

MARINE SUGAR™ LMFO Series



Raw Material: Fucoidan-3 types of brown algae (*Undaria pinnatifida*, *Laminaria japonica*, and *Sargassum fulvellum*)

Active ingredient: Low-Molecular weight Fuco-Oligosaccharides

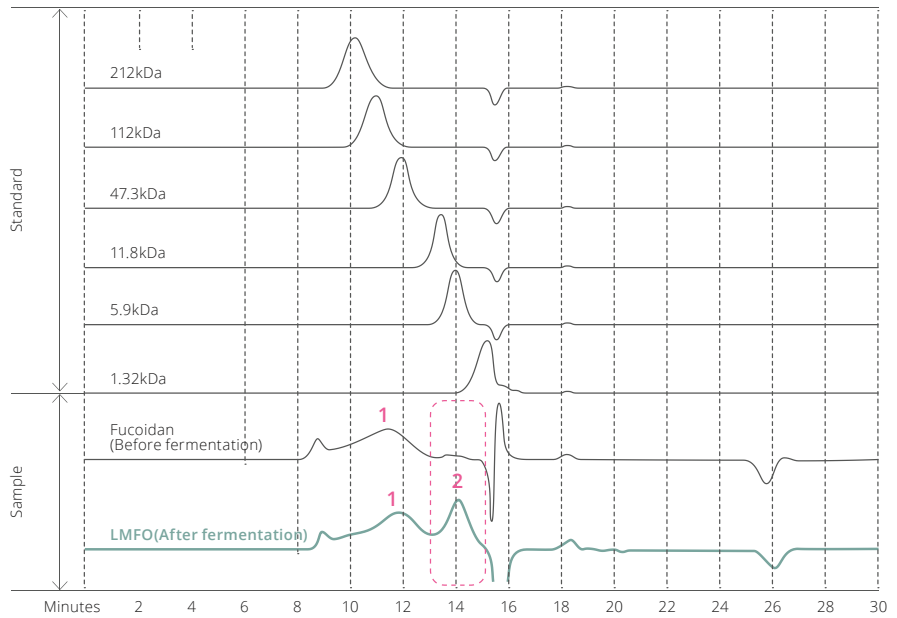
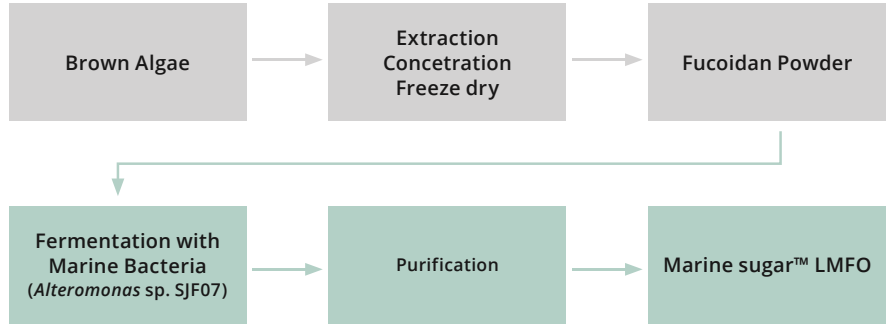
Low-Molecular weight Fuco-Oligosaccharides (LMFO) is a product fermented by *Alteromonas* sp. with brown algae (*Undaria pinnatifida*, *Laminaria japonica* or *Sargassum fulvellum*). LMFO-M is a mixture product of *Undaria pinnatifida*, *Laminaria japonica*, and *Sargassum fulvellum*.

MARINE BIOTECHNOLOGY PRODUCTS

- + **Fermentation product**
- + **Low-molecular Fuco-oligosaccharide**
- + **Moisturizing**
- + **Anti-wrinkle**
- + **Whitening**

Manufacturing process of Low Molecular weight Fuco-Oligosaccharides

When comparing the molecular weight between fucoidan and LMFO, low molecular weight peak appeared in LMFO. After fermentation with *Alteromonas* sp., the fucoidan of 200 kDa becomes low molecular weight fuco-oligosaccharides of 30 kDa or less.

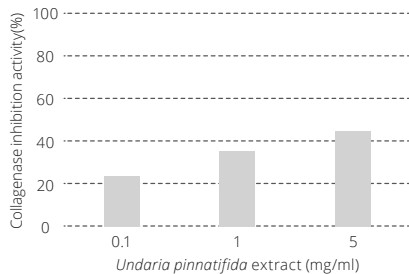


Effect of LMFO

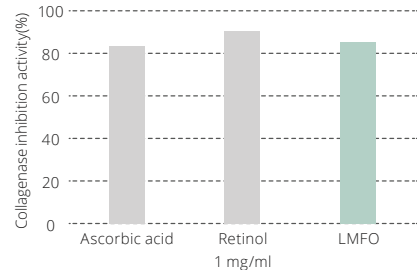
Anti-wrinkle effect of fucoidan (LMFO) from *Undaria pinnatifida* is increased by fermentation

Anti-wrinkle effect

• 35% inhibitory effect fucoidan 1 mg/ml



• 85% inhibitory effect LMFO 1 mg/ml





CATEGORY NAME

Marine Sugar™

PRODUCT NAME

LMFO-U

INCI NAME

Algae oligosaccharides

SOLUBILITY

Water soluble

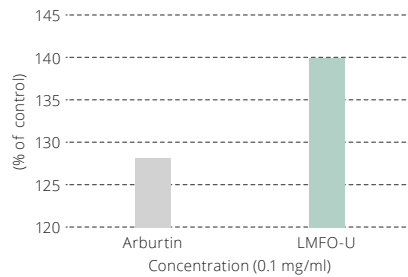
- Decolorization
- Deodorization
- Desalination
- Fermentation
- Low molecular
- Low particle size
- 9x steaming & drying

