specific surface area of 1 g of PCP/MOF is equivalent to about 27 tennis courts.

The specific surface area of PCP/MOF is even larger than that of activated carbon, which is equivalent to about 10 tennis courts per gram, and its large specific surface area indicates that it can adsorb a large amount of substances.



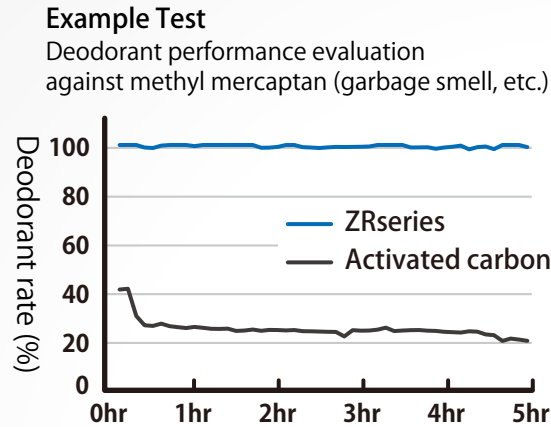
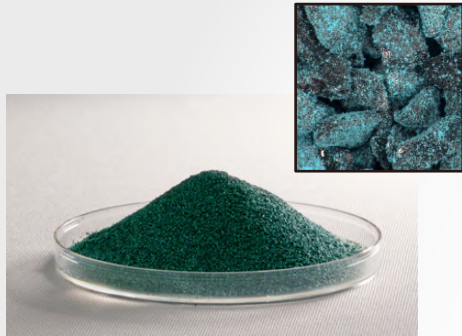
The specific surface area of
1 g of PCP/MOF is
approximately equivalent to
27 tennis courts!



b.cave™ Products Line-up

Granulated products with surface point bonding

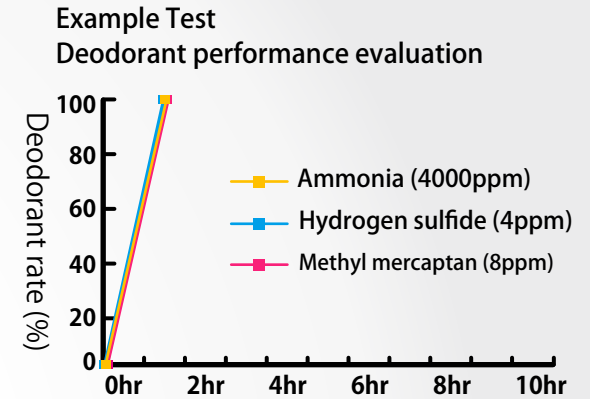
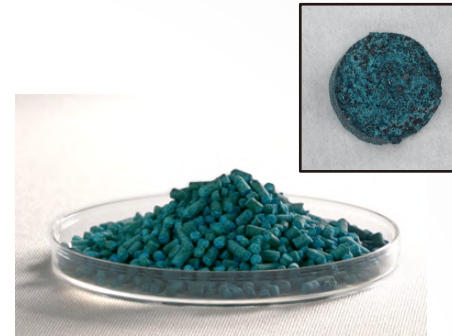
ZR series



- ▶ This series is in the form of particles, it has high gas-absorption rate from a large specific surface area.

Extruded pellet molded products

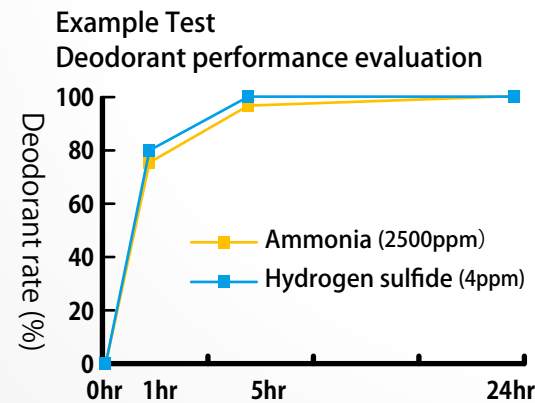
OS series



- ▶ Hollow or porous structure improves processing efficiency.
- ▶ PCP/MOF content can be increased compared to granulated products.

