

References

- Ajandouz, E. H. and Puigserver, A. 1999. Nonenzymatic browning reaction of essential amino acids: Effect of pH on caramelization and Maillard reaction kinetics. *J. Agric. Food Chem.* 47: 1786-1793.
- Ajandouz, E. H., Tchiakpe, L. S., Ore, F. D., Benajiba, A. and Puigserver, A. 2001. Effects of pH on caramelization and Maillard reaction kinetics in fructose-lysine model systems. *J. Food Sci.* 66: 926-931.
- Akoh, C. C. and Min, D. B. 1998. *Food lipids: Chemistry, Nutrition and Biotechnology*. Marcel Dekker. USA.
- Alaiz, M., Hidalgo, F. J. and Zamora, R. 1999. Effect of pH and temperature on comparative antioxidant activity of nonenzymatically browned proteins produced by reaction with oxidized lipids and carbohydrates. *J. Agric. Food Chem.* 47: 748-752.
- Alaiz, M., Hidalgo, F. J. and Zamora, R. 1997. Comparative antioxidant activity of Maillard and oxidized lipid-damaged bovine serum albumin. *J. Agric. Food Chem.* 45: 3250-3254.
- Alaiz, M., Zamora, R. and Hidalgo, F. J. 1995. Antioxidative activity of (E)-2-octenal amino acid reaction products. *J. Agric. Food Chem.* 43: 795-800.
- Alfawaz, M., Smith, J. S. and Jeon, I. J. 1994. Maillard reaction products as antioxidants in precooked ground beef. *Food Chem.* 51: 311-318.
- Alters, S. 1996. *Biology understanding life*. Von Hoffmann Press Inc. USA.
- Ames, J. M. 1998. Applications of the Maillard reaction in food industry. *Food Chem.* 62: 431-439.

- Anese, M., Nicoli, M. C., Massini, R. and Lerici, C. 1999a. Effect of drying processing on the Maillard reaction in pasta. *Food Res. Inter.* 32: 193-199.
- Anese, M., Manzocco, L., Nicoli, M. C. and Lerici, C. 1999b. Antioxidant properties of tomato juice as affected by heating. *J. Sci. Food Agric.* 79: 750-754.
- Antony, S. M., Han, I. Y., Rieck, J. R. and Dawson, P. L. 2000. Antioxidative effect of Maillard reaction products formed from honey at different reaction times. *J. Agric. Food Chem.* 48: 3985-3989.
- Antony, S. M., Han, I. Y., Rieck, J. R. and Dawson, P. L. 2002. Antioxidative effect of Maillard reaction products added to turkey meat during heating by addition of honey. *J. Food Sci.* 67: 1719-1724.
- Apriyantono, A. and Ames, J. M. 1993. Xylose-lysine model systems: The effect of pH on the volatile reaction products. *J. Sci. Food Agric.* 61: 477-484.
- Aruoma, O. I. 1994. Deoxyribose assay for detecting hydroxyl radicals. *Meth. Enzymol.* 233: 57-66.
- Asghar, A., Gray, J. I., Buckley, D. J., Pearson, A. M. and Booren, A. M. 1988. Perspectives on warmed-over flavor. *Food Technol.* 42(6): 102-108.
- Ashoor, S. H. and Zent, J. B. 1984. Maillard browning of common amino acids and sugars. *J. Food Sci.* 49: 1206-1207.
- Audesirk, T. Audesirk, G. and Byers, B. E. 2002. Biology life on earth. 6st ed. Prentice-Hall, Inc. New Jersey.
- Bailey, M. E., Shi-Lee, S. Y., Dupuy, H. P., St. Angelo, A. L. and Vercellotti, J. R. 1987. Inhibition of warmed-over flavor by Maillard reaction products. In *Warmed-over flavor of meat* (St. Agelo, A. J. and Bailey, M. E. eds.). p. 237. Academic Press. Orlando. FL.

- Baisier, W. M. and Labuza, T. P. 1992. Maillard browning kinetics in liquid model system. *J. Agric. Food Chem.* 4: 707-713.
- Bates, L., Ames, J. M., Mac Dougall, D. B. and Taylor, P. C. 1998. Laboratory reaction cell to model Maillard colour development in a starch-glucose-lysine system. *J. Food Sci.* 6: 991-996.
- Baxter, J. H. 1995. Free amino acid stability in reducing sugar systems. *J. Food Sci.* 60: 405-407.
- Beak, H. H. and Cadwallader, K. R. 1995. Enzymatic hydrolysis of clayfish processing by-products. *J. Food Sci.* 60: 929-935.
- Bedinghaus, A. J. and Ockerman, H. W. 1995. Antioxidative Maillard reaction products from reducing sugars and free amino acids in cooked ground pork patties. *J. Food Sci.* 60: 992-995.
- Bell, L. N. 1995. Kinetics of nonenzymatic browning in amorphous solid systems: Distinguishing the effects of water activity and the glass transition. *Food Res. Int.* 28: 591-597.
- Bell, L. N. 1997. Maillard reaction as influence by buffer type and concentration. *Food Chem.* 59: 143-147.
- Bell, L. N., White, K. L. and Chen, Y. H. 1998a. Maillard reaction in glassy low-moisture solids as affected by buffer type and concentration. *J. Food Sci.* 63: 785-788.
- Bell, L. N., Touma, D. E., White, K. L. and Chen, Y. H. 1998b. Glycine loss and Maillard browning as related to the glass transition in the model food system. *J. Food Sci.* 63: 625-628.

