

REFERENCES

- Adler-Nissen, J. 1986. The Enzymic Hydrolysis of Food Proteins. Elsevier Applied Science Publishers. Barking, UK.
- Aewsiri, T., Benjakul, S., Visessanguan, W., Wierenga, P.A., and Gruppen, H. 2011. Surface activity and molecular characteristics of cuttlefish skin gelatin modified by oxidized linoleic acid. *Int J Biol Macromol.* 48: 650 – 660.
- Alemán, A., Giménez, B., Montero, P., and Gómez-Guillén, M.C. 2011. Antioxidant activity of several marine skin gelatins. *Food Sci. Technol.* 44: 407-413.
- AOAC. 2000. Official method of analysis of association of chemistry. The Association of Official Analytical Chemists. Washington D.C.
- Benjakul, S., and Morrissey, M.T. 1997. Protein hydrolysates from Pacific whiting solid wastes. *J. Agric. Food Chem.* 45: 3423–3430.
- Benzie, I.F.F. and Strain, J.J. 1996. The ferric reducing ability of plasma (FRAP) as a measure of “antioxidant power”: the FRAP assay. *Anal. Biochem.* 239: 70–76.
- Binsan, W., Benjakul, S., Visessanguan, W., Roytrakul, S., Tanaka, M., and Kishimura, H. 2008. Antioxidative activity of Mungoong, an extract paste, from the cephalothorax of white shrimp (*Litopenaeus vannamei*). *Food Chem.* 106: 185–193.
- Cao, W., Zhang, C., Hong, P., Ji, H., Hao, J., and Zhang, J. 2009. Autolysis of shrimp head by gradual temperature and nutritional quality of the resulting hydrolysate. *LWT-Food Sci Technol.* 42: 244 – 249.
- Damodaran, S., Parkin, K.L., and Fennema, O.R. 2008. Fennema’s food chemistry. Boca Raton: CRC Press/Taylor & Francis.
- Dauksas, E., Falch, E., Šližytė, R., and Rustad, T., 2005. Composition of fatty acids and lipid classes in bulk products generated during enzymic hydrolysis of cod (*Gadus morhua*) by-products. *Process Biochem.* 40: 2659 – 2670.

- Decker, E.A. 1998. Antioxidant mechanisms. In Food Lipids (Akoh, C.C. and Min, D.B., eds.). p. 397 – 421. Marcel Decker. New York.
- Diniz, F.M. and Martin, A.M. 1997. Effects of the extent of enzymatic hydrolysis on functional properties of shark protein hydrolysate. LWT-Food Sci Technol. 30: 266 – 272.
- Fang, X., Xie, N., Chen, X., Yu, H., and Chen, J. 2012. Optimization of antioxidant hydrolysate production from flying squid muscle protein using response surface methodology. Food Bioprod. Process. 90: 676-682.
- Ferreira, I.C.F.R., Baptista, P., Vilas-Boas, M., and Barros, L. 2007. Free-radical scavenging capacity and reducing power of wild edible mushrooms from northeast Portugal: individual cap and stipe activity. J Agric Food Chem. 43: 574 – 578.
- Frankel, E.N. 1996. Antioxidants in lipid foods and their impact on food quality. Food Chem. 57: 51 – 55.
- Gbogouri, G.A., Linder, M., Fanni, J., and Parmentier, M. 2004. Influence of hydrolysis degree on the functional properties of salmon byproducts hydrolysates. J. Food Sci. 69: 615–622.
- Gennadios, A., Weller, C.L., Hanna, M.A., and Froning, G.W. 1996. Mechanical and barrier properties of egg albumen films. J. Food Sci. 61: 585-589.
- Gharavi, N., Haggarty, S., and El-Kadi, A.O. 2007. Chemoprotective and carcinogenic effects of *tert*-butylhydroquinone and its metabolites. Curr Drug Metab. 8: 1 – 7.
- Giménez, B., Alemán, A., Montero, P. and Gómez-Guillén, M. C. 2009. Antioxidant and functional properties of gelatin hydrolysates obtained from skin of sole and squid. Food Chem. 114: 976-983.
- Guérard, F., Dufossé, L., De La Broise, D., and Binet, A. 2001. Enzymatic hydrolysis of proteins from yellowfin tuna (*Thunnus albacares*) wastes using Alcalase. J Mol Catal B Enzym. 11: 1051–1059.
- Hall, G.M. and Ahmad, N.H. 1992. Functional properties of fish protein hydrolysates. In Fish Processing Technology (Hall, G.M., ed.). p. 249 – 265. Blackie Academic & Professional. New York, USA.

