



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN BIOCHEMISTRY

SBC 408: FOOD BIOCHEMISTRY

DATE: Friday, 30th March, 2012

TIME: 8.00 a.m. – 10.00 a.m.

SECTION A: Instruction: Answer All questions in this section. (20 marks)

PART 1: Multiple choice questions (MCQS)- 1 mark each

1. When carcasses are kept at 15°C, the time required for rigor mortis development is about
 - A. 2-4 hours in poultry, 4-18 hours in pork and 10-24 hours in beef
 - B. 4-18 hours in poultry, 2-4 hours in pork and 10-24 hours in beef
 - C. 2-4 hours in poultry, 1-7 hours in pork and 4-18 hours in beef
 - D. 1-7 hours in poultry, 4-18 hours in pork and 10-24 hours in beef
 - E. None of the above
2. Bread crust
 - A. Is hardened and browned through maillard reaction
 - B. Is formed through dextrinization and caramelization as temperatures reaches 90-110°C
 - C. Formation requires denaturation of Gluten and concomitant distribution of water vapour in the crumb
 - D. All of the above
3. The following factors are inhibitors of ethylene biosynthesis during the ripening process. Which one is not?
 - A. Lipid peroxidation
 - B. Amino-oxyacetic acetic acid
 - C. ACC synthase antisense Cdna

- D. CO₂
 - E. Cyanide
4. Cardboard aroma of beer is effected by
- A. 3-methyl-2-butenthiol
 - B. Phenols and peptides
 - C. Ester compounds
 - D. Stemwort content
 - E. Trans -2- nonenal
5. Hops contain
- A. 18.3% humulones, 3.5%polyphenols and 2.0% crude protein
 - B. 18.3% polyphenols, 3.5% bitter compounds and 2.0% crude protein
 - C. 18.3% crude protein 3.5%polyphenols and 2.0% humulones,
 - D. 18.3% bitter compounds 3.5%polyphenols and 2.0% humulones
 - E. 18.3% humulones, 3.5%polyphenols and 20.0% crude protein
6. During caramelization, step 2 of acid degradation involves
- A. Enolization results to complex mixture of products such as saccharinic acid
 - B. Dicarbonyls are converted to hydroxymethylfurfural
 - C. Dehydration of dicarbonyls to form 1,2-enediol
 - D. D-glucose is converted to D-fructose and D- mannose through enediol intermediate
 - E. None of the above
7. Cross-linked starches
- A. Are soluble at low temperature
 - B. Mainly used as thickeners
 - C. Does not retrograde easily
 - D. Are highly stable under extreme pH values
 - E. None of the above
8. Which of the following is untrue about casein micelles
- A. It is composed of casein and colloidal calcium phosphate
 - B. The natural micelles form is calcium phosphocaseinate
 - C. They are strongly solvated
 - D. They are tightly packed but porous, allowing rennin to act even in the interior of the micelle
 - E. Small summicelles aggregate together to large micelles by calcium phosphate bridges
9. Which of the following fruits is the odd one out
- A. Cantaloupes

- B. Cucumbers
- C. Cherries
- D. Peaches
- E. Melons

10. Wheat glutenin

- A. Has high level of proline and lysine
- B. Are responsible for the viscosity and extensibility of the dough
- C. Has high levels of tryptophan and proline
- D. Has high levels of lysine and tryptophan
- E. All of the above

PART 11: Fill in the empty spaces (1 mark each)

A.
Homogenization of milk reduces the diameter of fat globules to11..... The milk at 50-75°C is forced through12..... under pressures of13..... The globules are then finely dispersed in milk with greatly14..... The fat globules are surrounded by an interfacial layer called15..... which separates it from aqueous milk serum.

B.
In enzymatic browning reactions, quinone formation requires both the phenolase enzyme and O₂. Subsequent reactions in the polymerization of O-quinones are spontaneous, leading to16..... Amines, amino acids and nitrogen containing compounds react with O-quinones to give17..... Hydroxyquinones undergoes polymerization and are progressively converted to18..... and eventually to brown melanins. In cocoa manufacture,19..... are added to enhance colour formation, while20..... of tea during fermentation gives the desirable characteristic colour of black tea.

Section B: Answer all questions. Each is 5 marks

1 a). complete the table, as with regard to stecker degradation (3 marks)

Amino acid	Volatile compound	Aroma
Leucine	1.....	2.....
.....3.....	4.....	Meaty
alanine	5.....	6.....

- b). Outline the various defects that are associated with meat (2 marks)
2. a). Explain how rheological properties of dough can be determined (3 marks)
- b). Outline the nutritional aspects of Maillard reaction (2 marks)
3. a). Cereal proteins vary in amino acid composition and content. Justify (3 marks)
- b). Scheme the comparison of energy generation between resting and stressed muscles (2 marks)
4. Explain the influence of additives on the baking properties of wheat flour (5 marks)
5. Describe the following post harvest changes in fruits and vegetables (5 marks)
- i). Flavour
- ii). Colour
6. Discuss the physical and functional properties of starch, as an important component of cereal grains (5 marks)

Section C: Answer any two questions. Each is 10 marks

1. Give a detailed description of the brewing process (10 marks)
2. a). Describe preparation of dough during the baking process (4 marks)
- b). Diagram, using structures, the pathway of ethylene biosynthesis during the ripening of fruits and vegetables and explain how it is regulated (6 marks)
3. a). Describe how the following milk products can be generated (4 marks)
- i). Powdered milk
- ii). Butter
- iii). Evaporated or condensed milk
- b). Discuss the industrial application of the following enzymes (6 marks)
- i). Proteases
- ii). Lipooxygenase
- iii). Esterase