- Benjakul, S., and Morrissey, M. T. 1997. Protein hydrolysates from Pacific whiting solid waste. *J. Agric. Food Chem.* 45: 3423-3430.
- Benjakul, S., Visessanguan, W. and Srivilai, C. 2001a. Gel properties of bigeye snapper (*Priacanthus tayenus*) surimi as affected by setting and porcine plasma proteins. *J. Food Qual.* 24: 453-471.
- Benjakul, S., Visessanguan, W. and Srivilai, C. 2001b. Porcine plasma protein as proteinase inhibitor in bigeye snapper (*Priacanthus tayenus*) muscle and surimi. *J. Sci. Food Agric.* 81: 1039-1046.
- Benjakul, S., Visessanguan, W., Phongkanpai, V. and Tanaka, M. 2005. Antioxidative activity of caramelisation products and their preventive effect on lipid oxidation in fish mince. *Food Chem.* 90: 231-239.
- Benjakul, S., Lerttikkul, W. and Bauer, F. 2004. Antioxidant activity of Maillard reaction products from a porcine plasma protein-sugar model system. *Food Chem.* In press.
- Benzing-Purdie, L. M., Ripmeester, J. A. and Ratcliffe, C. I. 1985. Effect of temperature on Maillard reaction products. *J. Agric. Food Chem.* 33: 31-33.
- Bishov, S. J. and Henick, A. S. 1975. Antioxidant effect of protein hydrolysate in freeze-dried model system-synergistic action with a series of phenolic antioxidants. *J. Food Sci.* 40: 345-348.
- Bligh, E. G. and Dyer, W. J. 1959. A rapid method of total lipid extraction and purification. *Can. J. Biochem. Physiol.* 37: 911-917.
- Borrelli, R. C., Mennella, C., Barba, F., Russo, M., Russo, G. L., Krome, K., Erbersdobler, H. F., Faist, V. and Fogliano, V. 2003. Characterization of

- colored compounds obtained by enzymatic extraction of bakery products. Food Chem. Toxicol. 41: 1367-1374.
- Boselli, E., Cabini, M. F., Rodriguez-Estrada, M. T., Toschi, T. G., Faniel, M. and Lercker, G. 2005. Photoxidation of cholesterol and lipid of turkey meat during storage under chemical retail conditions. Food Chem. 91: 705-713.
- Brands, C. M. J., Alink, G. M., Van Boekel, M. J. S. and Jongen, W. M. F. 2000. Mutagenicity of heated sugar-casein systems: Effect of the Maillard reaction. J. Agric. Food Chem. 48: 2271-2275.
- Brands, C. M. J. and Van Boekel, M. A. J. S. 2002. Kinetics modelling of reactions in heated monosaccharide-casein system. J. Agric. Food Chem. 50: 6725-6739.
- Brand-Williams, W., Cuvelier, M. E. and Barset, C. 1995. Use of a free radical method to evaluate antioxidant activity. Lebensm-Wiss u-Technol. 28: 25-30.
- Bressa, F., Tesson, N., Rosa, M. D., Sensidoni, A. and Tubaro, F. 1996. Antioxidant effect of Maillard reaction products: Application to a butter cookie of a competition kinetics analysis. J. Agric. Food Chem. 44: 692-695.
- Brum, G., Mc. Kane, L. and Karp, G. 1994. Biology: Exploring life. 2nd ed. John Wiley and Sons, Inc. USA.
- Brun-Merimee, S., Billaud, C., Louarme, L. and Nicolas, J. 2004. Effect of glutathione and Maillard reaction products prepared from glucose or fructose with glutathione on polyphenoloxidase from apple. II. Kinetic study and mechanism of inhibition. Food Chem. 84: 235-241.
- Buege, J. A. and Aust, S. D. 1978. Microsomal lipid peroxidation. Method enzymol. 52: 302-310.

- Buera, M. D. P., Chirife, J., Resnik, S. L. and Wetzler, G. 1987. Nonenzymatic browning in liquid model systems of high water activity: Kinetics of color changes due to Maillard's reaction between different single sugars and glycine and comparison with caramelization browning. *J. Food Sci.* 52: 1063-1067.
- Buera, M. P. and Karel, M. 1995. Effect of physical changes on the rates of nonenzymatic browning and related reactions. *Food Chem.* 28: 359-365.
- Bunn, H. F., and Higgins, P. J. 1981. Reaction of monosaccharides with proteins: possible evolutionary significance. *Science*. 213: 222-224.
- Burton, H. S. and McWeeney, D. J. 1963. Non-enzymic browning reactions. Consideration of sugar stability. *Nature (London)*. 197: 266-270.
- Caldironi, H. A. and Ockerman, H. W. 1982. Incorporation of blood plasma protein extracts in sausages. *J. Food Sci.* 47: 405-408.
- Calligaris, S., Manzocco, L., Anese, M. and Nicoli, M. C. 2004. Effect of heat-treatment on the antioxidant and prooxidant activity of milk. *Int. Dairy J.* 14: 421-427.
- Chaijan, M., Benjakul, S., Visessanguan, W. and Faustman, C. 2004. Changes of pigments and color in sardine (*Sardinella gibbosa*) and mackerel (*Rastrelliger kanagurta*) muscle during iced storage. *Food Chem.* In press.
- Chan, E., Ng, M., Peng, H. W. and Chua, L. 2001. Beef plasma in processed meats. *Asia Pacific Food Industry*. 13: 40-44.
- Chaplin, M. F. 1994. Monosaccharides. In *Carbohydrate Analysis A Practical Approach* (Chaplin N. F. and Kennedy J. F., eds.). p. 110. Oxford University Press. New York.

- Chio, K. S. and Tappel, A. L. 1961. Synthesis and characterization of the fluorescent products derived from malonaldehyde and amino acids. *Biochemistry*. 8: 2821-2827.
- Chiu, W. K., Tanaka, M., Nagashima, Y. and Tagushi, T. 1991. Prevention of sardine lipid oxidation by antioxidative Maillard reaction products prepared from fructose-tryptophan. *Nippon Suisan Gakkaishi*. 57: 1773-1781.
- Cofrades, S., Guerra, M. A., Carballo, J., Martin, F. F. and Colmenero, F. J. 2000. Plasma protein and soy fiber content effect on bologna sausage properties as influenced by fat level. *J. Food Sci.* 65: 281-286.
- Davidek, T., Clety, N., Aubin, S. and Blank, I. 2002. Degradation of the amadori compound N-(1-deoxy-D-fructos-yl) glycine in aqueous model systems. *J. Agric. Food Chem.* 50: 5472-5479.
- Decker, A. E. 1998. Antioxidant mechanism. In *Food lipid: Chemistry, Nutrition, and Biotechnology* (Akoh, C. C and Min, D. B., eds.). p. 397-448. Marcel Decker, Inc. New York.
- Decker, E. A. and Welch, B. 1990. The role of ferritin as a lipid oxidation catalyst in muscle food. *J. Agric. Food Chem.* 38: 674-677.
- Decker, E. A. and Xu, Z. 1998. Minimizing rancidity in muscle foods. *Food Technol.* 52(10): 54-59.
- Del Castillo, M. D., Ames, J. M. and Gordon, H. M. 2002. Effect of roasting on the antioxidant activity of coffee brews. *J. Agric. Food Chem.* 50: 3698-3703.
- Dill, C. M. 1976. Plasma in edible meat products. *Natl Provisioner* 1976: 55-61.
- Donnelly, E. B. and Delaney, R. A. M. 1977. The fractionation of porcine plasma by potential food industry techniques. *J. Food Technol.* 12: 493-503.