Tablet Molded Products

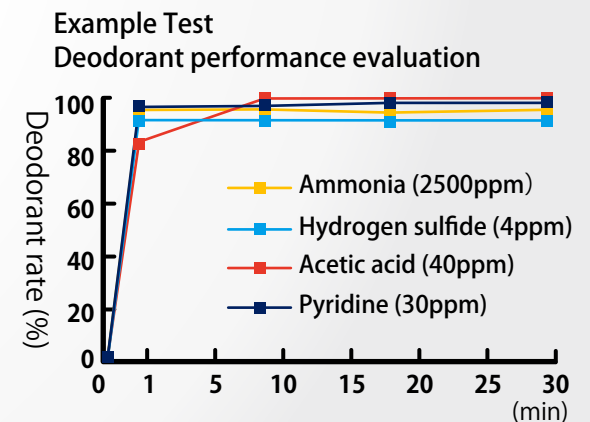
DJ series



- ▶ This series is a tablet type (high density) with long-lasting functionality.
- ▶ High-performance products which contains high concentrations of PCP/MOF can be easily manufactured.

Sheet Products

S series

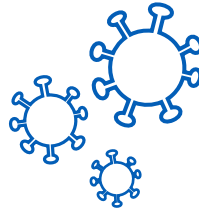


- ▶ Nonwoven fabric impregnated with PCP/MOF paint, paint can also be sold.
- ▶ Processing by bringing in base material is also possible.

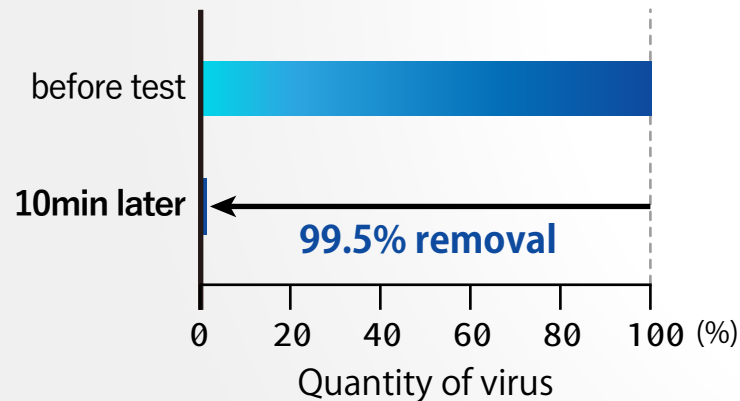
Sanitary applications

The ZR, OS, and DJ series of **b.cave**™ have been confirmed to have a high antiviral effect against influenza and norovirus, and filters equipped with **b.cave**™ have shown excellent results in tests against airborne viruses.

b.cave™ is a material that is expected to be utilized not only for its deodorizing performance, but also for its sanitary properties.



[Antiviral performance evaluation] (influenza A virus)



Against floating viruses inactivation test using b.cave filter.

Measuring organization:

Institute of Food Environment and Hygiene, Inc.

Test method:

Conducted in accordance with JEM1467 Appendix D.

