KOKEN

A biomass material discovered from a Japanese blue-green algae

Sacran®

(APHANOTHECE SACRUM POLYSACCHARIDES)

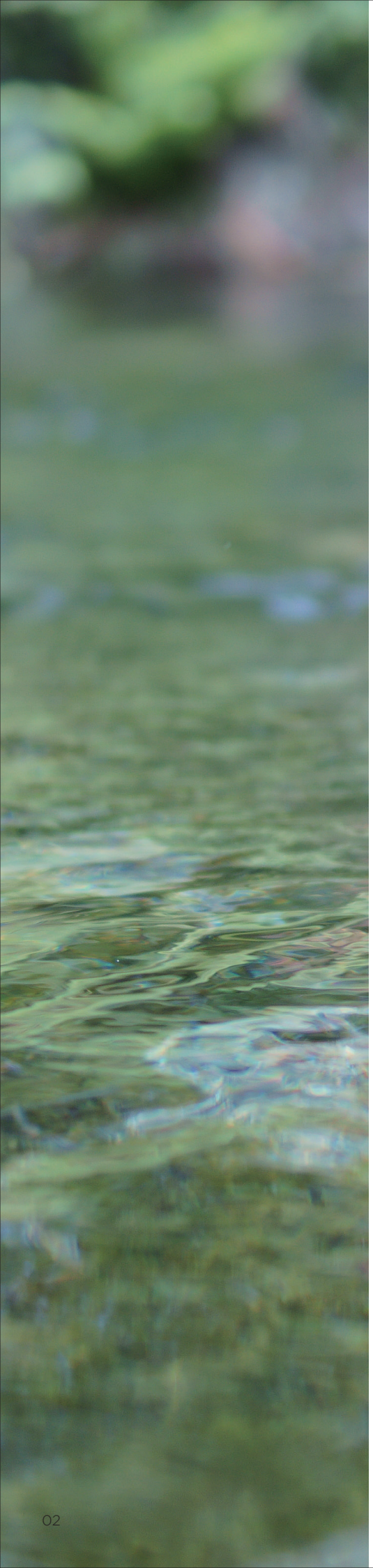
Rare macromolecular polysaccharides derived from Suizenjinori protects the skin from accumulated environmental damage.

Natural material

- Chemical-free
- Conservation of species
- Sustainable

Function

- Moisturizing
- Brightens up skin tones
- Improved skin texture
- Anti-inflammatory
- Anti-pollution
- Barrier on the skin
- Thickening



“Suizenjinori”, a miraculous living organism cultivated in Japan's beautiful water environment

The endemic species of Japan, “Suizenjinori”

Scientific name: Aphanothece Sacrum

Suizenjinori is a freshwater blue-green algae unique to Japan discovered by the Dutch biologist Suringer around the Suizenji temple at Lake Ezu (Kumamoto Prefecture). Impressed by the beautiful environment in which the Suizenjinori grew, the species was conferred the scientific name sacrum ("sacred").
It has long been used in high-end local cuisine, and it was carefully protected and nurtured to be a gift for the Shogunate during the Edo period.

In recent years, it has also been learned that it acts as an antioxidant, and it is attracting attention as a health ingredient rich in minerals such as calcium and iron.

Protect the assets generated by Japan’ s water resources.

Suizenjinori is a rare organism that only grows in underflow from the Aso Mountains in Kyushu, which are rich in natural minerals.
Due to a decline in spring water and water pollution, natural Suizenjinori is now classified as an IA endangered species.
To preserve an environment for this Suizenjinori to grow, GREEN SCIENCE MATERIAL INC. established cultivation technologies. Currently, cultivation utilizing this technology is underway in Mashiki, Kumamoto Prefecture, and also in Asakura, Fukuoka Prefecture (Kogane River) in a growing environment that is closer to natural conditions, as an effort to conserve Suizenjinori.