- Duh, P. D. 1998. Antioxidant activity of burdock (*Arctium lappa linne'*): its scavenging effect on free radical and active oxygen. J. Am. Oil Chem. Soc. 75: 455-461.
- Dziezak, J. D. 1986. Antioxidants: The ultimate answer to oxidation. Food Technol. 40(9): 94-102.
- Eichner, K. and Karel, M. 1972. The influence of water content and water activity on the sugar-amino browning in model systems under various conditions. J. Agric. Food Chem. 20: 218-223.
- Eichner, K. 1981. Antioxidant effect of Maillard reaction intermediates. Prog. Food Nutr. Sci. 5: 441-451.
- Einarsson, H., Eklund, T. and Nes, I. F. 1988. Inhibitory mechanism of Maillard reaction products. Microbiol. 53: 27-36.
- Eiserich, J. P. and Shibamoto, T. 1994. Antioxidative activity of volatile heterocyclic compounds. J. Agric. Food Chem. 42: 1060-1063.
- Ellis, G. P. 1959. The Maillard reaction. Adv. Carbohydr. Chem. 14: 63.
- Eskin, N. A. M. 1990. Biochemistry of Food. 2nd ed. Department of Foods and Nutrition. Academic Press. Inc. USA.
- Fallico, B. and Ames, J. M. 1999. Effect of hexanol and iron on color development in a glucose/phenylalanine model system. J. Agric. Food Chem. 47: 2255-2261.
- FAO. 1996. Edible by-products of slaughter animals. FAO Animal Production and Health Paper. 123: 1-32.

- Farag, R. S., Ghali, Y. and Rashed, M. M. 1982. Linoleic acid oxidation catalyzed by amadori compounds in aqueous media. *Can. Inst. Food Sci. Technol. J.* 15: 174-179.
- Frankel, E. N. 1998. Lipid oxidation. Dundee. The Oily Press. UK.
- Frankel, E. N. and Huang, S. W. 1996. Evaluation of antioxidant activity of rosemary extracts, carnosol and carnosic acid in bulk vegetable oils and fish oils and their emulsions. *J. Sci. Food Agric.* 72: 201-208.
- Frankel, E. N., Huang, S. W. and Aeschbach, R. 1997. Antioxidant activity of green tea in different lipid systems. *J. Am. Oil Chem. Soc.* 74: 1309-1315.
- Friedman, M. 1996. Food browning and its prevention: an overview. *J. Agric. Food Chem.* 44: 631-653.
- Fukumoto, L. R. and Mazza, G. 2000. Assessing antioxidant and prooxidant activities of phenolic compounds. *J. Agric. Food Chem.* 48: 3597-3604.
- Giese, J. 1996. Antioxidants : Tools for preventing lipid oxidation. *Food Technol.* 50 (11): 73-80.
- Giron-Calle, J., Alaiz, M., Millan, F., Ruiz-Gutierrez, V. and Vioque, E. 2002. Bound malondialdehyde in foods: Bioavailability of the N-2-propenals of lysine. *J. Agric. Food Chem.* 50: 6194-6198.
- Gomyo, T. and Horikoshi, M. 1976. On the interaction of melanoidin with metallic ions. *Agric. Biol. Chem.* 40: 33-40.
- Gordon, A. 1971. Animal blood as a source of protein in food products. *Food Trade Rev.* 4: 29-30.

- Gordon, M. H. 2001. The development of oxidative rancidity in foods. In Antioxidants in food: practical applications. (Pokorny, J., Yanishlieva, N. and Gordon, M. H., eds.). p.7-21. Woodhead Publishing. USA.
- Guerard, F., Dufosse, L., Broise, D. D. L. and Binet, A. 2001. Enzymatic hydrolysis of proteins from yellowfin tuna (*Thunnus abacares*) wastes using Alcalase. J. Molecular Catalysis B: Enzymatic 11: 051-1059.
- Guerard, F., and Sumaya-Martinez, M. T. 2003. Antioxidant effect of protein hydrolysates in the reaction with glucose. J. Am. Oil Chem. Soc. 80: 467-470.
- Halliwell, B., Gutteridge, J. M. C. and Aruoma, O. 1987. The deoxyribose method: A simple “test-tube” assay for determination of rate constants for reactions of hydroxyl radicals. Anal. Biochem. 165: 215-219.
- Harward, L. D. and Angyal, S. J. 1977. A symmetry rule for the circular dichroism of reducing sugars, and the proportion of carbonyl forms in aqueous solutions. Carbohydr. Res. 53: 13-20.
- Hayese, F., Hirashima, S., Okamoto, G. and Kato, H. 1989. Scavenging of active oxygens by melanoidins. Agric. Biol. Chem. 53: 3383-3385.
- Hidalgo, F. J. and Zamora, R. 1993. Nonenzymatic browning and fluorescence development in a (E)-4,5-epoxy-(E)-2-heptanol/lysine model system. J. Food Sci. 58: 667-670.
- Hindarso, H., Ismadji, S., Wicaksana, F., Mudjijati, S. and Indraswati, N. 2001. Adsorption of benzene and toluene from aqueous solution into granular activated carbon. J. Chem. Eng. Data. 46: 788-791.

