

Glycosphere-PPYS

Stable Papain for Enzymatic Peeling, Skin Whitening and Hair Revitalization

Europe & China Program



Papain

Papain is an enzyme present in the fruits of *Papaya carica*, the Papaya tree. It is a proteolytic enzyme which breaks down proteins. In skin care products, it can be used to hydrolyze *stratum corneum* proteins and promote the elimination of dead skin cells. As such, it is often presented as an alternative to AHA's (Alpha Hydroxy Acids) for enzymatic peeling to obtain smoother and younger looking skin. Papain has demonstrated action in revitalizing hair by

removing the uplifted scales of the cuticle, smoothing the hair fiber and restoring shine. It is used in skin whitening products, as a tyrosinase inhibitor and because its proteolytic activity promotes fast cell turnover.

However, due to poor stability of its tri-dimensional structure as all enzymes, it is unlikely to maintain its activity in a formulation over a long period of time and need to be protected.



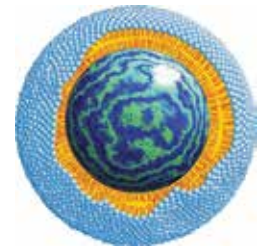
Three-dimentional structure of Papain

Glycosphere-PPYS

Glycospheres are submicron delivery systems. They can entrap enzymes such as papain within their hydrophilic inner core, separating them from the constituents of cosmetic formulas and protecting them from degradation. Papain keeps its enzymatic activity after entrapment, and the size of the Glycospheres (200nm) prevents it from penetrating deep into the epidermis.

Applications

- Enzymatic peeling in skin care products
- Hair revitalization
- Helps skin whitening
- Gs-PPYS is best formulated by replacing part of the water in the formula by the Glycosphere suspension
- Recommended use level is between 1 and 5%



Glycospheres are based on a stable inner core, made of a network of cross-linked starch. This polysaccharide has been modified with a quaternary ammonium, which allows it to bind and entrap poly-anions like Papain. The core is surrounded by lipid layers which help protect the entrapped molecules.

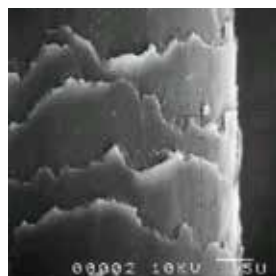
INCI name:

Water (And) Pentylene Glycol (And) Papain (And) Palmitoyl Hydroxypropyltrimonium Amylopectin/Glycerin Crosspolymer (And) 1,2-Hexanediol (And) Caprylyl Glycol (And) Hydrogenated Lecithin

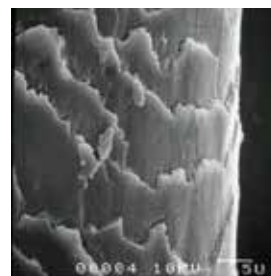
Effect of Gs-PPY on Hair Cuticle

To evaluate the effect of papain on hair cuticles, tresses were soaked in either water, a papain solution or an aqueous suspension of Gs-PPY. SEM pictures of the cuticle surfaces were then taken. Water and papain solution treatments show rough surface with lifted cuticles, but Gs-PPY treated hair has a smoother surface, which should result in silky and shiny hair.

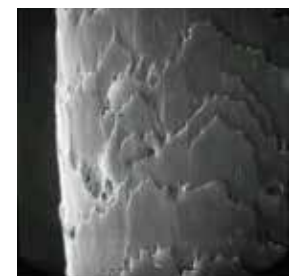
Untreated Hair



Hair treated with free PPY



Hair treated with Gs-PPY



Hair tresses were treated for 15 minutes with water, a papain solution or an aqueous suspension of Gs-PPY (1% papain). SEM pictures were then taken.

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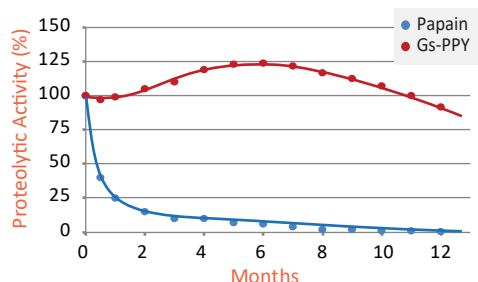
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Stability of Entrapped Papain Over Time

Proteolytic Activity

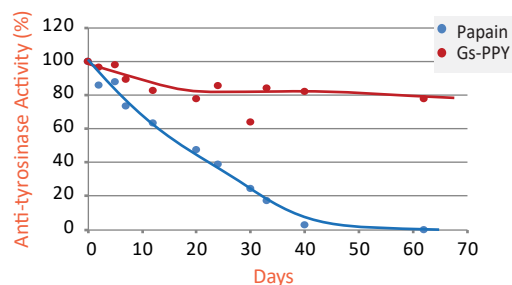
The proteolytic activity of papain, in solution or entrapped in Glycospheres was tested in vitro, using a synthetic substrate (benzoyl arginine para-nitroanilide/L-BAPA). Glycosphere-PPY and Papain in an aqueous solution (as control) were kept at 40°C and their activity was measured regularly over a period of one year. The graphic below shows that papain in solution rapidly loses its activity, but papain protected by the Glycosphere core retains most of its activity after a year at elevated temperatures.



Papain (either in solution or as Gs-PPY) was dispersed in a buffer in the presence of cysteine and EDTA, then incubated 30 min with the L-BAPA substrate before the reaction was stopped with acetic acid. The release of the chromophore was measured with a spectrophotometer (410nm) and plotted on the graph as a percentage of the initial activity.

