Foaming and interfacial properties of gelatin from fish skin

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Foaming and interfacial properties of gelatin from fish skin

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Intro

The large quantities of by-products generated by the fish-processing industry are a potential source for the production of gelatin.

Protein based foams are the essential building component of many aerated food structures: breads, cakes, extruded and expanded cereal, whipped creams, ice creams.

Can gelatin from fish skin be employed as a good foaming agent in food applications?

Strategy

A and B (commercial fish gelatin)
C and D (fish skin gelatin)

- Chemical composition
- Amino acid analysis
- SDS-PAGE
- Double wall ring interfacial rheology
- Foaming properties

Results

Amino acid (residues/1000 residues) A B C D
Arginine 64 58 57 74
Serine 43 68 65 68
Hydroxyproline 99 68 73 71
Glycine 252 271 289 272
Threonine 26 25 15 28
Alanine 93 93 102 85
Proline 107 94 105 92
Proline 12 17 7 12
Valine 50 49 52 45
Histidine 7 10 5 9
Lysine 35 28 28 33
Glutamic acid 91 95 113 99
Tryptophan 0 0 0 0
Leucine 26 23 10 20
Phenylalanine 15 15 7 13
Isoleucine 20 22 11 20
Tyrosine 3 3 2 3

Sample Moisture (%) Ash (%) Protein (%) Fat (%)
A 5.41 ± 0.64 0.14 ± 0.12 95.36 ± 0.23 0.32 ± 0.18
B 11.73 ± 0.08 0.18 ± 0.03 94.24 ± 0.72 0.29 ± 0.0
C 7.09 ± 0.06 27.62 ± 0.11 71.33 ± 0.34 0.78 ± 1.09
D 4.81 ± 1.28 24.38 ± 1.06 60.34 ± 1.48 0.05 ± 0.01

Partial conclusion

- Small peptides for sample A (no distinct bands for B)
- Higher viscoelastic properties for sample C
- Gelatin from fish skin (sample C and D) present +48 ± 2 % of foam stability after 30 min compared to A and B.

Future directions

- Pendant drop, ellipsometry, film pressure balance as well as small angle X-ray scattering (SAXS) to understand these differences
- Combined effect of ultrasound, pH varying and temperature to increase foam stability

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