- Hodge, J.E. 1953. Chemistry of browning reactions in model systems. *J. Agric. Food Chem.* 1: 928-943.
- Hofmann, T. 1998. Characterization of the chemical structure of novel colored Maillard reaction products from 2-furan carboxaldehyde and amino acid. *J. Agric. Food Chem.* 463: 932-940.
- Hofmann, T., Bor, W. and Stettmaier, K. 1999a. Radical-assisted melanoidin formation during thermal processing of foods as well as under physiological conditions. *J. Agric. Food Chem.* 47: 391-396.
- Hofmann, T., Bor, W. and Stettmaier, K. 1999b. Studies on radical intermediated in the earlier stage of the nonenzymatic browning reaction of carbohydrate and amino acids. *J. Agric. Food Chem.* 47: 379-390.
- Hofmann, T., Bors, W. and Stettmaier, K. 2002. CROSSPY-A radical intermediate of melanoidin formation in roasted coffee. In *Free Radicals in Food-Chemistry, Nutrition and Health Effects* (Morello, M.J., Sahidi, F. and Ho, C.T., eds.). p. 328-344. ACS Symposium Series 807: American Chemical Society. Washington D.C.
- Hofmann, T. 2001. Structure, color and formation of low and high molecular weight products formed by food-related Maillard type reactions. In *Chemistry and Physiology of Food Colors* (Ames, J. and Hofmann, T., eds.). p. 134-151. ACS Symposium Series 775: American Chemical Society. Washington DC.
- Homma, S., Terasawa, N., Kubo, T., Yoneyama-Ishii, N., Aida, K. and Fujimaki, M. 1997. Changes in chemical properties of melanoidin by oxidation and reduction. *Biosci. Biotechnol. Biochem.* 61: 533-535.

- Howell, N. K. and Lawrie, R. A. 1983. Functional aspects of blood plasma proteins: I. Separation and characterization. *J. Food Technol.* 18: 747-762.
- Hurrell, R. F. and Carpenter, K. J. 1974. Mechanism of heat damage in proteins. IV. The reactive lysine content of heat-damaged material as measured in different ways. *Br. J. Nutr.* 32: 589.
- Ide, N., Lau, B. H. S., Matsuura, H. and Itakura, Y. 1999. Antioxidant effects of fructosyl arginine, a Maillard reaction product in aged garlic extract. *J. Nutr. Biochem.* 10: 372-376.
- IUPAC. 1979. Standard methods for the analysis of oils, fat and derivatives. 6th ed. Part 1. Pergamon Press. Paris.
- Jadhav, S. J., Nimbalker, S. S., Kulkami, A. D. and Madhavi, D. L. 1996. Lipid oxidation in biological and food systems. In *Food antioxidants*. (Madhavi, D. L., Despande, S. S. and Sulunkhe, D. K., eds.). p. 5-64. Marcel Dekker. New York.
- Janero, D. R. 1990. Malonaldehyde and thiobarbituric acid reactivity as diagnostics of lipid peroxidation and peroxidative tissue injury. *Free Rad. Biol. Med.* 9: 515-540.
- Jao, C. L. and Ko, W. C. 2002. 1,1-Diphenyl-2-picrylhydrazyl (DPPH) radical scavenging by protein hydrolysates from tuna cooking juice. *Fish. Sci.* 68: 430-435.
- Jardine, D., Antolovich, M., Prenzler, P. D. and Robards, K. 2002. Liquid chromatography-mass spectrometry (LC-MS) investigation of the thiobarbituric acid reactive substances (TBARS) reaction. *J. Agric. Food Chem.* 50: 1720-1724.

- Je, J. Y., Park, P. J. and Kim, S. K. 2005. Antioxidant activity of peptide isolated from Alaska pollack (*Theragra chalocogramma*) from protein hydrolysate. Food Res. Inter. In press.
- Jiang, S. T., Lee, B. L., Tsao, C. Y. and Lee, J. J. 1997. Mackerel chathepsins B and L effects on thermal degradation of surimi. J. Food Sci. 62: 310-315.
- Jing, H. and Kitts, D. D. 2002. Chemical and biochemical properties of casein-sugar Maillard reaction products. Food Chem. Toxic. 40: 1007-1015.
- Jing, H. and Kitts, D. D. 2004. Antioxidant activity of sugar-lysine Maillard reaction products in cell free and cell culture systems. Arch. Biochem. Biophys. 429: 154-163.
- Johnson, P. E., Lykken, G., Mahalko, J., Malne, D., Inman, L., Sandstead, H. H., Garcia, W. J. and Inglett, G. E. 1983. The effect of browned and unbrowned corn products on absorption of zinc, iron and copper in humans, *In* The Maillard reaction in foods and nutrition (Waller, G. R. and Feather, M. S., eds.). p. 349-360. American Chemical Society. Washington. D.C.
- Johnson, L. A., Havel, E. F. and Hoseney, R. C. 1979. Blood plasma as a replacement for egg in cake. Cereal Chem. 56: 339-342.
- Kajimoto, G. and Yoshida, H. 1975. Relationship between the reaction of melanoidin and metal in oil system and effect of melanoidin-metal complex on rancidification of oil. Yukagaku. 24: 297-300.
- Kajimoto, G., Yoshida, H. and Takamori, Y. 1975. Reactions between the browning reaction products from glycine and reducing sugars and metals. Yukagaku. 24: 15-21.

- Karmas, R., Buera, M. P. and Karel, M. 1992. Effect of glass transition on rates of nonenzymatic browning in food systems. *J. Agric. Food Chem.* 40: 873-879.
- Karmas, R. and Karel, M. 1994. The effect of glass transition on Maillard browning in food models. In *Maillard reactions in Chemistry, Food and Health.* (Labuza, T. P., Reineccius, G. A., Monnier, V. M., O'Brien, J. and Baynes, J. W., eds.). p.182-187. The Royal Society of Chemistry. Cambridge. England.
- Kato, K., Watanabe, K. and Sato, Y. 1981. Effect of some metals on the Maillard reaction of ovalbumin. *J. Agric. Food Chem.* 29: 540-543.
- Kato, H. 1992. Maillard reaction in biological system and disease. *Farumashia,* 28: 466-470.
- Kato, H. and Hayase, F. 1989. Chemical analysis of the compounds produced by amino-carbonyl reaction in food and biological systems. *Yukagaku.* 38: 865-875.
- Kawashima, K., Ioth, H., Miyoshi, M. and Chibata, I. 1977. Antioxidant activity of browning products prepared from low molecular carbonyl compounds and amino acids. *J. Agric. Food Chem.* 90: 821-827.
- Kim, H. J., Choi, S. J., Shin, W. S. and Moon, T. W. 2003. Emulsifying properties of bovine serum albumin-galactomannan conjugates. *J. Agric. Food Chem.* 51: 1049-1056.
- Kislanger, T., Humeny, A., Peich, C. C., Zhang, X., Niwa, T., Pischetsrieder, M. and Becker, C. M. 2003. Relative quantification of N-(carboxymethyl)lysine, imidazolone A, and the amadori product in glycated lysozyme by MALDI-TOF mass spectrometry. *J. Agric. Food Chem.* 51: 51-57.