Towards the creation of a resource recycling-oriented sustainable society

The Sacran that is extracted from Suizenjinori is blended with cosmetics and textiles, and part of the proceeds are allocated to assist in environmental conservation of the Kogane River which is the natural habitat of Suizenjinori.
Suizenjinori has benefited people as a material that takes advantage of the characteristics of the region, and supports regional revitalization.
GREEN SCIENCE MATERIAL INC. aims to shape a recycling-oriented society in which nature and people coexist.

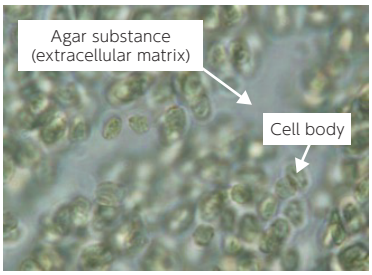
A novel polysacchairdes unique to Japan

What is “Sacran”?

Aphanothece Sacrum History

Researchers at the Japan Advanced Institute of Science and Technology discovered that Suizenjinori secrete extremely large amounts of agar substances in the extracellular matrix.

This substance adsorbs ions in water to form a gel, and stores a large amount of water inside that gel structure to serve as the scaffolding for cell division. This is said to protect cells from external shocks or drying out, and preventing the bacteria and virus from entering with a huge mesh structure.



Microscope image of Suizenjinori 10μm

In 2006, the substance was successfully extracted for the first time in the world at the Japan Advanced Institute of Science and Technology.

The suffix "an" used to denote polysaccharides was added to the scientific name "aphanothece sacrum" to form the name "Sacran."

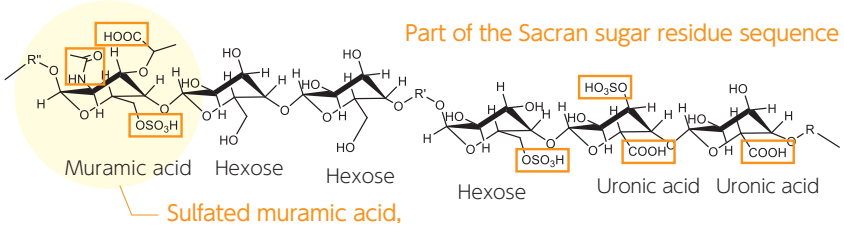
Just **6 grams** of Sacran can be extracted from every 1kg of Suizenjinori.

Due to the bioactive properties that Sacran possesses, it has gained attention as a new biomass material unique to Japan, such as in the treatment of skin diseases such as allergic dermatitis, in research as a sustained release carrier for other drugs, and its application as a clothing fabric.

The Structure of Sacran

Sacran is an anionic sulfated polysaccharide with a molecular weight of 29 million

