國立臺灣大學 115 學年度碩士班招生考試試題

Part A (50%)

1. Please explain the following questions relevant to the endogenous enzymes in cereal grains based on the changes of chemical components, effects on the processing, nutritional and eating qualities of the specific cereal product? (5% each, total in 20%)
   (a) Using sprouted wheat flour, which biosyntheized abundant α-amylases and amyloglucosidase during sprouting, was used for bread making.
   (b) Whole oat or barley flour, which contained β-glucanase, was used for making drum-dried instant cereal porridge with health claim.
   (c) The phytase and protease biosyntheized during brown rice germination on the nutrition and health benefits of germinated rice products.
   (d) Effects of lipase and lipoxygenase on the durum wheat flour for pasta making.

2. Please answer the following questions relevant to dietary starch. (5% each, total in 20%)
   (a) Classify the starch types based on the *in vitro* digestibility test and what are the blood glucose level and insulin response after consumption by human.
   (b) Classify the 5 types of resistant starch and explain why they could prevent from digestion in gut?
   (c) Please provide the one method at least to increase the type III and type V resistant starch content in foods, respectively.
   (d) How to determine the content of resistant starch in whole grain products?

3. Please define the differences in the chemical structures and gelling behaviors of three types of pectin: high-methoxyl (HM), low-methoxyl (LM), and amidated pectin. (10%)

Part B (50%)

1. Explain how Accelerated Shelf-Life Testing (ASLT) is used to estimate the shelf life of foods. Please include the following items in your answer. (a) the basic principle; (b) the relationship between reaction rate and temperature (Arrhenius concept); (c) its advantages and limitations. (10%)
2. Why is a rotating turntable an essential component in a household microwave oven? Explain the heating characteristics of microwave energy and how the turntable improves heating uniformity and food safety. (10%)
3. Why are edible oils that contain a higher proportion of polyunsaturated fatty acids (PUFAs) more susceptible to oxidation? Explain the chemical basis of this phenomenon, and describe practical strategies that can be used to slow down or prevent lipid oxidation in edible oils. (10%)
4. A fruit juice feed stream has a soluble solids content of 12 °Brix. A total of 1,000 kg of this juice is fed daily into a multiple-effect evaporator for concentration. The final product is required to have a soluble solids content of 45 °Brix. Assume that there is no loss of soluble solids during evaporation. Calculate: (a) the mass of the concentrated product (kg); (b) the mass of water removed by evaporation (kg). (10%)
5. Properly fermented and dried cacao beans are the essential raw material for chocolate manufacturing. Explain why cacao fermentation is a critical determinant of chocolate quality. Please include the major biochemical, chemical, and physical changes that occur in cacao beans during the fermentation process in your answer. (10%)

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