- Kristinsson, H. G. and Rasco, B. A. 2000. Fish protein hydrolysates: Production, Biochemical, and Functional properties. Critic. Rev. Food Sci. Nutr. 40: 43-81.
- Kwak, E. J. and Lim, S. I. 2004. The effect of sugar, amino acid, metal ion, and NaCl on model Maillard reaction under pH control. Amino Acids. 27: 85-90.
- Labuza, T. P. and Baisier, W. M. 1992. Kinetics of nonenzymatic browning. In Physical chemistry of foods (Schwartzberg, H. G. and Hartel R. W., eds.). p. 595-649. Marcel Dekker. New York.
- Lee, C. C., Johnson, L. A., Love, J. A. and Johnson, S. 1991. Effect of processing and level on performance of bovine plasma as an egg white substitute in cakes. Cereal Chem. 68: 100-104.
- Lee, J. J., Tzeng, S. S. and Jiang S. T. 2000. Purification and characterization of low molecular weight kininogen from pig plasma. J. Food Sci. 65: 81-86.
- Lee, H. S. 1992. Antioxidative activity of browning reaction products. Isolated from storage-aged orange juice. J. Agric. Food Chem. 40: 550-552.
- Lee, B. J. and Hendricks, D. G. 1997. Antioxidant effects of L-carnisine on liposomes and beef homogenates. J. Food Sci. 62: 931-934.
- Lenzell, J. L. 1974. Mammary blood flow and method of identifying and measuring precursors of milk. In Lactation: a comprehensive treatise. Vol. I. (Larson, B. L. and Smith, V. R., eds.). p. 143-225. Academic Press, New York.
- Leong, L. P. and Wedzicha, B. L. 2000. A critical appraisal of the kinetic model for the Maillard browning of glucose with glycine. Food Chem. 68: 21-28.
- Lerici, C. R., Barbanti, D., Manzano, M. and Cherubin, S. 1990. Early indicators of chemical changes in foods due to enzymic or non enzymic browning

- reactions. 1: study on heat treated model systems. Lebensmittel-Wissenschaft und Technologie. 23: 289-294.
- Lindenmeier, M., Faist, V. and Hofmann, T. 2002. Structural and functional characterization of pronyl-lysine, a novel protein modification in bread crust melanoidins showing *in vitro* antioxidative and phase I/II enzyme modulating activity. J. Agric. Food Chem. 50: 6997-7006.
- Lingnert, H. 1990. Development of the Maillard reaction during food processing. In The Maillard reaction in food processing, Human Nutrition and Physiology. (Finot, P. A., Aeschbacher, H. U., Hurrel, R. F. and Liardon, R., eds.). p. 171-185. Birkhauser Verlag. Basel.
- Lingnert, H. and Eriksson, C. E. 1981. Antioxidative Maillard reaction products. I. Products from sugars and free amino acids. Prog. Food Nutr. Sci. 5: 433-466.
- Lingnert, H. and Eriksson, C. E. 1980a. Antioxidative Maillard reaction products. II. Products from sugars and peptides or protein hydrolysates. J. Food Process. Preserv. 4: 173-181.
- Lingnert, H. and Eriksson, C. E. 1980b. Antioxidative effect of Maillard reaction products. Prog. Food Nutr. Sci. 5: 453-466.
- Lingnert, H., and Lundgren, B. 1980. Antioxidative Maillard reaction products. IV. Application in sausage. J. Food Proc. Preserv. 4: 235-247.
- Lingnert, N. and Waller, G.R. 1983. Stability of antioxidant formed from histidine and glucose by the Maillard reaction. J. Agric. Food Chem. 31: 27-30.
- Logani, M. K. and Davies, R. E. 1980. Lipid oxidation: Biochemical effects and antioxidants. Lipids. 15: 485-495.

- Manzocco, L., Nicoli, M.C. and maltini, E. 1999. DSC analysis of Maillard browning and procedural effect. *J. Food Proc. Preserv.* 23: 317-328.
- Markuze, Z. 1963. Effect of traces of metals on the browning of glucose-lysine solutions. *Roczn. Panstw. Zakl. Hig.* 14: 65.
- Martins, S. I. F. S., Jongen, W. M. F. and Van Boekel, M. A. J. S. 2001. A review of Maillard reaction in food and implication to kinetic modeling. *Trends Food Sci. Technol.* 11: 364-374.
- Martins, S. I. F. S., Marcelis, A. T. M. and Van Boekel, M. A. J. S. 2003. Kinetic modelling of the Amadori N-(1-Deoxy-D- fructose-1-yl) glycine degradation pathways. Part I- reaction mechanism. *Carbohydr. Res.* 338: 1651-1663.
- Martins, S. I. F. S. and Van Boekel, M. A. J. S. 2005. A kinetic model for the glucose/glycine Maillard reaction pathway. *Food Chem.* 90: 257-269.
- Mastrocola, D. and Munari, M. 2000. Progress of the Maillard reaction and antioxidant action of Maillard reaction products in preheated model systems during storage. *J. Agric. Food Chem.* 48: 3555-3559.
- Matsudomi, N., Inoue, Y., Nakashima, A. K. and Kobayashi, K. 1995. Emulsion stabilization by Maillard type covalent complex of plasma protein with galactomannan. *J. Food Sci.* 60: 265-268.
- Matthaus, B. 2002. Antioxidant activity of extracts obtained from residues of different oilseeds. *J. Agric. Food Chem.* 50: 3444-3452.
- Mauron, J. 1981. The Maillard reaction in food: A critical review from nutritional standpoint. *Prog. Food Nutr. Sci.* 5: 5-35.
- McGookin, B. J. and Augustin, M. A. 1991. Antioxidant activity of Maillard reaction products from casein-sugar mixtures. *J. Dairy Res.* 58: 313-320.

