

National Pingtung University of Science & Technology

2012 Entrance Exam for the International Master's Degree Program in Food Science

Instructions:

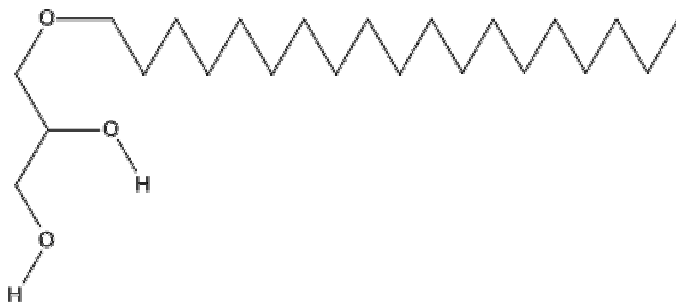
1. Write your answers on the **answer booklet** and clearly mark the corresponding question number in the front of them. No point will be given for anything written in the question sheets, but you may use the blank space for notes or scratch work.
2. All answers must be written **in English**. No point will be given if you write your answers in languages other than English.
3. **Do not** mark anything, such as name, phone number, entrance exam admit card number, etc., which may show or mean your recognition on the answer booklet. Violation of this rule will be considered cheating and treated accordingly.

I. Multiple-Choice Questions: 15 questions; 2 points per question. Mark only one correct or best answer to each question; no deduction for a blank or wrong answer.

1. The technical name for freeze drying is _____.
【A】 lyophilization 【B】 condensation 【C】 evaporation
【D】 vaporization 【E】 sublimation
2. What is the number of degrees Celsius required for a specific thermal death time curve to pass through one log cycle, or achieve 90% destruction?
【A】 A-value 【B】 D-value 【C】 F-value
【D】 L-value 【E】 Z-value
3. An extruder is a piece of equipment commonly used to form _____.
【A】 meat patties 【B】 corn crackers 【C】 tortillas
【D】 fruit jams 【E】 pasta
4. By using _____ the microbial species introduced for fermentation can be controlled.
【A】 back slopping 【B】 Natural contaminations
【C】 a starter culture 【D】 a mother culture 【E】 none of the above
5. _____ is an ingredient used in food to slow the reaction of lipids forming free radicals leading to oxidative rancidity in food.
【A】 Sodium caseinate 【B】 Potassium sorbate
【C】 Disodium inosinate 【D】 Butylated hydroxyanisole
【E】 Ascorbic acid

6. The acceptable daily intake (ADI) of aspartame is _____.
【A】 zero
【B】 a no observable adverse effect level (NOAEL)
【C】 1/10 of a no observable adverse effect level (NOAEL)
【D】 1/100 of a no observable adverse effect level (NOAEL)
【E】 1/1000 of a no observable adverse effect level (NOEL)
7. A fatty acid does NOT contain which of the following elements?
【A】 carbon 【B】 nitrogen 【C】 oxygen
【D】 hydrogen 【E】 none of the above
8. If the legal maximum of nitrite (NO_2) is 156 ppm, how much sodium nitrite can you legally add to 1 lb of meat?
【A】 70.8 mg 【B】 93.6 mg 【C】 156 mg
【D】 156 μg 【E】 156 g
9. A process that changes the shape of a protein molecule without breaking its covalent bonds is called _____.
【A】 agglutination 【B】 coagulation 【C】 denaturation
【D】 hydrolization 【E】 saturation
10. A food that would be rich in omega-3 fatty acids would be _____.
【A】 butter 【B】 fatty fish 【C】 lard
【D】 olive oil 【E】 vegetable oil
11. Which of the following processes changes liquid oils into semisolids and makes the oil less susceptible to oxidation and rancidity?
【A】 fermentation 【B】 oxidization 【C】 reduction
【D】 rehydration 【E】 hydrogenation

12. Consider the following general chemical structure
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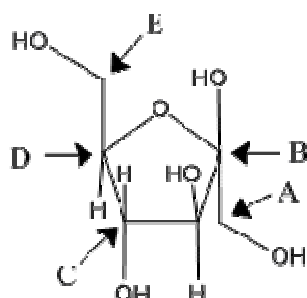


This compound is likely to be good _____.

