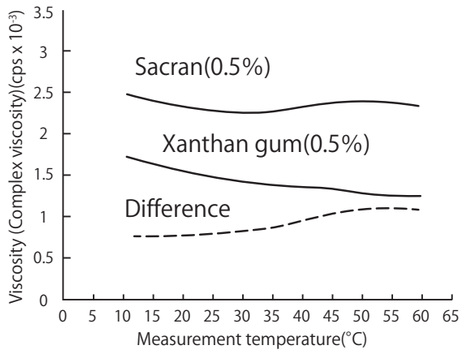
Sacran

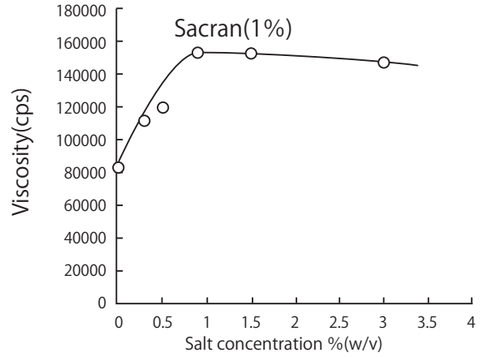
Temperature stability



Data obtained by Japan Advanced Institute of Science and Technology
Provided by Green Science Material Inc.

Xanthan gum decreases in viscosity when heated. On the other hand, sacran does not show any change in viscosity due to heating and remains stable. This difference in viscosity was confirmed to increase when heated.

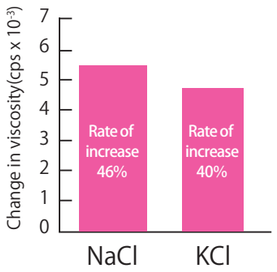
Increase in viscosity due to the addition of salt



Data obtained by Japan Advanced Institute of Science and Technology
Provided by Green Science Material Inc.

Addition of various concentrations of salt (NaCl) to 1% (w/v) sacran solution resulted in an increase in sacran viscosity. The maximum viscosity was reached when the concentration was equivalent (about 0.9%) to physiological salt solution.

Effect of ion type



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Provided by Green Science Material Inc.

As a result of measuring the rate of increase in viscosity when various univalent metal ions at 0.6% (w/v) are added to 1 % (w/v) sacran solution (viscosity 12,000 cps), an increase in viscosity was found in all cases.

Safety evaluation	Human patch test : negative

Product name	INCI name	Other ingredients	Package
Sacran B	APHANOTHECE SACRUM EXOPOLYSACCHARIDES	WATER, AND BUTYLENE GLYCOL	1 kg
Sacran F	APHANOTHECE SACRUM EXOPOLYSACCHARIDES	WATER, AND PHENOXYETHANOL	1 kg

Manufacturer: Green Science Material Inc.
Country of origin: Japan (Kumamoto/Fukuoka Prefectures)

KOKEN CO., LTD. 1-4-14 Koraku, Bunkyo-ku, Tokyo 112-0004, Japan E-mail: customer@kokenmpc.co.jp TEL: 81-3-3816-3562 FAX: 81-3-3816-3582 **www.kokenmpc.co.jp**

C-1-3000-1-01-01

KOKEN

Raw material exclusively for cosmetic manufacturing

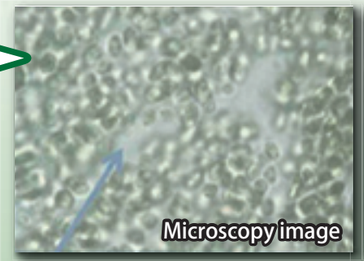
Raw material for cosmetics from fresh water algae