- Migo, V. P., del Rosario, E. J. and Matsumura, M. 1997. Flocculation of melanoidins induced by inorganic ions. *J. Ferment. Bioeng.* 83: 287-291.
- Miller, R., Olsson, K. and Pernemalm, P. 1984. Formation of aromatic compound from carbohydrates. IX. Reaction of D-glucose and L-lysine in slightly acidic, aqueous solution. *Acta. Chem. Scand. B.* 38: 689-694.
- Morales, F. J. and Jimenez-Perez, S. 2001. Free radical scavenging capacity of Maillard reaction products as related to colour and fluorescence. *Food Chem.* 72: 119-125.
- Morales, F. J., Fernandez-Fraguas, C. and Jimenez-Perez, S. 2005. Iron-binding ability of melanoidins from food and model systems. *Food Chem.* 90: 821-827.
- Morales, F. J., Romero, C. and Jimenez-Perez, S. 1996. Fluorescence associated with Maillard reaction in milk and milk-resembling systems. *Food Chem.* 67: 423-428.
- Morales, F. J and Van Boekel, M. A. J. S. 1997. A study on advanced Maillard reaction in heated casein-sugar solution: Fluorescence accumulation. *Int. Diary J.* 7: 675-683.
- Moreno, F. J., Molina, E., Olano, A. and Lopez-Fandino, R. 2003. High-pressure effects on Maillard reaction between glucose and glycine. *J. Agric. Food Chem..* 51: 394-400.
- Morrissey, M. T., Wu, J. W., Lin, D. and An, H. 1993. Protease inhibitors on torsion measurement and autolysis of Pacific whiting surimi. *J. Food Sci.* 58: 1050-1054.

- Munari, M., Mastrocola, D., Nicoli, M. C. and Lerici, C. R. 1995. Interactions between Maillard reaction products (MRPs) and lipid oxidation in intermediate moisture model systems. *Riv. Ital. Sostanze Grasse.* 72: 351-354.
- Murakami, M., Shigeeda, A., Danjo, K., Yamaguchi, T., Takamura, H. and Matoba, T. 2002. Radical scavenging activity and brightly colored pigments in the early stage of Maillard reaction. *J. Food Sci.* 67: 93-96.
- Myhara, R. M. and Kruker, G. 1998. The performance of decolourized bovine plasma protein as a replacement for egg white in high ratio white cakes. *Food Qual. Perform.* 9: 135-138.
- Nakayama, T., Osawa, T., Mendosa, E. N. T., Laurena, A. C. and Kawakishi, S. 1994. Comparative study of antioxidative assays of plant materials. In *Postharvest biochemistry of plant food-materials in the tropics.* (Uritani, I., Garcia, V. V. and Mendoza, E. M. T., eds.). p. 241-251.: Japan Scienctific Societies Press. Japan.
- Namiki, M. 1990. Antioxidant/antimutagens in food. *Crit. Rev. Food Sci. Nutr.* 29: 273-300.
- Namiki, M. and Hayashi, T. 1982. A new mechanism of the Maillard reaction involving sugar formation and free radical formation. In *Maillard reaction in food and nutrition.* (Waller, G.R. and Feather, M.S., eds.). p. 21-46. American Chemical Society. Washington D.C.
- Narla R. S. and Nao, M. N. A. 1995. Scavenging of free-radicals and inhibition of lipid peroxidation by 3-phenylsydnone. *J. Pharm. Pharmacol.* 4: 623-625.

- Naranjo, G. B., Malec, L. S. and Vigo, M. S. 1998. Reducing sugars effect on available lysine loss of casein by moderate heat treatment. *Food Chem.* 62: 309-313.
- Nicoli, M. C., Anese, M., Parpinel, M. T., Franceschi, S. and Lerici, C. R. 1997. Loss and/or formation of antioxidants during food processing and storage. *Cancer Letters.* 114: 71-74.
- Nicoli, M. C., Anese, M., Parpinel, M. 1999. Influence of processing on the antioxidant properties of fruit and vegetable. *Trends Food Sci. Technol.* 10: 94-100.
- Niki, E. 1987. Antioxidants in relation to lipid peroxidation. *Chem. Phys. Lipids.* 44: 227-253.
- Nursten, H. E. 1986. Maillard browning reactions in dried foods. In *Concentration and drying of foods* (MacCarthy, D., eds.). p. 53-68. Elsevier. UK.
- O'Brien, J. 1995. Heat-induced changes in lactose: isomerization, degradation, Maillard browning. In *heat-induced changes in milk*. (Fox, P. F., ed.). p. 134-170. International Dairy Federation. Brussels.
- O'Brien, J. and Morrissey, P. A. 1997. Metal ion complexation by products of the Maillard reaction. *Food Chem.* 58: 17-27.
- O'Brien, J. and Morrissey, P. A. 1989. Nutritional and toxicological aspects of the Maillard browning reaction in foods. *CRC Crit. Rev. Food Sci. Nutr.* 28: 211-248.
- Obretenov, T., Ivanov, S. and Peeva, D. 1986. Antioxidative activity of Maillard reaction products obtained from hydrolysates. *Der. Food Sci.* 13: 281-290.

- Ockerman H. W. and Hansen C. I. 2000. Animal by-product processing and utilization. (Lancaster, P. A., ed.). p. 375. Technomic Publishing. USA.
- Olano, A. and Martinez, I. 1996. Nonenzymatic browning. *In* Handbook of food analysis (Nollet, L. M. L., ed.). p. 1638-1721. Dekker. New York.
- Osawa, T. 1994. Novel natural antioxidants for utilization in food and biological system. *In* Postharvest biochemical of plant food-material in the tropics. (Uritani, I., Garcia, V. V. and Mendoza, E. M. T., eds.). p. 241-251. Japan Scientific Societies Press. Japan.
- Oyaizu, M. 1986. Antioxidant activity of browning products of glucosamine fractionated by organic solvent and thin-layer chromatography. Nippon Shokuhin Kogyo Gakkaishi. 35: 771-775.
- Park, C. K. and Kim, D. H. 1983. Relationship between fluorescence and antioxidant activity of ethanol extracts of a Maillard browning mixture. J. Am. Oil Chem. Soc. 60: 22-32.
- Petriella, C., Resnik, S. L., Lozano, R. D. and Chirife, J. 1985. Kinetics of deteriorative reactions in model food systems of high water activity: color changes due to non-enzymatic browning. J. Food Sci. 50: 622.
- Pischetsrieder, M. and Severin, T. H. 1996. Advanced Maillard products of disaccharides: analysis and relation to reaction conditions. *In* Chemical markers for processed and stored foods (Lee, T. C. and Kim, H. J., eds.). p. 14-23. ACS Symposium Series 631: American Chemical Society. Washington D.C.