Anti-Tyrosinase Activity

The capacity of papain to inhibit melanin synthesis by deactivating tyrosinase was tested in vitro, using tyrosinase and L-DOPA, the substrate tyrosinase converts. Glycosphere-PPY and Papain in an aqueous solution (as control) were kept at 40°C and their activity was measured regularly over a period of two months. The graphic below shows that papain in solution rapidly loses its activity, but papain protected by the Glycosphere core retains most of its activity even at elevated temperatures.



Papain (either in solution or as Gs-PPY) was dispersed in a potassium buffer in the presence of L-DOPA, then incubated 15 min with tyrosinase. The amount of Dopachrome, formed from L-DOPA by incubation with tyrosinase, was measured with a spectrophotometer (476nm). A lower amount of Dopachrome released when papain is present shows that papain inhibits tyrosinase. The inhibition of tyrosinase activity was plotted on the graph as a percentage of the initial inhibition.



KLP-173D

Picante Red Long-Lasting Water-Based Liquid Lipstick

Part 1

- Deionized Water - Water 25.00%
- Glycerin U.S.P. Natural 96% - Ruger Chemical: Glycerin 11.90%
- SIH-2 RED No.211P - Daito/Kobo Products: Iron Oxides (CI 77491) (And) Silica 5.70%
- Jeosorb L-20 - Jeen International: Polysorbate 20 0.30%
- Gs-GTS - Water (And) Pentylene Glycol (And) Palmitoyl Hydroxypropyltrimonium Amylopectin/Glycerin Crosspolymer (And) Camellia Sinensis Leaf Extract (And) 1,2-Hexanediol (And) Caprylyl Glycol (And) Hydrogenated Lecithin 0.15%
- Gs-PPYS - Kobo Products: Water (And) Pentylene Glycol (And) Papain (And) Palmitoyl Hydroxypropyltrimonium Amylopectin/Glycerin Crosspolymer (And) 1,2-Hexanediol (And) Caprylyl Glycol (And) Hydrogenated Lecithin 0.15%
- Gs-VA100C - Kobo Products: Butylene Glycol (And) Water (And) Palmitoyl Hydroxypropyltrimonium Amylopectin/Glycerin Crosspolymer (And) Polysorbate 20 (And) Retinol (And) Phenoxyethanol (And) Parabens (And) Hydrogenated Lecithin (And) BHT (And) BHA 0.15%
- Gs-VE - Kobo Products: Water (And) Palmitoyl Hydroxypropyltrimonium Amylopectin/Glycerin Crosspolymer (And) Phenoxyethanol (And) Tocopherol (And) Parabens (And) Hydrogenated Lecithin 0.15%
- Edeta® BD - BASF: Disodium EDTA 0.10%

Part 2

- Butylene Glycol - Ruger Chemical: Butylene Glycol 4.90%
- Keltrol® CG - CP Kelco: Xanthan Gum 0.15%

Part 3

- Simulgel™ EG - Seppic: Sodium Acrylate/Sodium Acryloyldimethyl Taurate Copolymer (And) Isohexadecane (And) Polysorbate 80 1.35%

Part 4

- Denatured Ethanol - Chemical.net: Alcohol 4.30%

Part 5

- CES-1104 - Avantor/Kobo Products: Dimethicone (And) Water (And) Glycerin (And) Pentylene Glycol (And) Dimethicone/Vinyl Dimethicone Crosspolymer (And) Amodimethicone (And) Carbomer (And) Phenoxyethanol (And) Sodium Hydroxide (And) Disodium EDTA 4.00%
- Phenoxetol™ - Clariant: Phenoxyethanol 0.90%

Part 6

- MSS-500W - Kobo Products: Silica 10.00%
- KTZ® CRIMSON - Kobo Products: Mica (And) Titanium Dioxide (And) Iron Oxides (CI 77491) (And) Carmine 5.70%

Part 7

- KOBOGUARD® 50AMP-G - Kobo Products: Acrylates/Ethylhexyl Acrylate Copolymer (And) Water (And) Aminomethyl Propanol 25.00%
- Strawberry Fragrance - Berje Inc.: Fragrance 0.10%

Manufacturing Procedure:

1. Combine Part 1, prop mix until homogeneous.
2. Combine Part 2, slowly add slurry to batch while mixing.
3. Slowly add Part 3, mix for 10 min until homogeneous.
4. Slowly add Part 4 while mixing until uniform.
5. Slowly add Part 5 while mixing until uniform.
6. Slowly add Part 6 to batch while mixing until uniform.
7. Slowly add Part 7, mix for 10 min until homogeneous.

Description:

This fiery red long-lasting liquid lipstick feels velvety on the lips. KOBOGUARD® 50AMP-G contributes to longevity, adhesion to the lips and water-resistant properties. KTZ® CRIMSON, a Pearlescent Pigment, offers unique color and metallic effect. MSS-500W gives the beautiful, velvety feel. CES-1104 is an encapsulated elastomer gel, which breaks upon application and offers an instantly refreshing feel followed by a velvety silicone after feel. Glycosphere Delivery Systems, Gs-VE (Tocopherol), Gs-GTS (Green Tea Polyphenols) and Gs-VA100C (Retinol) add skin care benefits to the formula. Gs-PPYS contains Papain, a natural material, known for its skin-smoothing properties. SIH-2 RED No.211P is a hydrophilic silica treated Red Iron Oxide. Pigments with this treatment disperse well in water.

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Glycosphere-PPYS

www.koboproducts.com