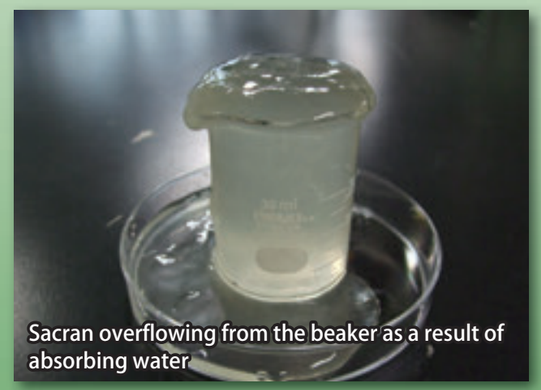
Sacran

APHANOTHECE SACRUM EXOPOLYSACCHARIDES

Sacran is a natural giant molecular polysaccharide extracted from the algae, Aphanothece sacrum, which lives in clear spring water from underflow water in the Aso region. Aphanothece sacrum is a highly valuable plant that can only live in special regions where the water is pristine and flows slowly. This product was named “Sacran” in acknowledgement of the scientific name, “Aphanothece sacrum” , where ‘sacrum’ means ‘sacred’ . It is regarded as a luxury foodstuff and was gifted to the shogun as an offering during the Edo era.

Aphanothece sacrum secretes sacran to protect the cell from the harsh environment.
Sacran is said to prevent the invasion of bacteria and viruses from outside by retaining a lot of water and protecting Aphanothece sacrum from drying out.





Applications: Lotions, milky lotions, creams, skin-care products, makeup products, etc.

Characteristics

Natural giant molecular
Natural polysaccharide extracted from Aphanothece sacrum found in Kumamoto and Fukuoka prefectures

Moisturizing effect
10-fold higher moisture retention capacity compared to hyaluronic acid

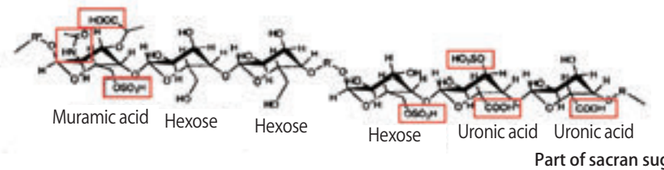
Protective membrane formation
Functions as a barrier to protect skin from external stimulus

Anti-inflammatory effect

Sacran

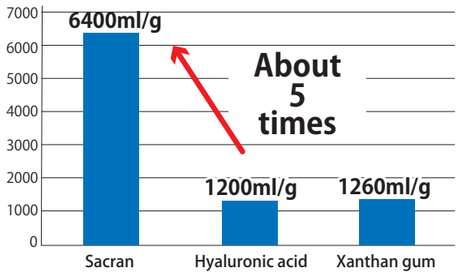
Characteristics of Sacran

- Super-macromolecule with molecular weight of about 20 million
- Anionic polysaccharide with about 11% of sulfate groups and 12% of carboxyl groups per sugar chain
- Eleven types of monosaccharides including glucose, galactose, xylose and fucose have been identified as components and sacran also contains a novel monosaccharide, sulfated muramic acid.
- Aphanothece sacrum is a prokaryote but sacran is predicted to have a similar structure to mucopolysaccharides produced by eukaryotes and is anticipated to have a range of physiological activities.

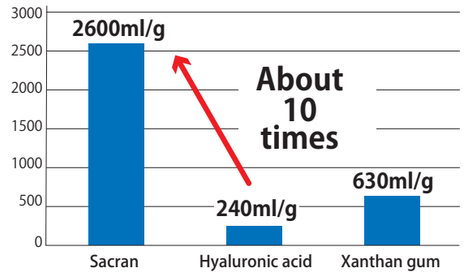


Part of sacran sugar residue sequence

Water retention capacity



Retention of pure water

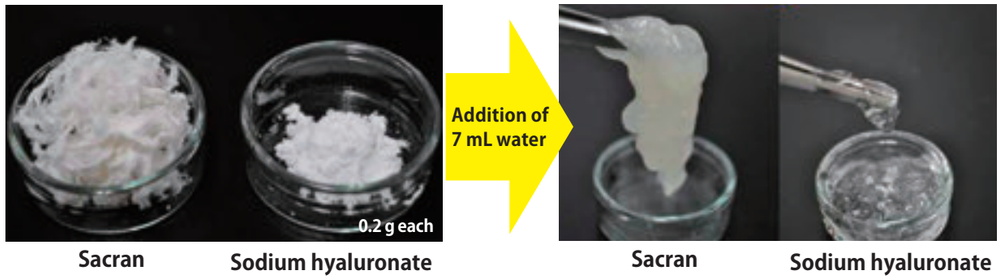


Retention of salt water

Data obtained by Japan Advanced Institute of Science and Technology
Provided by Green Science Material Inc.

