Personal Care

Lonza

Consumer Care

Hydrolyzed Milk Proteins & Amino Acids

Film-Forming Proteins for Moisturization

INCI Name: Hydrolyzed Milk Protein
SAP Code#: 121670

INCI Name: Milk Amino Acids
SAP Code#: 138040

Key Product Attributes

- Excellent film-forming capabilities
- Effective moisturization
- Nourishing to the skin
- Protective against drying
- Restorative effects

Background Information

The starting material for Hydromilk EN-20 and Milk Amino 20 PF is pure whole cow's milk, a renewable resource. Milk may be considered to be a complete food, since it is composed of all the essential amino acids in varying quantities. It is collected under strictly controlled conditions, primarily for consumption, but also for other uses. To produce a cosmetic grade material, the non-protein components – fats and carbohydrates – are removed and the protein is then hydrolyzed and purified. The resulting product is a light colored, low-odor cosmetic grade protein. Total hydrolysis of the milk protein yields the free amino acids.

The proteins in milk comprise of caseins and whey proteins (i.e. curds and whey). These proteins differ widely from each other both in their amino acid composition (see table) and in their chemical properties. We use whole milk as a special enzymatic process that converts aqueous solubility while maintaining a significant proportion of soluble "globular" protein.

The properties of the proteins in milk have been reported as follows:

Caseins (80%)		Whey Proteins (20%)	
α-casein	59.0%	Euglobulin	1.2%
B-casein	17.6%	Pseudoglobulin	0.8%
Γ-casein	2.4%	Component III	3.6%
K-casein	1.0%	α-Lactalbumin	2.4%
		ß-Lactoglobulin	11.0%
		Blood serum albumin	1.0%

Hydromilk EN-20

Hydrolyzed Milk Protein

Hydromilk EN-20 is different from the traditional cosmetic proteins since it exists in a whole "globular" form, giving it different properties which may prove interesting from a cosmetic standpoint. It behaves more like a whole native protein than a hydrolyzed protein.

It is supplied at a pH of 7.0, however, if the pH is reduced below pH 4.0, precipitation will occur. Strong salt solutions or 2% sodium hydroxide will cause a thick rubbery gel to form at 5% protein level. Hydromilk EN-20 is stable up to 80°C. It should be added to emulsions after they have started to set up, at the same time as the fragrance. Heat treatment at 45°C changes the characteristics of Hydromilk EN-20, creating a firmer, more adhesive film.

Cosmetic Properties

Benefits to the Hair:

Hydromilk EN-20 has the ability to improve the manageability and body of the hair and to improve the hair's gloss and texture. It will also form a continuous film on hair, thereby coating and sealing it. This is especially important for damaged hair since it improves the feel and helps restore the hair's normalcy. It has good film forming properties which are important during styling and setting. The good moisturizing properties allow the maintenance of higher moisture levels, enhancing the hair's flexibility and stretchability and giving it a healthier appearance.

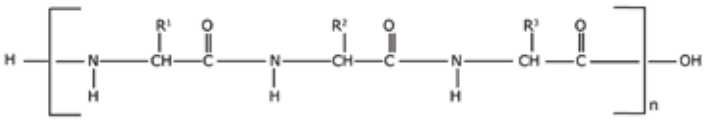
Benefits to the Skin:

Milk has been associated with beautiful skin throughout history since Cleopatra bathed in it. Thus, there is a time-tested consumer benefit in its incorporation into high quality cosmetic formulations. Hydromilk EN-20 provides a protective colloid effect; the films that are produced help to protect the skin from the environment and keep the skin soft and supple. The moisturizing properties will help to minimize dry skin conditions. Since all the essential amino acids are present it may be considered a complete food for the skin and may help to nurture the skin.

The products will also help to combat the drying effects of surfactants and protect the skin from surfactant attack. Surfactants are known to be responsible for the removal of lipidic material from the skin which in turn causes further moisture loss and damage to the skin's permeability barrier. Excessive dehydration causes dry, scaly or even cracked skin. This may be prevented by the protective action of Hydromilk EN-20.