Part of the Sacran sugar residue sequence

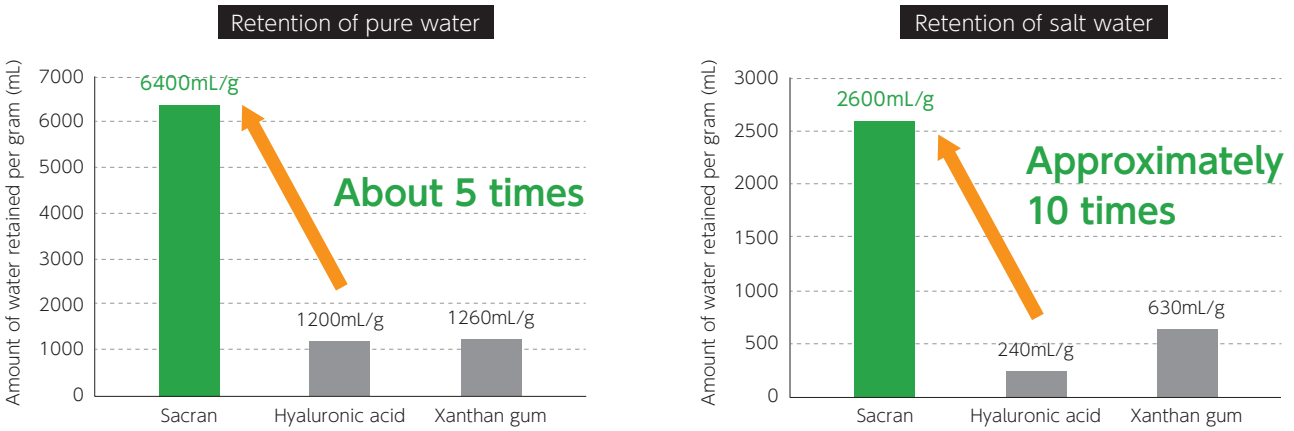


Sulfated muramic acid,
a novel monosaccharide expected to exhibit bioactive properties

- Has approx. 11% sulfate groups and 12% carboxyl groups per sugar chain.
- 11 constituent monosaccharides, including glucose, galactose, xylose and fucose, have been identified. This includes sulfated muramic acid, a new monosaccharide.
- Although it is a prokaryote, it is predicted to have a similar structure to mucopolysaccharides produced by eukaryotes, and is expected to have a range of bioactive properties.

Function

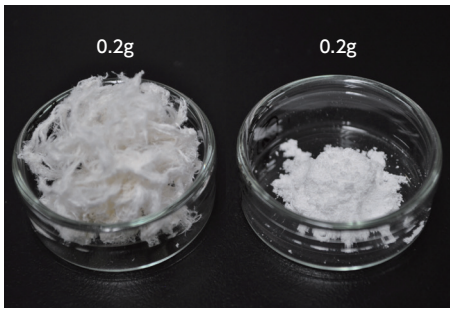
Outstanding water retention capacity



Water retention that is 5-10 times greater than hyaluronic acid

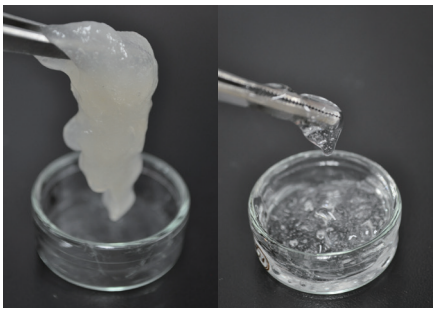
Using the improved tea bag method, a water retention assay was conducted for sacran, hyaluronic acid and xanthan gum. As a result of measuring the volume (mL) of water retained by 1g (dry weight) of each sample, sacran was found to have a water retention capacity exceeding 6000-fold its own weight.
Furthermore, compared to hyaluronic acid and xanthan gum, it was confirmed to have a water retention capacity 5 times and 10 times greater than hyaluronic acid when using pure water and salt water for the assay, respectively.

Data obtained by Japan Advanced Institute of Science and Technology Provided by GREEN SCIENCE MATERIAL INC.



Sacran Sodium hyaluronate

Addition of 7mL water



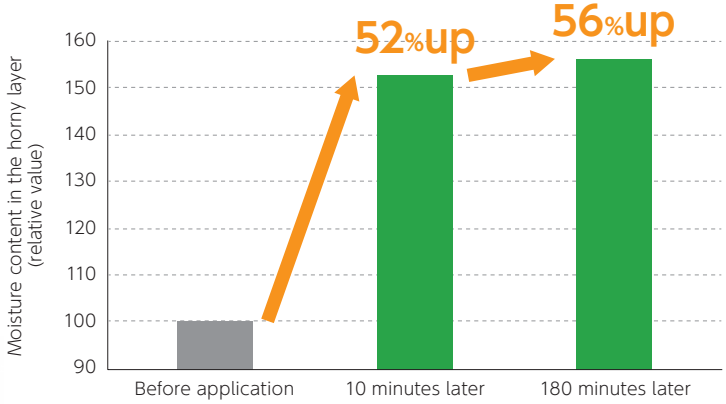
Sacran Sodium hyaluronate

Water Retention Capacity Test

Based on in-house data

Moisturizing effect

Sacran B1% solution was applied to the forearm, and moisture content in the horny later was measured from before application to 10 minutes after, and 180 minutes after.