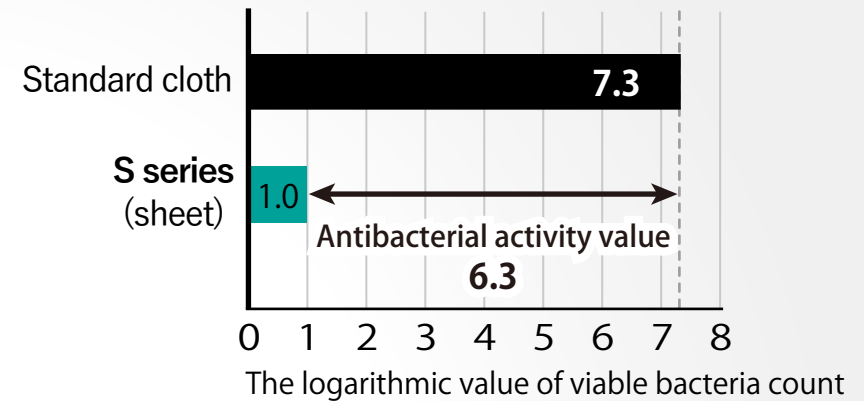
Test section size: 1 m² acrylic box

Virus: Influenza A virus

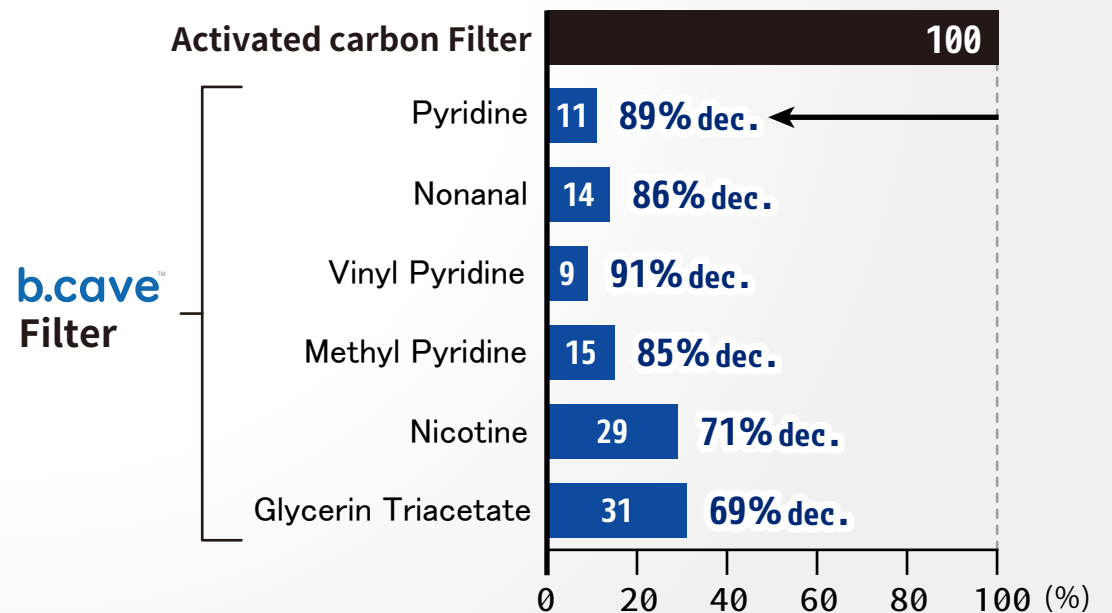
Air purifier used: Toyotomi AC-V20D

Collection time: 0 min, 10 min, 30 min

[Antibacterial properties of the S series]



[Comparison with Activated carbon Filter between residual ratio of odorous components of Cigarettes]



A comparison test of the amount of odorous components in cigarette smoke was conducted using a filter with b.cave ZR series sandwiched between non-woven fabrics and an activated carbon filter.

Future of our PCP/MOF projects

Based on PCP/MOF technology, we will continue to focus on research and development of materials that can be used in various fields, and develop products that flexibly meet customer requirements.

b.cave™

- **b.cave materials**
- **b.cave materials &**
- **b.cave equipments**

Odour solutions

- Solving odour problems in the work environment.
- Responding to complaints in the vicinity due to odour.
- Odour control in the livestock and dairy industry.
- Creating comfort in nursing care and childcare.
- Creating a better working place.
- Urban development reform from an odour perspective.
- Improving quality of life through olfaction.
- Toxic gas adsorption, antiviral.
- Consumer-oriented items.
- And more

• **Processing technologies**

→ **PCP/MOF total solutions**

Moulding technology using various PCP/MOF.

Possible to adjust PCP/MOF content and to combine with different materials.

Consultation on moulding for various PCP/MOF is available.

Applications: CO2 capture, CCS, CCUS, decarbonisation, gas tank miniaturisation, etc...



OHARA PARAGIUM CHEMICAL CO.,LTD.

<http://www.paragium.co.jp/>

**SUSTAINABLE
DEVELOPMENT GOALS**



b.cave introductory video on **YouTube**