Hydromilk EN-20 is compatible with both cationics and anionics and at 1% in a solution of 50% alcohol in water.

Chemical Structure:



R ^{1,2,3} are amino acid side chain groups characteristic of milk proteins
n = 3-5, equivalent to a molecuar weight of 1000 - 1500

Solubilities (at 5%)	
Water	Soluble
Mineral Oil	Insoluble
Propylene Glycol	Soluble
Sodium Lauryl Ether Sulfate	Soluble

Milk Amino 20 PF

Milk Amino Acid Proteins

Cosmetic Properties

Milk amino acids consist of highly soluble amino acids derived from milk proteins made by a combination of enzyme and acid hydrolysis. Milk amino acids contain all the essential amino acids and can be viewed as a balanced treatment for the skin and hair.

Free amino acids are found on the skin as a part of the final breakdown product of the involucrins (a form of keratin) which constitute a key part (nearly 50%) of the skin's own Natural Moisturizing Factors (NMF). They play a major role in maintaining barrier homeostasis and ensuring that the skin's surface feels soft and does not look dry. The correct balance is essential for protecting the skin from looking dry and as an aid to preventing wrinkles from developing (especially as we age), normal looking skin is indicative that the skin cells are renewing correctly and that the skin's surface is not being damaged by environmental issues (for example, surfactant attack when using cleansers and shampoos). The topical application of Milk Amino 20 PF will help to replenish the NMF of the skin, provide for a normal skin cell turnover which will give the skin a healthy look and these amino acids can be re-used in normal cell metabolism to produce the new proteins, especially the differing keratins (cellular keratins 1-17, filaggrins, and involucrins) in the epidermis.

Often skin dryness is associated with the loss of glutamine (a form of glutamic acid – a conditionally essential amino acid). Milk has very high levels of this amino acid and when topically applied by using Milk Amino 20 PF, it will help to optimize the levels in the skin, alleviating dry, dull-looking skin.

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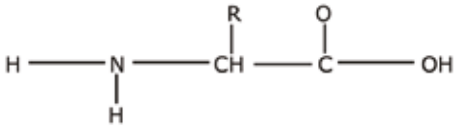
Milk Amino 20 PF is composed of a mixture of discrete amino acids which have the general structure:



R is the amino acid side chain group characteristic of whole milk. See table on following page.

Solubilities (at 5%)	
Water	Soluble
Mineral Oil	Insoluble
Propylene Glycol	Soluble
Sodium Lauryl Ether Sulfate	Soluble

	%w/w per 100g protein Lactoglobulin	Whole Casein	Whole Milk
Aspartic acid	11.46	7.1	10.9
Threonine	5.15	4.9	4.7
K-Serine	4.07	6.3	4.8
Glutamic acid	19.1	22.4	16.0
Proline	5.27	10.6	4.6
Glycine	1.5	2.0	1.6
Alanine	7.07	3.2	4.8
Valine	5.67	7.2	4.8
Cystine/Cysteine	3.39	0.3	2.5
Methionine	3.21	2.8	2.5
Isoleucine	5.88	6.1	5.1
Leucine	15.48	9.2	13.3
Tyrosine	3.69	6.3	3.1
Phenylalanine	3.86	5.0	4.0
Lysine	11.3	8.2	10.0
Histidine	1.6	3.1	1.0
Arginine	2.88	4.1	2.8
Tryptophan	1.92	1.2	1.9

Hydrolyzed Milk Protein

Typical Properties	
Appearance	Hazy, pale amber liquid
Odor	Characteristic amino acid
pH (direct @ 25°C)	5.5-7.0
Non-Volatile Matter (1g/1hr/105°C)	18-25%
Preservation System	0.9-1.1% Phenoxyethanol
Recommended Use Level	1-3%

Milk Amino Acid Proteins

Typical Properties	
Appearance	Clear to hazy yellow liquid
Odor	Characteristic
pH (direct @ 25°C)	4.5-7.5
Non-Volatile Matter (1g/1hr/105°C)	20-30%
Preservation System	0.9-1.1% Phenoxyethanol
Recommended Use Level	1-3%

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