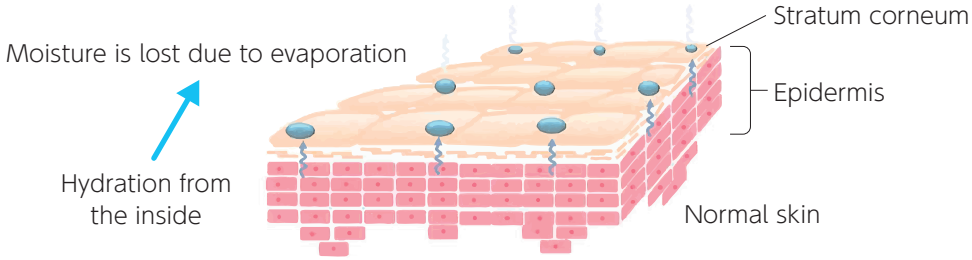


It was found that due to the application of Sacran, high moisture retention effects continued to be maintained from 10 minutes after application, and three hours after application.

Based on in-house data

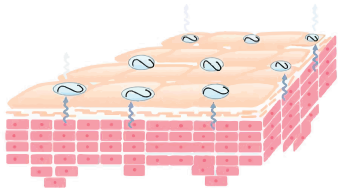
Barrier function

Conceptual Image of Moisture Catching and Membrane Barrier

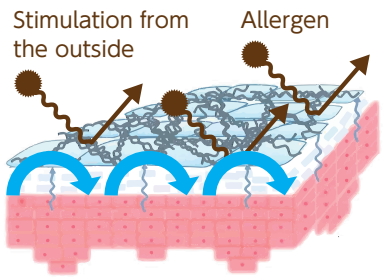


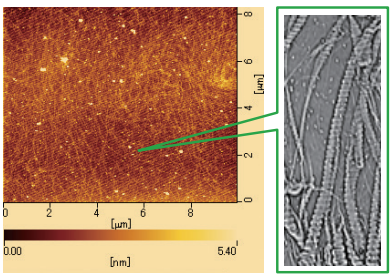
Regular polymer membrane

Scattered membrane barriers where moisture is only retained around the polymeric components.



Sacran's extra-high molecular membrane



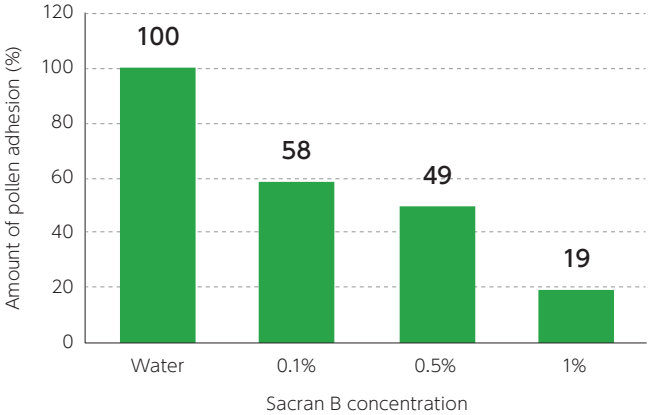


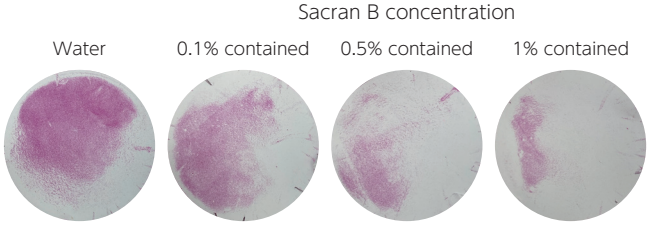
Sacran aggregate forms a strong network membrane with a helical structure, and is expected to protect the skin from external factors. (pollen, dust, viruses, etc.)
In addition, since moisture can be retained in the spaces between the molecular chains of the helical structure, a Sacran water retention network covers the whole of the skin with moisture, promoting skin activation.