- Pokorny, J. 2001. Natural antioxidant functionality during food processing. In Antioxidants in food: practical applications. (Pokorny, J., Yanishlieva, N. and Gordon, M. H., eds.). p. 331-354. Woodhead Publishing. USA.
- Rajalakshmi, D. and Narasimhan, S. 1996. Food antioxidants : Sources and method of Evaluation. In Food Antioxidants. (Madhavi, D. L., Despande, S. S. and Sulunkhe, D. K., eds.). p. 65-158. Marcel Dekker. New York.
- Ranken, M. D. 1980. Applications of blood protein. In Applied protein chemistry (Grant, R. A., ed.). p. 169-180. Applied Science. London. UK.
- Rena-Ramos, E. A. and Xiong, Y. L. 2003. Whey and soy protein hydrolysates inhibit lipid oxidation in cooked pork patties. Meat Sci. 64: 259-263.
- Rendleman, J. A. 1987. Complexation of calcium by melanoidin and its role in determining bioavailability. J. Food Sci. 52: 1699-1705.
- Renn, R. T. and Sathe, S. K. 1997. Effect of pH, temperature, and reactant molar ratio on L-leucine and D-glucose Maillard browning reaction in an aqueous system. J. Agric. Food Chem. 45: 3782-3787.
- Rival, S. G. S., Boeriu, C. G. and Wickers, H. J. 2001. Casein and casein hydrolysates. 2. Antioxidative properties and relevance to lipoxygenase inhibition. J. Agric. Food Chem. 491: 295-302.
- Rizzi, G. 1997. Chemical structure of colored Maillard reaction products. Food Res. Int. 13: 1-28.
- Rizzi, G. P. 2004. Role of phosphate and carboxylate ions in Maillard browning. J. Agric. Food Chem. 52: 953-957.
- Ruch, R. T., Chung, S. U. and Klaunig, J. E. 1984. Spin trapping of superoxide and hydroxyl radicals. Meth. Enzym. 105: 198-209.

- Saito, M., Ichikawa, N. and Taira, H. 1988. Fractionation and emulsifying properties of plasma proteins. *Agric. Biol. Chem.* 52: 2831-2836.
- Saito, M. and Taira, H. 1987. Heat Denaturization and emulsifying properties of plasma proteins. *Agric. Biol. Chem.* 51: 2787-2792.
- Sathivel, S., Bechtel, P. J., Babbitt, J., Smiley, S., Crapo, C., Repond, K. D. and Prinyawiwatkul, W. 2003. Biochemical and functional properties of herring (*Clupia harengus*) byproduct hydrolysates. *J. Food Sci.* 68: 2196-2200.
- Salas, J. J., Williams, M., Harwood, J. L. and Sanchez. 1999. Lipoxygenase activity in olive (*Olea europaea*) fruit. *J. Am. Oil Chem. Soc.* 76: 1163-1168.
- Serevini, C. and Lerici, C. R. 1995. Interaction between the Maillard reaction and lipid oxidation in model systems during temperature treatment. *Ital. J. Food Sci.* 7: 189-196.
- Shahidi, F. and Wanasundara, P. K. J. P. D. 1992. Phenolic Antioxidants. *Crit. Rev. Food Sci. Nutr.* 32: 67-103.
- Shen, S. C. and Wu, J. S. B. 2004. Maillard browning in ethanolic solution. *J. Food Sci.* 69: 273-279.
- Shibamoto, T. 1983. Heterocyclic compounds in browning and browning/nitrite model systems: Occurrence, formation mechanisms, flavor characteristics and mutagenic activity. In *Instrumental Analysis of Foods* (Charalambous, G. and Inglett, G., eds.). p. 229-278. Academic Press, New York.
- Sikorski, Z. E. 2001. Chemical & functional properties of food proteins. p. 191-213. Technomic Publishing. USA.
- Singh, N. and Rajini, P. S. 2004. Free radical scavenging activity of an aqueous extract of potato peel. *Food Chem.* 85: 611-616.

- Smith, J. S. and Alfawaz, M. 1995. Antioxidant activity of Maillard reaction products in cooked ground beef, sensory and TBA values. *J. Food Sci.* 60: 234-240.
- Spark, A. A. 1969. Role of amino acids in non-enzymatic browning. *J. Sci. Food Agric.* 20: 308-316.
- Spencer, J. P. E., Jenner, A., Aruoma, O.I., Cross, C. E., Wu, R. and Halliwell, B. 1996. Oxidative DNA damage in human respiratory tract epithelial cells. Time course in relation to DNA strand breakage. *Biochem. Biophys. Res. Comm.* 224: 17-22.
- Stahnke, L. H. 1994. Aroma components from dry fermented sausages fermented with *Staphylococcus xylosus*. *Meat Sci.* 38: 39-53.
- Stahnke, L. H. 1995. Dried sausages fermented with *Staphylococcus xylosus* at different temperatures and different ingredient levels-part II volatile components. *Meat Sci.* 41: 193-209.
- Steel, R. G. D. and Torrie, J. H. 1980. *Principles and procedures of statistics; A biometrical approach.* 2nd ed. p. 633. McGraw-Hill. New York.
- Stoeckli, F., Lopez-Ramon, M. V. and Moreno-Castilla, C. 2001. Adsorption of phenolic compounds from aqueous solutions, by activated carbons, described by the Dubinin-Astakhov equation. *Langmuir.* 17: 3301-3306.
- Sun, Y., Hayakawa, S. and Izumori, K. 2004. Modification of ovalbumin with a rare ketohexose through the Maillard reaction: Effect on protein structure and gel properties. *J. Agric. Food Chem.* 52: 1293-1299.
- Synowiecki, J. and Al-khateeb, N. A. A. Q. 2000. The recovery of protein hydrolysate during enzymatic isolation of chitin from shrimp *Crangon crangon* processing discards. *Food Chem.* 68: 147-152.

