

20395PF.

AC Sebum Control Enzyme PF

COMPLEX ACTIVES



VEGAN



IN VIVO



IN VITRO



CHINA



THE FEATURES.

A shiny complexion, redness, or oily hair follicles caused by excessive sebum production does not leave a flawless first impression. Produced by sebaceous glands to naturally provide the skin's surface and hair with a hydrophobic coating, as well as skin barrier function, too much sebum can become problematic. Sebum Control Enzyme PF is an ingredient developed by Active Concepts to impart sebum-reduction benefits to cosmetic and personal care formulations. This unique combination of butylene glycol, water, and *Spiraea ulmaria* (meadowsweet) extract offers a nourishing, water-soluble solution capable of decreasing sebum levels and attenuating excessive oxidative stress. Incorporate AC Sebum Control Enzyme PF in a variety of skin and hair care applications to reap its potent revitalizing, sebum-controlling properties.

Butylene Glycol & Water & Spiraea Ulmaria Extract

Actions

Sebum Reduction
Antioxidant
Revitalizing
Nourishing
Great for Skin

TECHNICAL DATA SHEET.

AC Sebum Control Enzyme PF



THE REGULATION.

INCI. Butylene Glycol & Water & Spiraea Ulmaria Extract
CAS. 107-88-0 & 7732-18-5 & 84775-57-5
EINECS. 203-529-7 & 231-791-2 & 283-866-3
EUROPE. Compliant
USA. Compliant
CHINA. Compliant

THE SPECIFICATION.

Origin. Botanical/Bacteria/Synthetic
Natural Antimicrobial. Lactobacillus Ferment
Preservatives. None
Solvents Used. Butylene Glycol & Water
Soluble/Miscible. Water Soluble
Appearance. Clear Brown Liquid
Use Level. 2 - 5 %



THE STORY.

Shiny skin, redness, and oily hair follicles do not leave a flawless first impression. Sebum is produced by sebaceous glands located in the skin, where a majority of its composition is a mixture of relatively nonpolar lipids synthesized *de novo* by the gland. Along with lipids, sebum is also composed of squalene, wax, cholesterol, and triglycerides that function in providing the skin's surface and hair with a hydrophobic coating, as well as skin barrier function^{1,2}. A holocrine mechanism stimulates sebum excretion, which the lipid-laden cells disintegrate and pour their contents through sebaceous ducts onto the skin's surface.

Impacted by various conditions, the skin and scalp can become red, itchy, oily, dry, and flaky. Regular moisturizing, washing, and/or conditioning may not fix these problems, but actually make them worse. Active Concepts developed a product that controls excess sebum and is the answer to this persistent problem. AC Sebum Control Enzyme PF regulates the sebum on the skin and scalp to maintain a healthy balance, thus preventing overly oily or dry skin. This product is a perfect addition to skin care products with a focus on oily or dry skin, while also being a useful ingredient in hair care products, such as dry shampoos, to minimize the appearance of oily hair. AC Sebum Control Enzyme PF regulates sebum production and secretion so that we are not just covering up the problem but providing a solution!

To create AC Sebum Control Enzyme PF, Active Concepts processes *Spiraea ulmaria* (meadowsweet) via milling prior to an aqueous extraction of the ground material. Butylene glycol is then introduced as a solvent dilution before *Lactobacillus* ferment is added as a natural antimicrobial. After undergoing a specified filtration method, AC Sebum Control Enzyme PF is ready for further implementation in various hair and skin care applications.

THE SCIENCE.

Spiraea ulmaria, or meadowsweet, is a perennial herb in the *Rosaceae* family, containing tannins and salicin, a plant salicylate³. Tannins have natural astringent properties and are used to treat acne. When applied topically, tannins can coagulate the surface proteins of cells and exudates, leading to a reduction in permeability and secretion⁴. This is because the astringent effect produced by tannins constricts tissues and contracts pore openings in skin. In addition, salicylates are among the most commonly used drugs for pain relief, lowering fever, and reducing inflammation. They are derived from salicylic acid which is used in the cosmetic industry to treat acne and other skin conditions⁵. Salicylic acid is also known for being a mild keratolytic and anti-inflammatory agent that has been implemented in the removal of follicular clog.

Additionally, one of the most important enzymes in sebum regulation is the enzyme 5 α -reductase. This enzyme converts testosterone to dihydrotestosterone (DHT) which binds to the androgen receptor and activates the genes involved in increasing sebum production⁶. Tannins have been shown to bind to 5 α -reductase which inhibits the conversion of testosterone to DHT⁷, and by inhibiting 5 α -reductase, we can considerably reduce the amount of sebum produced.

THE BENEFITS.

Skin

Antimicrobial Challenge Test



Oxidative stress scavenging Reactive Oxygen Species Scavenging Assay



Facial sebum reduction Sebum Reduction Assay



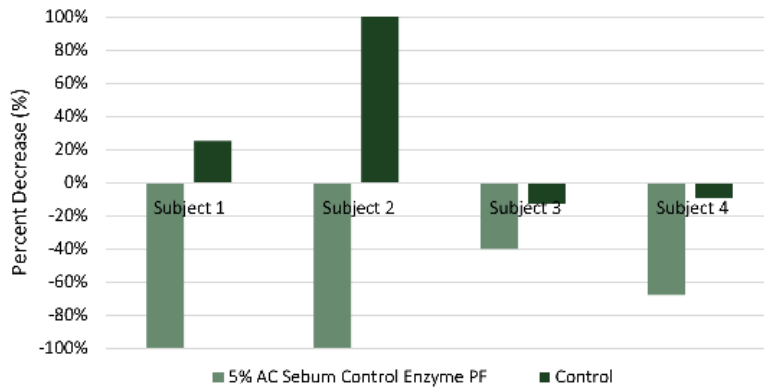
Antioxidant ORAC Assay



THE EFFICACY.