Images provided by GREEN SCIENCE MATERIAL INC.

Anti-pollution

Sacran B adjusted to various concentrations is applied to a filter and dried.
A pseudo-pollen was sprinkled and the amount of pollen adhering to the filter was calculated through image analysis.





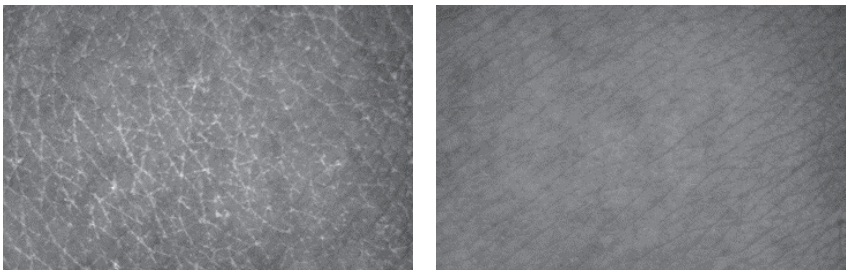
A Sacran concentration-dependent decrease in pseudo-pollen adhesion and anti-pollution effects were observed.

Based on in-house data

Improvement of rough skin

Create skin roughness by tape stripping and acetone treatment. The sample was applied to the skin on consecutive days and the condition of the skin was observed. The ability to improve the skin barrier, smoothness and dryness was confirmed through image analysis and trans epidermal water loss (TEWL) testing.

Observation of skin condition

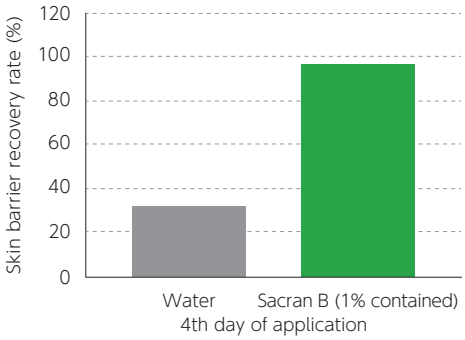


Rough skin

Sacran B (1% contained)
4th day of application

Based on in-house data

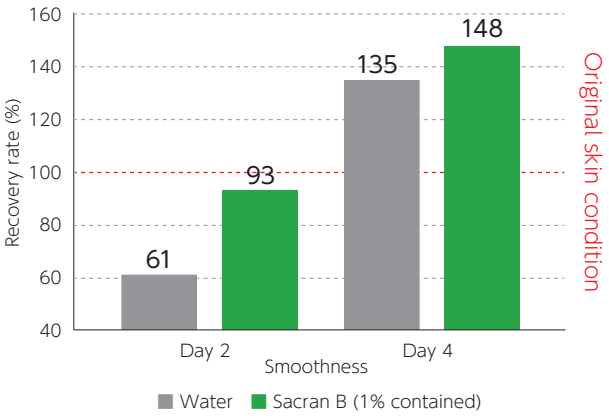
Skin barrier recovery rate (TEWL)



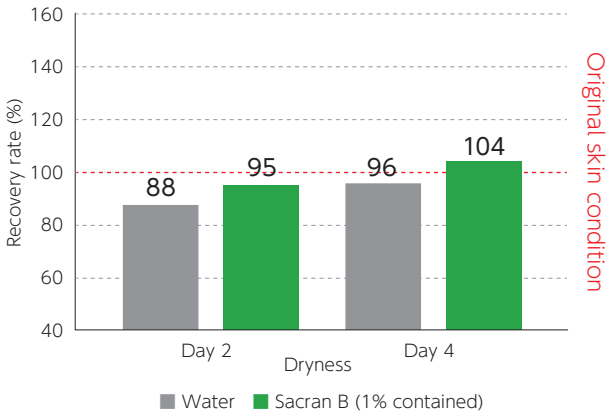
Based on in-house data

It was found that applying Sacran eliminated almost all visible dry areas on the skin. Recovery of the skin barrier function was also observed.