- Tanaka, M., Chui, W. K., Nagashima, Y. and Taguchi, T. 1990. Development of antioxidative effect during the Maillard reaction between tryptophan and glucose. *J. Tokyo Univ. Fish.* 77: 33-41.
- Tanaka, M., Chiu, W. K., Nagashima, Y. and Taguchi, T. 1992. Inhibitory effect of the Maillard reaction products towards lipid oxidation. *J. Tokyo Univ. Fish.* 79: 135-141.
- Tanaka, M., Chiba, N., Ishizaki, S., Takai, R. and Taguchi, T. 1994. Influence of water activity and Maillard reaction on the polymerization of myosin heavy chain in freeze-dried squid meat. *Fish. Sci.* 60: 607-611.
- Taga, M. S., Miller, E. E. and Pratt, D. E. 1984. Chiaseeds as source of natural lipid antioxidant. *J. Am. Oil Chem. Soc.* 61: 928-931.
- Tang, S. Z., Kerry, J. P., Sheehan, D. and Buckley, D. J. 2002. Antioxidative mechanisms of tea catechins in chicken meat systems. *Food Chem.* 76: 45-51.
- Toribio, J. L. and Lozano, J. E. 1986. Heat induced browning of clarified apple juice at high temperatures. *J. Food Sci.* 51: 172-179.
- Tybor, P. T., Dill, C. W. and Landmann, W. A. 1973. Effect of decolorization and lactose incorporation on the emulsification capacity of spray-dried blood protein concentrates. *J. Food Sci.* 38: 4-6.
- Van Boekel, M. A. J. S. 1996. Kinetic modelling of sugar reaction in heated milk-like systems. *Neth. Milk Diary J.* 50: 245-266.
- Van Boekel, M. A. J. S. 1998. Effect of heating on Maillard reactions in milk. *Food Chem.* 62: 403-414.

- Van Boekel, M. A. J. S. 2001. Kinetic aspects of the Maillard reaction: a critical review. *Nahrung/Food*. 45: 150-159.
- Van Boekel, M. A. J. S. and Martins, S. I. F. S. 2002. Fate of glycine in glucose-glycine reaction: A kinetic analysis. *Int Congr Ser.* 1245: 289-293.
- Van Waarde, A. 1988. Biochemistry of non-protein nitrogenous compounds in fish including the use of amino acid for anaerobic energy production. *Comp. Biochem. Physiol.* 91: 207-228.
- Wahyuni, M., Ishizaki, S. and Tanaka, M. 1999. Effect of glucose-6-phosphate ratio on functional properties of fish water soluble proteins modified by the Maillard reaction. *J. Tokyo Univ. Fish.* 86: 25-39.
- Wismer-Pedersen, J. 1988. Use of hemoglobin in foods. A review, *Meat Sci.* 24: 31-45.
- Wismer-Pedersen, J. 1979. Utilization of animal blood in meat products. *Food Technol.* 33(8): 76-80.
- Wijewickreme, A. N. and Kitts, D. D. 1998a. Oxidative reactions of model Maillard reaction products and-tocopherol in a flour-liquid mixture. *J. Food Sci.* 63: 466-471.
- Wijewickreme, A. N. and Kitts, D. D. 1998b. Modulation of metal induced genotoxicity by Maillard reaction products isolated from coffee. *Food Chem. Toxicol.* 36: 543-553.
- Wijewickreme, A. N. and Kitts, D. D. 1997. Influence of reactions on the oxidative behavior of model Maillard reaction products. *J. Agric. Food Chem.* 45: 4571-4576.

- Wijewickreme, A. N., Kitts, D. D. and Durance, T. D. 1997. Reaction conditions influence the elementary composition and metal chelating affinity of nondialyzable model Maillard reaction products. *J. Agric. Food Chem.* 45: 4577-4583.
- Wijewickreme, A. N., Krejpcio, Z. and Kitts, D. D. 1999. Hydroxyl scavenging activity of glucose, fructose and ribose-lysine model Maillard products. *J. Food Sci.* 64: 457-461.
- Woffenden, H. M., Ames, J. M. and Chandra, S. 2001. Relationships between antioxidant activity, color and flavor compounds of crystal malt extracts. *J. Agric. Food Chem.* 49: 5524-5530.
- Wu, C. M. and Pan, B. S. 1997. Flavor compounds. In *Chemical and functional properties of food components* (Sikorski, Z. E., ed.). p. 211-233. Technomic Publishing. USA.
- 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. Intern.* 36: 949-957.
- Yamamoto, T., Yamamoto, S., Miyahara, I., Matsumura, Y., Hirata, A. and Kin, M. 1990. Isolation of a β -mannan hydrolyzing enzyme and hydrolysis of sugar gum by the enzyme isolated. *Denpun Kagaku.* 37: 99-105.
- Yanishlieva-Maslarova, N. V. 2001. Inhibiting oxidation. In *Antioxidants in food: practical applications*. (Pokorny, J., Yanishlieva, N. and Gordon, M. H., eds.). p. 22-84. Woodhead Publishing. USA.

- Yeboah, F. K., Alli, I. and Yaylayan, V. A. 1999. Reactivities of D-glucose and D-fructose during glycation of bovine serum albumin. *J. Agric. Food Chem.* 47: 3164-3172.
- Yen, G. and Hsieh, P. 1995. Antioxidative activity and scavenging effects on active oxygen of xylose-lysine Maillard reaction products. *J. Sci. Food Agric.* 67: 415-420.
- Yi, O. S., Meyer, A. S. and Frankel, E. N. 1997. Antioxidant activity of grape extracts in a lecithin liposome system. *J. Am Oil. Chem. Soc.* 74: 1301-1307.
- Yaylayan, V. A., Ismail, A. A. and Mandeville, S. 1993. Quantitative determination of the effect of pH and temperature on the keto form of D-fructose by FTIR spectroscopy. *Carbohydr. Res.* 248: 355-360.
- Yoo, M. A., Kim, H. W., Kim, K. H. and Kang, M. H. 2004. Antiodant effect of brown substances separated from defatted roasted sesame dregs. *Food Sci Biotechnol.* 13: 274-278.
- Yoshimura, Y., Iijima, T., Watanabe, T. and Nakazawa, H. 1997. Antioxidative effect of Maillard reaction products using glucose-glycine model system. *J. Agric. Food Chem.* 45: 4106-4109.
- Zhang, J., Zhu, W., Makkee, M., van der Linden, B., Kapteijn, E. and Moulijn, J. A. 2001. Adsorption of 1,2-Dichloropropane on activated carbon. *J. Chem. Eng. Data.* 46: 662-664.