- Harnedy, P.A., and Fitzgerald, R.J. 2012. Bioactive peptides from marine processing waste and shellfish: A review. *J Funct Foods*. 4: 6-24.
- Hoque, M.S., Benjakul, S. and Prodpran, T. 2010. Effect of heat treatment of film forming solution on the properties of film from cuttlefish (*Sepia pharaonis*) skin gelatin. *J Food Eng*. 96: 55-73.
- Jambrak, A.R., Mason, T.J., Lelas, V., and Krešić, G. 2010. Ultrasonic effect on physicochemical and functional properties of α -lactalbumin. *LWT–Food Sci Technol*. 43: 254-262.
- Jemil, I., Jridi, M., Nasri, R., Ktari, N., Ben Slama-Ben Salem, R., Mehiri, M., Hajji, M. and Nasri, M. 2014. Functional, antioxidant and antibacterial properties of protein hydrolysates prepared from fish meat fermented by *Bacillus subtilis* A26. *Process Biochem*. 49: 963 – 972.
- Kaewmanee, T., Benjakul, S., and Visessanguan, W. 2009. Protein hydrolysate of salted duck egg white as a substitute of phosphate and its effect on quality of Pacific white shrimp (*Litopenaeus vannamei*). *J Food Sci*. 74: S351 – S361.
- Ketnawa, S., Martínez-Alvarez, O., Benjakul, S., and Rawdkuen S. 2016. Gelatin hydrolysates from farmed Giant catfish skin using alkaline proteases and its antioxidative function of simulated gastro-intestinal digestion. *Food Chem*. 192: 34-42.
- Khantaphant, S. and Benjakul, S. 2008. Comparative study on the proteases from fish pyloric caeca and the use for production of gelatin hydrolysate with antioxidative activity. *Comp Biochem Physiol*. 151B: 410 – 419.
- Khantaphant, S., Benjakul, S., and Kishimura, H. 2011. Antioxidative and ACE inhibitory activities of protein hydrolysates from the muscle of brownstripe red snapper prepare using pyloric caeca and commercial proteases. *Process Biochem*. 46: 318 – 327.
- Kim, S.K., Kim, Y.T., Byun, H.G., Nam, K.S., Joo, D.S., and Shahidi, F. 2001. Isolation and characterization of antioxidative peptides from gelatin hydrolysate of Alaska pollack skin. *J Agric Food Chem*. 49: 1984 – 1989.
- Kim, S.K. and Wijesekara, I. 2010. Development and biological activities of marine-derived bioactive peptides: A review. *J Funct Foods*. 2: 1-9.