Skin smoothness



Dryness



The application of Sacran was observed to make the skin smoother, and improve dryness.

Based on in-house data

Anti-inflammatory effect

0.2% of sacran is applied twice daily to untreated patients with atopic dermatitis.

Patient: 11-year-old female
Symptoms: Atopic dermatitis from 3 years of age,
prescribed fluocinolone acetonide but her condition continued to worsen

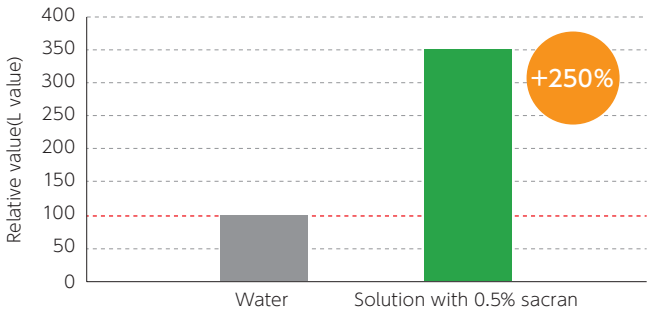
Improvement of skin condition was observed and reduction in itching was reported after 2 weeks.

Data from Ngatu, M.D., Kochi Medical School
Provided by GREEN SCIENCE MATERIAL INC.

Effect of brightening up skin tones

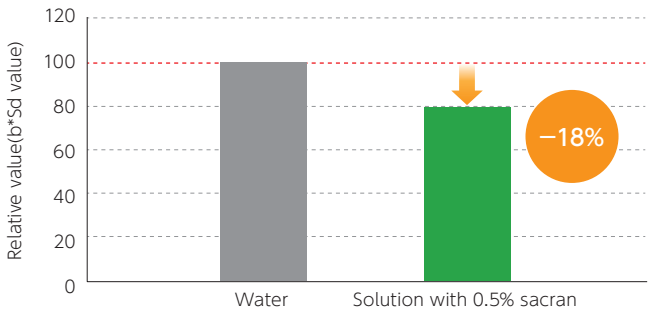
After an appropriate amount of Sacran B 0.5% solution was applied to the skin, measurements were taken using a color-difference meter.

Skin brightness



Based on in-house data

Uneven skin coloring



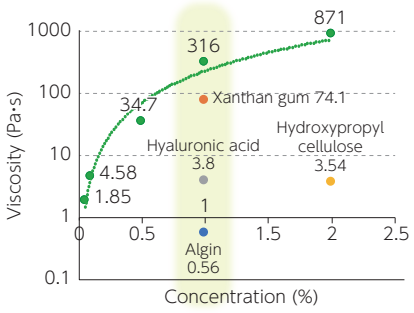
Based on in-house data

It was found that the application of Sacran brightens the tone of the skin and reduces uneven coloring. It is expected to create translucent skin.

Basic physical properties　Viscosity

Viscosity

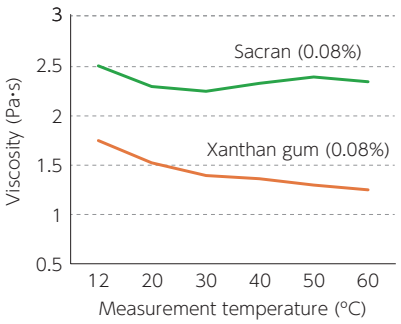
Each polysaccharide solution was adjusted to each concentration and measured using a rotational viscometer.



Sacran when the concentration was 1% exhibited approximately four times the viscosity of xanthan gum and 80 times the viscosity of hyaluronic acid.

