



## **Marine Collagen Sources**

Within the personal care and cosmetics industry, collagen from marine sources has become popular largely due to the perceived safety benefits; particularly from transmissible spongiform encephalopathies (such as Mad Cow Disease) as these sources have a lower risk of contamination.

Although, marine collagen resembles and can be commercially prepared in a similar way to mammalian collagens such as CollTech's OVICOLL<sup>®</sup> there are a number of distinct differences in both the process and final product which should be considered and are discussed below.

## **Traceability**

For marine collagen products traceability to the raw material source is often difficult to provide. In contrast CollTech's OVICOLL<sup>®</sup> is fully traceable from "farm to product" therefore assuring the quality of the raw material source and the quality of the product.

## **Collagen Type**

Collagen produced from mammal skin sources, is predominantly Type I collagen, but also normally contains a minor amount of Type III collagen as these are the two main types of collagen found in skin. In marine sources, skin is a poor source of Type I and Type III collagen. Bone cartilage however provides a good source of Type II collagen and some marine collagen sources contain this collagen type. For cosmetic purposes Type I and Type III collagen are preferred since the product is being applied to the skin.

## Thermal Stability

A number of scientific publications have established that the thermal stability of collagen from a particular species is correlated to the nominal environmental temperature of that species<sup>12</sup>. The environmental temperature of marine species is typically significantly less than that of mammals and accordingly purified marine collagens have been observed to have a melting temperature upto 20°C lower than mammalian counterparts<sup>2</sup>. Typical melting temperatures are shown below in Table 1.

**Table 1. Melting Temperatures for Various Collagens<sup>3</sup>**

Collagen Type	Melting Temperature (°C)
Bovine Type I	42.2
Bovine Type III	43.5
Pig Type I	42.0
Pig Type III	43.2
Chicken Type I	44.7
Chicken Type III	45.1
Nile perch ( <i>Tilapia sp.</i> )	35.8
Blue Grenadier( <i>Macruronus sp.</i> )	23.0

From a protein chemistry prospective, thermal stability of collagen is governed by hydroxyproline content and a lower hydroxyproline content is observed in marine collagens. A typical analysis of hydroxyproline content of OVICOLL<sup>®</sup> Clear and a marine source is shown below.

**Table 2. Typical Amino Acid Analysis for OVICOLL<sup>®</sup> and a marine source<sup>3</sup>.**

**Values presented are residues per 1000 residues.**

Amino Acid	OVICOLL <sup>®</sup> Clear	<i>Macruronus sp.</i>
Hydroxyproline	<b>130</b>	<b>63</b>
Proline	122	96



The lower thermal stability of marine collagens therefore leads to reduced stability of end product and the propensity for room temperature stored products to show a reduced shelf life.

## **Odor**

A low thermal stability also restricts the chemical and physical processes that can be used in extracting marine collagen. One consequence of this is technical difficulties in removing the characteristic marine odor, caused by trimethylamine. As the processes used have to be gentle in order to preserve the collagen. Genuine marine collagen can always be recognized by its distinct odor characteristic and this restricts the levels at which it can be used in cosmetic formulations before it becomes aesthetically displeasing.

## **Summary**

CollTech's OVICOLL<sup>®</sup> is a premium mammalian collagen which is not hindered by issues of traceability, thermal stability or unwanted odor and in this regard is a superior product to marine collagens.

## **References**

<sup>1</sup> Rigby BJ, Robinson MS. *Nature*. 1975 Jan 24;253(5489):277-9.

<sup>2</sup> Peng Y, Glattauer V, Werkmeister JA and Ramshaw JA. *J Cosmet Sci*. 2004 Jul-Aug;55(4):327-41.

<sup>3</sup> Ramshaw JA, Werkmeister JA and Bremner HA. *Arch Biochem Biophys*. 1988 Dec;267(2):497-502.