- Klompong, V., Benjakul, S., Kantachote, D. and Shahidi, F. 2007. Antioxidative activity and functional properties of protein hydrolysate of yellow stripe travelling (*Selaroides leptolepis*) as influenced by the degree of hydrolysis and enzyme type. *Food Chem.* 102: 1317 – 1327.
- Kristinsson, H.G., and Rasco, B.A. 2000a. Fish protein hydrolysates: production, biochemical, and functional properties. *Crit Rev Food Sci Nutr.* 40: 43-81.
- Kristinsson, H.G. and Rasco, B.A. 2000b. Biochemical and functional properties of atlantic salmon (*Salmon salar*) muscle proteins hydrolyzed with various alkaline proteases. *J Agric Food Chem.* 48: 657-666.
- Kristinsson, H.G. and Rasco, B.A. 2002. Fish protein hydrolysates and their potential use in the food industry. In *Recent Advances in Marine Biotechnology*. Vol 7. (Fingerman, M. and Nagabhushanam, R., eds.). p. 157 – 181. Science Publishers, Inc. Enfield, NH.
- Kristinsson, H.G. 2007. Aquatic Food Protein Hydrolysates. In *Maximising the Value of Marine By-products*. (Shahidi, F., ed). p. 229 – 248. Woodhead Publishing Limited. Cambridge.
- Lawal, O.S. 2004. Functionality of African locust bean (*Parkia biglobossa*) protein isolate: Effects of pH, ionic strength and various protein concentrations. *Food Chem.* 86: 345 – 355.
- López-Expósito, I., Quirós, A., Amigo, L. and Recio, I. 2007. Casein hydrolysates as a source of antimicrobial, antioxidant and antihypertensive peptides. *Dairy Sci Technol.* 87: 241 – 249.
- Lu, C.C. 2005. A new family of myopsid squid from Australasian waters (Cephalopoda: Teuthida). In: Chotiyaputta, C., Hatfield, E.M.C., and Lu, C.C., eds, p 71-82, *Cephalopod biology, recruitment and culture*. International Cephalopod Symposium and Workshop, 17-21 Feb 2003. Research Bulletin, Phuket Marine Biological Center, No. 66, Published by the Center Phuket, Thailand, July 2005, 365 pp.
- Mason, T.J., and Peters, D. 2002. *Practical sonochemistry: Power ultrasound uses and applications*. 2nd ed. Woodhead Publishing. Cambridge, UK.

- Mendis, E., Rajapakse, N., and Kim, S.K. 2005. Antioxidant properties of a radical scavenging peptide purified from enzymatically prepared fish skin gelatin hydrolysate. *J Agric Food Chem.* 53: 581 – 587.
- Morr, C. V. 1985. Composition, physicochemical and functional properties of reference whey protein concentrates. *J Food Sci.* 50: 1046–1411.
- Mutilangi, W.A.M., Panyam, D. and Kilara, A. 1996. Functional properties of hydrolysates from proteolysis of heat-denatured whey protein isolate. *J Food Sci.* 61: 270 – 303.
- Nalinanon, S., Benjakul, S., Kishimura, H. and Shahidi, F. 2011. Functionalities and antioxidant properties of protein hydrolysates from the muscle of ornate threadfin bream treated with pepsin from skipjack tuna. *Food Chem.* 124: 1354 – 1362.
- Nielsen, P.M. 1997. Functionality of protein hydrolysates. *In Food proteins and their applications* Damodaran, S., and Paraf, A. (Eds.). pp 443 – 472. Marcel Decker. New York.
- Panyam, D. and Kilara, A. 1996. Enhancing the functionality of food proteins by enzymatic modification. *Trends Food Sci Technol.* 7: 120 – 125.
- Phanturat, P., Benjakul, S., Visessanguan, W. and Roytrakul, S. 2010. Use of pyloric caeca extract from bigeye snapper (*Priacanthus macracanthus*) for the production of gelatin hydrolysate with antioxidative activity. *LWT-Food Sci Technol.* 43: 86 – 97.
- Qian, Z.L., Jung, W.K., and Kim, S.K. 2008. Free radical scavenging activity of a novel antioxidative peptide purified from hydrolysate of bullfrog skin, *Rana catesbeiana* Shaw. *Bioresour Technol.* 99: 1690 – 1698.
- Rahman, K. 2007. Studies on free radicals, antioxidants, and co-factors. *Clin Interv Aging.* 2: 219–236.
- Rajapakse, N., Mendis, E., Byun, H.G., and Kim, S.K. 2005. Purification and in vitro antioxidative effects of giant squid muscle peptides on free radical-mediated oxidative systems. *J Nutr Biochem.* 16: 562-569.