Temperature effects

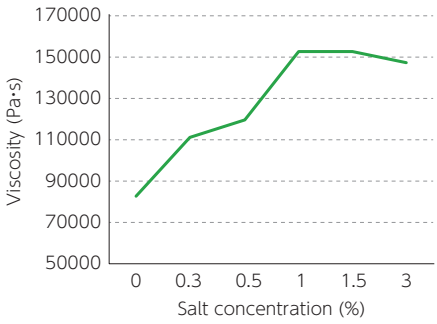
Each sample was heated using an electric wire heater attached to the rotational viscometer, and viscosity at each temperature was measured using the rotational viscometer.



While the viscosity of xanthan gum declined due to heating, the viscosity of Sacran did not change due to heating, indicating that it is stable.

Increased viscosity effect due to the addition to salt

Salt at each concentration was added to 1% concentration Sacran and measurements taken with a rotational viscometer.



It was observed that there is an effect of increased viscosity with the addition of salt to Sacran. The maximum viscosity was reached when the concentration was equivalent (about 0.9%) to physiological salt solution.

Data obtained by Japan Advanced Institute of Science and Technology　Provided by GREEN SCIENCE MATERIAL INC.

Photos of external appearance

Product name　Sacran B, Sacran F

Product name　Sacran　10g

Dissolution method video

Commitment to material procurement

Aiming to conserve species and develop environmentally-friendly original Japanese biomass resources

GSM
グリーンサイエンス・マテリアル株式会社
GREEN SCIENCE MATERIAL INC.

Japan is a country poor in natural minerals and resources. But there is a resoruce of which Japan can be proud.That is its underground water resources. Overseas, there are few countries where people can drink tap water directly.
Our first aim is to conserve aphanothece sacrum, a species endemic to Japan that only grows in Japan's underground water resources by using Sacran as a material that is useful to everyone.
We believe that aphanothece sacrum has a role to play in reconsidering Japan's abundant water resources once more.
Sacran has potential for application not only in cosmetics but healthcare and clothing as well, making it a material with almost unknown potential.
Our aim is to make Sacran widely used in the products familiar to us in the future. We will cultivate Sacran as an original "made in Japan" biomass resource that the world wants, but cannot have.

GREEN SCIENCE MATERIAL INC. Shinichiro Kaneko

The Kogane river where Suizenjinori grows naturally
(Asakura City, Fukuoka Pref.)

Farm (Mashiki town, Kumamoto Pref.)

Recommended formulation ratio: 0.5%-1%
Safety evaluation: Human Repeat Insult Patch Test (HRIPT): Conducted
Skin Irritation Test (SkinEthic Skin Irritation Test method): Negative
Eye Irritation Test (SkinEthic Human Corneal Epithelium [HCE] Test method): Negative
Sensitization Test (h-CLAT method): Negative
Mutagenicity (microbe, chromosomal aberrations): None

	Product name	INCI name ／中文名称	Other ingredient	Package	Sample
Solution type	Sacran B	APHANOTHECE SACRUM POLYSACCHARIDES 水前寺紫菜 (APHANOTHECE SACRUM) 多糖	WATER, BUTYLENE GLYCOL	1kg	10g
	Sacran F		WATER, PHENOXYETHANOL	1kg	
Fiber type	Sacran		–	10g	1g*

The manufacturer: GREEN SCIENCE MATERIALS, INC.
The country of origin: Japan (Kumamoto Pref./Fukuoka Pref.)
The place of origin: Japan (Kumamoto Pref./Fukuoka Pref.)

"Sacran" is registered trademark of GREEN SCIENCE MATERIAL INC.
*Sacran samples are chargeable.

Contact

KOKEN CO., LTD.
1-4-14 Koraku, Bunkyo-ku, Tokyo 112-0004, Japan
TEL +81-3-3868-0560 FAX +81-3-3816-3570
https://koken-cosme.com/en/