Marine Sugar™ LMFO-U

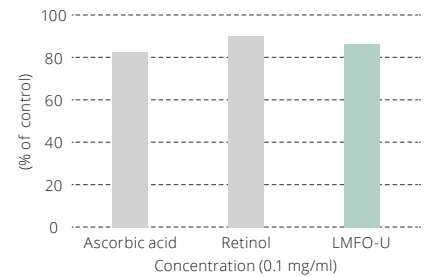
Anti-wrinkle

The inhibitory effect of collagenase activity and production effect of procollagen by LMFO-U

Procollagen production



Inhibition of collagenase activity



CATEGORY NAME

Marine Sugar™

PRODUCT NAME

LMFO-S

INCI NAME

Algae oligosaccharides

SOLUBILITY

Water soluble

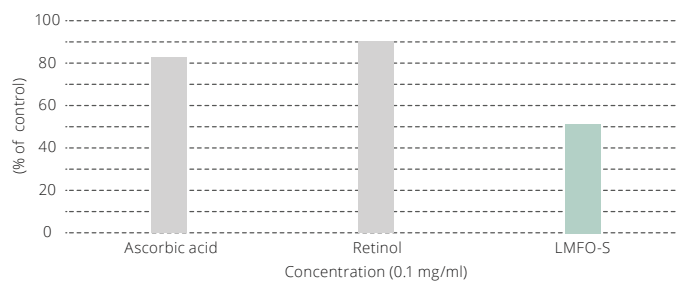
- Decolorization
- Deodorization
- Desalination
- Fermentation
- Low molecular
- Low particle size
- 9x steaming & drying

Marine Sugar™ LMFO-S

Anti-wrinkle

The inhibitory effect of collagenase activity by LMFO-S

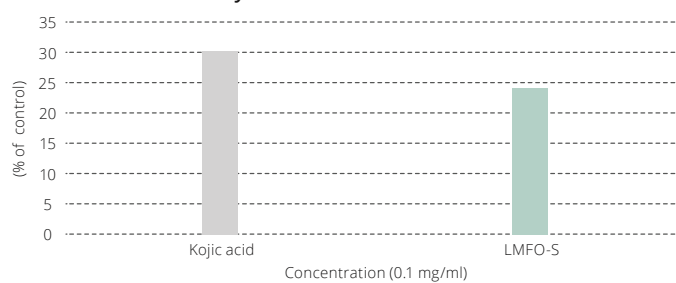
Inhibition of collagenase activity



Whitening

The inhibitory effect of melanin production by LMFO-S

Inhibition of melanin synthesis

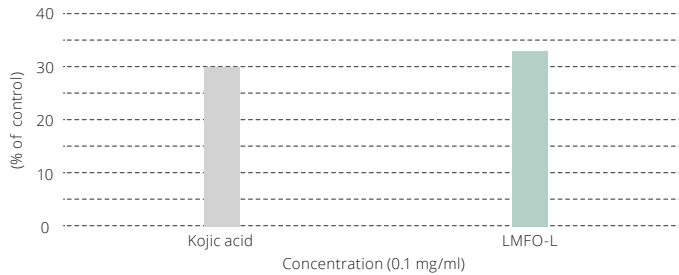


Marine Sugar™ LMFO-L

Whitening

The inhibitory effect of melanin production by LMFO-L

Inhibition of melanin synthesis



CATEGORY NAME
Marine Sugar™

PRODUCT NAME
LMFO-L

INCI NAME
Algae oligosaccharides

SOLUBILITY
Water soluble

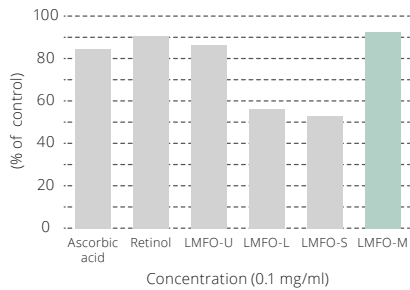
- Decolorization
- Deodorization
- Desalination
- Fermentation
- Low molecular
- Low particle size
- 9x steaming & drying

Marine Sugar™ LMFO-M

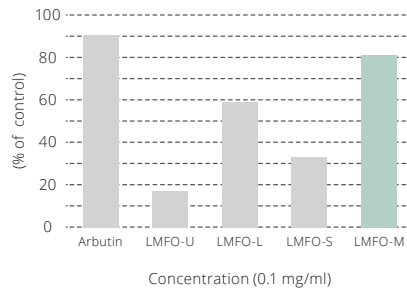
Anti-wrinkle

The inhibitory effect of collagenase activity and MMP-1 expression by LMFO-M

Inhibition of collagenase activity



Inhibition of total MMP-1



CATEGORY NAME
Marine Sugar™

PRODUCT NAME
LMFO-M

INCI NAME
Algae oligosaccharides

SOLUBILITY
Water soluble

- Decolorization
- Deodorization
- Desalination
- Fermentation
- Low molecular
- Low particle size
- 9x steaming & drying

Whitening

The inhibitory effect of melanin production by LMFO-M

Inhibition of melanin synthesis