- Ryan, J. T., Ross, R. P., Bolton, D., Fitzgerald, G. F., and Stanton, C. 2011. Bioactive peptides from muscle sources: Meat and fish. *Nutrients*. 3: 765–791.
- Shahidi, F., 2006. Maximising the Value of Marine by-Products. CRC Press Woodhead Publishing. Cambridge, UK.
- Shavandi, A., Hu, Z., Teh, S., Zhao, J., Carne, A., Bekhit, A., and Bekhit, A.E.A. 2017. Antioxidant and functional properties of protein hydrolysates obtained from squid pen chitosan extraction effluent. *Food Chem.* 227: 194-201.
- Šližytė, R., Dauksas, E., Falch, E., Storro, I., and Rustad, T. 2005. Yield and composition of different fractions obtained after enzymatic hydrolysis of cod (*Gadus morhua*) by-products. *Process Biochem.* 40: 1415 – 1424.
- Spellman, D., McEvoy, E., O’Cuinn, G., and Fitzgerald, R.J. 2003. Proteinase and exopeptidase hydrolysis of whey protein: Comparison of the TNBS, OPA and pH stat methods for quantification of degree of hydrolysis. *Int Dairy J.* 13: 447 – 453.
- Sumaya-Martínez, T., Castillo-Morales, A., Favela-Torres, E., Huerta-Ochoa, S. and Prado-Barragán, L.A. 2005. Fish protein hydrolysates from gold carp (*Carassius auratus*): I. A study of hydrolysis parameters using response surface methodology. *J Sci Food Agric.* 85: 98 – 104.
- Thiansilakul, Y., Benjakul, S., and Shahidi, F. 2007. Compositions, functional properties and antioxidative activity of protein hydrolysates prepared from round scad (*Decapterus maruadsi*). *Food Chem.* 103: 1385-1394.
- Vecchione, M., Shea, E., Bussarawit, S., Anderson, F., Alexeyev, D., Lu, C.C., Okutani, T., Roeleveld, M., Chotiyaputta, C., Roper, C., Jorgensen, E., and Sukramongkol, N. 2005. Systematics of Indo-West Pacific Loliginids. *Phuket Marine Biological Center Research Bulletin.* 66: 23 – 26.
- Vieira, G.H.F., Martin, A.M., Saker-Sampaiao, S., Omar, S. and Gonzalves, R.C.F. 1995. Studies on the enzymatic hydrolysis of Brazilian lobster (*Panulirus spp*) processing wastes. *J Food Sci.* 69: 61 – 65.
- Wang, H., Gao, X.D., Zhou, G.C., Cai, L. and Yao, W.B. 2008. *In vitro* and *in vivo* antioxidant activity of aqueous extract from *Choerospondias axillaris* fruit. *Food Chem.* 106: 888 – 895.

- Wang, J., Zhao, M., Yang, X., and Jiang, Y. 2006. Improvement on functional properties of wheat gluten by enzymatic hydrolysis and ultrafiltration. *J Cereal Sci.* 44: 93 – 100.
- Wang, L., Agyare, K. and Damodaran, S. 2009. Optimisation of hydrolysis conditions and fractionation of peptide cryoprotectants from gelatin hydrolysate. *Food Chem.* 115: 620 – 630.
- Webster, J. D., Ledward, D. A. and Lawrie, R. A. 1982. Protein hydrolysates from meat industry by-products. *Meat Sci.* 7: 147-157.
- Wu, H.C., Chen, H.M., and Shiau, C.Y. 2003. Free amino acids and peptides as related to antioxidant properties in protein hydrolysates of mackerel (*Scomber austriasicus*). *Food Res Int.* 36: 949 – 957.
- You, L., Zhao, M., Regenstein, J.M., and Ren, J. 2010. Changes in the antioxidant activity of loach (*Misgurnus anguillicaudatus*) protein hydrolysates during a simulated gastrointestinal digestion. *Food Chem.* 120: 810 – 816.
- Zayas, J.F. 1997. Foaming properties of proteins. In *Functionality of Proteins in Food*. p. 260 – 309. Springer.
- Zhang, Y., Zhang, Y., Liu, X., Huang, L., Chen, Z., and Cheng, J. 2017. Influence of hydrolysis behaviour and microfluidisation on the functionality and structural properties of collagen hydrolysates. *Food Chem.* 227: 211-218.
- Zhuang, Y., Sun, L., Zhao, X., Wang, J., Hou, H. and Li, B. 2009. Antioxidant and melanogenesis-inhibitory activities of collagen peptide from jellyfish (*Rhopilema esculentum*). *J Sci Food Agric.* 89: 1722 – 1727.
- Zlatanov, S., Laskaridis, K., Feist, C., and Sagredos, A. 2006. Proximate composition, fatty acid analysis and protein digestibility-corrected amino acid score of three Mediterranean cephalopods. *Mol Nutr Food Res.* 50: 967-970.