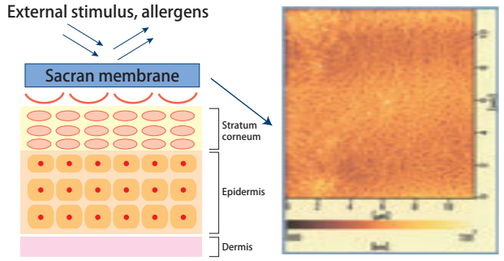
Using the improved tea bag method, a water retention assay was conducted for sacran, hyaluronic acid and xanthan gum. As a result of measuring the volume (mL) of water retained by 1 g (dry weight) of each sample, sacran was found to have a water retention capacity exceeding 6000-fold its own weight. 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.

Difference in water retention capacity between sacran and Sodium hyaluronate



From in-house data

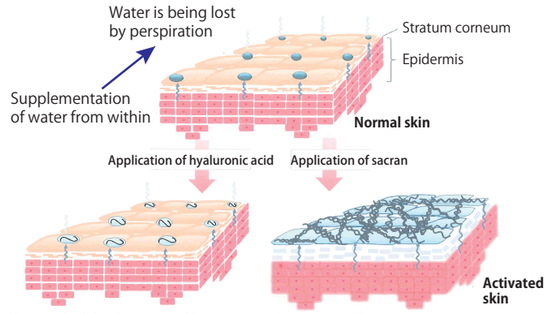
Barrier function



Sacran solution (concentration: 10 ppm) was applied to mica and observed by atomic force microscopy (AFM). Sacran found to form a mesh-like film and to be a macromolecule with a length of 12 μm

Data obtained by Japan Advanced Institute of Science and Technology
Provided by Green Science Material Inc.

Diagram showing water retention by sacran

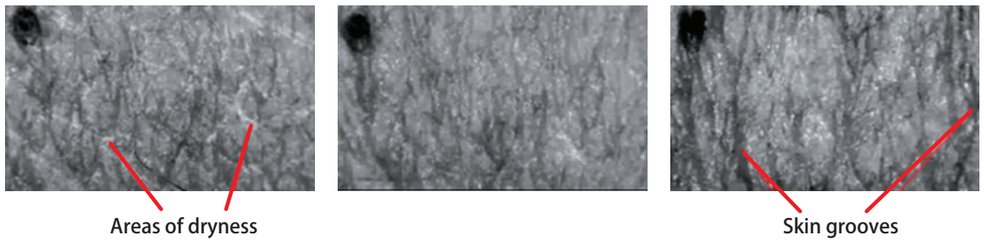


Skin to which hyaluronic acid has been applied
Moisture is retained only around the small hyaluronic acid molecules

Skin activated by sacran
The mesh made by sacran, which is larger than the cells, covers the skin surface, allowing the water to be completely retained.

Effect on skin

Microscopy image of the observation site (inner side of the upper arm)



About 100 μL of sacran solution (0.1%) was continuously applied once every day to the inner side of the upper arm and skin texture was observed with a microscope 3 days, 1 week and 2 weeks after starting application. Skin was dry (white region) before application but after 2 weeks of sacran application, there were no dried areas and skin grooves were more noticeable.

It is anticipated that the application of sacran over time will improve the texture of the skin

From in-house data

Anti-inflammatory effect

Medication use is stopped and sacran solution is applied

Almost completely cured after 3 weeks (itchiness has ceased and redness has almost disappeared)

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

Data from Ngatu, M.D., Kochi Medical School,
Provided by Green Science Material Inc.