Sebum Reduction Assay.

An *in vivo* study was conducted to evaluate the ability of AC Sebum Control Enzyme PF to reduce facial sebum when incorporated into a base lotion, performing tests on the forehead, nose, and chin. 4 M/F subjects between the ages of 21 and 35, and who were known to be free of any skin pathologies, participated in this study. A DermaLab Skin Combo with sebum-collecting strips was used to measure the sebum levels on the subject's forehead, nose, and chin at baseline and after 6 hours. Results indicate AC Sebum Control Enzyme PF is capable of significantly decreasing sebum, a common problem, over time.



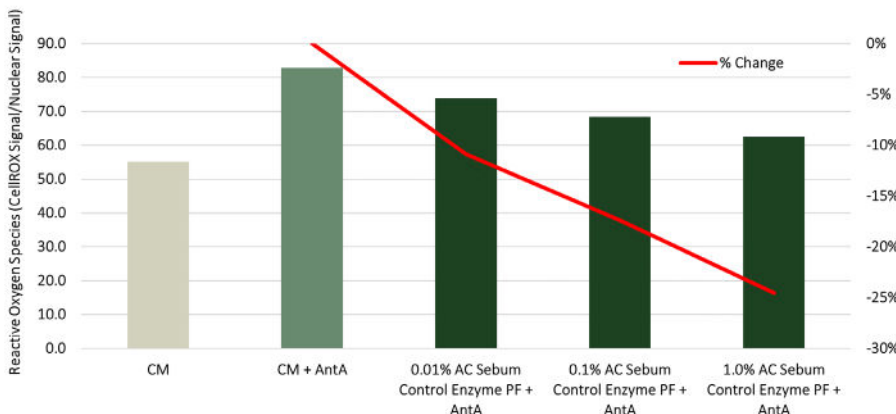
Decreased sebum on the chin by 100% after 6 hours compared to control (tested at 5%)

Facial sebum reduction.

Mattifies complexion

Reactive Oxygen Species Scavenging Assay.

A ROS Scavenging Assay was conducted to assess the *in vitro* effect of AC Sebum Control Enzyme PF to scavenge unnecessary oxidative stress in dermal fibroblasts. Human dermal fibroblasts were seeded into a 96-well tissue culture microplate and grown to 80%-90% confluency in complete media (CM). 0.01%, 0.1% and 1.0% concentrations of AC Sebum Control Enzyme PF in CM were added to cells and placed at 37°C. Control wells were incubated with CM only and all conditions were tested in duplicate. Following an 18-hour incubation, the media in all wells was removed and cells were washed once with phosphate buffered saline. Results indicate that AC Sebum Control Enzyme PF scavenges unnecessary ROS, which may help to attenuate characteristics of cellular aging.



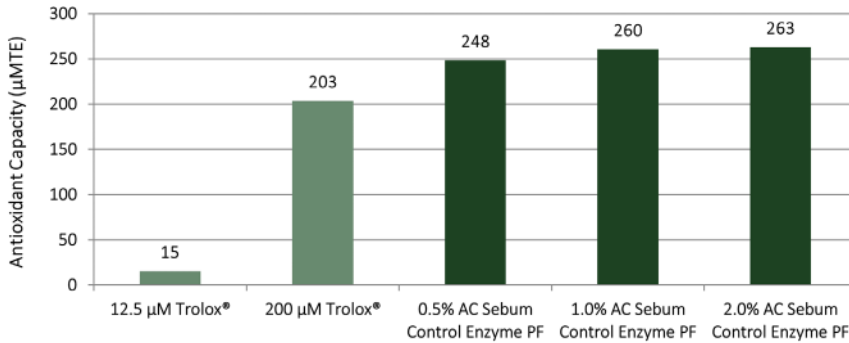
Reduced ROS levels by 25% compared to AntA-treated fibroblasts (at 1%)

Oxidative stress scavenging.

Restores healthy skin

ORAC Assay.

An Oxygen Radical Absorbance Capacity (ORAC) assay was conducted to assess the antioxidant capacity of AC Sebum Control Enzyme PF. Solutions of AC Sebum Control Enzyme PF and Trolox® (positive control) were prepared in 75 mM potassium phosphate buffer. Materials were prepared at three different concentrations/dilutions. Trolox® was used as a reference for antioxidant capacity and prepared at concentrations ranging from 12.5 µM to 200 µM in 75 mM potassium phosphate buffer. Results indicate that AC Sebum Control Enzyme PF is capable of providing antioxidant properties and aids in the anti-aging process through protection at the cellular level.



The ingredient outperformed 200µM Trolox® in antioxidant capacity by 20% (at 0.5%)

Antioxidant.

Free radical quenching abilities & Cellular protection

References:

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5. Varga, Ines, et al. "Salicylic acid-a medicine with various healing properties." Veterinarska stanica 49.6 (2018): 413-422.
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7. Liu, Jie, et al. "Steroid 5α-reductase inhibitory activity of condensed tannins from woody plants." Journal of wood science 54 (2008): 68-75.

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