- 【A】 emulsifier 【B】 flavor potentiator 【C】 sweetener
【D】 salt substitute 【E】 none of the above

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13. In the structure below, which carbon is the anomeric carbon?



【A】 A

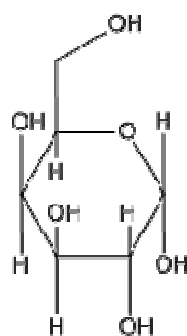
【D】 D

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【C】 C

14. What sugar is this?



【A】 beta-D-glucose

【D】 beta-D-allose

【B】 alpha-D-galactose

【E】 alpha-D-glucose

【C】 alpha-D-mannose

15. Which of the following amino acids in a protein would be most susceptible to participate in Maillard browning?

【A】 L-aspartic acid

【D】 L-lysine

【B】 L-glutamic acid

【E】 L-serine

【C】 glycine

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II. Fill-in-the-blank questions: 15 questions; 3 points per question. Fill in the blanks with appropriate and necessary answer(s).

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1. HACCP is an acronym that stands for _____.
2. Aspartame contains which two amino acids? _____.
3. How many carbon atoms and carbon-carbon double bonds are there in linoleinic acid? _____.
4. What is made by adding *Streptococcus thermophilus* and *Lactobacillus bulgaricus* to milk? _____.
5. *Bacillus thuringiensis* is an microorganism which can be used as _____.
6. A food additive that retards rancidity of unsaturated oils and prevents browning in _____.

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fruits and vegetables that occur during exposure to oxygen is called a(n) _____.

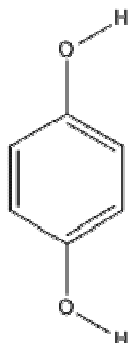
7. The purpose for using a leavening agent such as baking soda or baking powder in cakes and cookies is to provide a source of _____.
8. To determine the amount of free water available for microbes to use in a food system, a food scientist would measure the _____ of that food.
9. The red color of a tomato is due to a compound called _____.
10. The process when ice becomes water vapor without first going through a liquid state is called _____.
11. A complex protein molecule that stimulates or speeds up a specific chemical reaction without being used up itself is called a(n) _____.
12. _____ is composed of one molecule of glycerol and three fatty acids.
13. An ingredient statement for a food product states that the food contains flour, starch, salt, flavorings, MSG and BHT. MSG is considered to be a(n) _____.
14. What is definition of essential amino acids? _____.
15. Oil and water separate when mixed together due to the _____ portions of fatty acids in oil.

III. Short Answer Questions: 2 questions; 10 points for question #1 and 15 points for question #2. Write your answers clearly and legibly. Cross out any errors you make; crossed-out work will not be scored. Diagrams may be used to supplement clarification, but diagrams alone will not suffice.

1. At 8:30 a.m. Saturday, April 7, you inoculate a broth with *Bacillus thuringiensis* (1,000 cells/mL) and incubated the culture at 30°C. At 10:00 a.m. when the organisms entered its logarithmic phase of growth, the population was 2,000 cells/mL. The population was 6,400,000 cells/mL when the end of the logarithmic phase of growth was reached at 6:09 p.m. that evening. Determine the number of generations, generation time and specific growth rate that occurred during the logarithmic phase of growth under the preceding conditions. Show all calculations.

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2. Phenolics have been studied as antioxidants in ground beef. The general structure of a phenolic is shown below.



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- Write the general equations for fat oxidation, i.e., initiation, propagation, and termination.
 - Using chemical equations show how phenolics may exert an antioxidant effect by reaction with the radical species R or ROO.
 - Explain why such reactions would lead to cessation of oxidation.

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