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Science Olympiad Wicklund Invitational
February 6, 2016

Food Science

Written Test Questions Booklet

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Identify the ONE choice that best completes the statement or answers the question. Record your answers on your answer sheet. (1 point per question, total 27 points)

1. The process of modifying the molecular structure of a protein, or cooked protein, is called _____.
A. esterification, B. fermentation
C. denaturation, D. pickling
E. coagulation

2. Which of the following does not contain carbohydrates?
A. wheat, B. apple, C. tomato, D. milk, E. corn oil, F. none of the above

3. The only animal-based carbohydrates is _____.
A. glucose
B. lactose
C. fructose
D. galactose
E. monosaccharides
F. disaccharides
G. maltose
H. honey
I. sucrose

4. Which of the following is not a type of lipids?
A. fat, B. wax, C. lecithin, D. oil, E. none of the above

5. Which of the following is not true to trans fat?
A. Trans fat has been shown to both lower the good cholesterol in your body and raise the bad.
B. Trans fats are easy to use, inexpensive to produce and last a long time.
C. When the Nutrition Facts label says a food contains “0 g” of trans fat, you are safe to eat as many servings as you like regarding trans fat intake per day.
D. Trans fats give foods a desirable taste and texture.
E. A food generally contains artificial trans fat if its ingredient list contains any kind of partially hydrogenated vegetable oil, such as vegetable shortening or margarine.
F. None of the above.

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6. Which one of the following is not true about lactose intolerance?
- A. Lactose intolerance is the same as milk allergy
 - B. People with lactose intolerance do not have enough of the enzyme lactase in their body.
 - C. People with lactose intolerance can consume lactose-free milk products.
 - D. Lactose intolerance can cause uncomfortable symptoms such as nausea, cramping, bloating, abdominal pain, gas, and diarrhea.
 - E. None of the above
7. People with milk allergy are mainly allergic to _____ in milk?
- A. carbohydrates
 - B. protein
 - C. butterfat
 - D. vitamins
 - E. minerals
8. For those with lactose intolerance, _____ can be used as a source of calcium.
- A. skimmed milk
 - B. sour cream
 - C. condensed milk
 - D. cheddar cheese
 - E. cottage cheese
9. Which of the following cheese has higher calcium and low sodium compared to others?
- A. Blue
 - B. Brie
 - C. Monterey Jack
 - D. Process American
 - E. Swiss
10. Making which of the following food does not involve the process of fermentation?
- A. Beer
 - B. Bread
 - C. Ice cream
 - D. Yogurt
 - E. Vinegar

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11. Which of the following factor does not affect milk composition including fat and solids-not-fat?

- A. individual cow
- B. different breeds
- C. underfeeding
- D. age of cow
- E. stage of lactation
- F. none of the above

12. Which of the following cheese milk yields the most amount of cheddar cheese using the same method?

- A. cow's milk
- B. dolphin's milk
- C. pig's milk
- D. rabbit's milk
- E. sheep's milk

Species	water	fat	casein	whey protein	lactose	energy kcal/100 g
Cow	87.3	3.9	2.6	0.6	4.6	66
Dolphin	58.3	33.0	3.9	2.9	1.1	329
Pig	81.2	6.8	2.8	2.0	5.5	102
Rabbit	67.2	15.3	9.3	4.6	2.1	202
Sheep	82.0	7.2	3.9	0.7	4.8	102

13. Saturated fats are _____ .

- A. single bonds
- B. double bonds
- C. triple bonds
- D. 3+ bonds

14. How many percentage of protein is contained in 2% cow's milk?

- A. 1.2%, B. 2.0%, C. 2.2%, D. 3.4%, E. 4.0%, F. 5.5%

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15. After milk mixed with water, milk's density _____.
- A. increases
 - B. decreases
 - C. stays the same
16. Where will digested carbohydrates be absorbed in the human body?
- A. mouth
 - B. stomach
 - C. liver
 - D. small intestine
 - E. large intestine
17. In 1877 _____ distinguished three proteins in milk: casein, lactalbumin and lactoglobulin.
- A. O. Hammarsten
 - B. A. Fourcroy
 - C. G. J. Mulder
 - D. J. J. Berzelius
 - E. C. Voit
 - F. F. Sanger
18. The key enzyme in the regulation of fatty acid synthesis is
- A. Acetyl CoA carboxylase
 - B. AMP activated protein kinase
 - C. Protein phosphatase
 - D. Ribulase
19. The main purpose of homogeneous is
- A. broken casein micelles
 - B. broken curd
 - C. crushing fat globules
 - D. sterilization

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20. Based on the Code of Federal Regulations by the U.S. Food and Drug Administration, the following product can,

NUTRITION FACTS	
Serving Size 34 Pieces (40g)	
AMOUNT PER SERVING	
Calories 170	Calories from Fat 60
% DAILY VALUE*	
Total Fat 7g	10%
Saturated Fat 6g	30%
Trans Fat 0g	0%
Cholesterol 0mg	0%
Sodium 20mg	1%
Total Carbohydrate 29g	10%
Dietary Fiber less than 1g	2%
Sugars 25g	
Protein 1g	
Vitamin A 0%	Vitamin C 2%
Calcium 4%	Iron 2%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower based on your calorie needs

- A. claim to be cholesterol free
 - B. claim to be fat free
 - C. claim to be sugar free
 - D. claim to be energy free
 - E. none of the above
21. How much water is typically contained in ice cream (in percentage by weight)?
A. 10%, B. 20%, C. 30%, D. 40%, E. 50%, F. 60%, G. 70%, H. 80%
22. What is the main purpose of adding polysaccharides when making ice cream?
A. To complete the syneresis process
B. To increase the viscosity
C. To destabilize the fat globules
D. To soften the final product
23. For a fat-free cheese that contains 55% water, what type is it?
A. extra hard, B. Hard, C. semisolid, D. soft

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24. Vitamins A, D, E, and K are found within the milk _____ portion of the milk.
A. fat B. protein C. carbohydrate D. water
25. A cheese that contains 55% of fat is:
A. double cream cheese, B. cream cheese, C. fat cheese, D. skim cheese
26. Which of the following is describing the process of making cheddar?
A. The curd is washed in warm water, lowering its acidity and making for a milder-tasting cheese
B. The cut curd is repeatedly piled up, pushing more moisture away. The curd is also mixed (or *milled*) for a long time, taking the sharp edges off the cut curd pieces and influencing the final product's texture.
C. The curd is stretched and kneaded in hot water, developing a stringy, fibrous body.
27. Folic acid is also known as what vitamin?
A. Vitamin A, B. Vitamin B1, C. Vitamin B2, D. Vitamin B9, E. Vitamin B12
F. Vitamin C, G. Vitamin D, H. Vitamin E, I. Vitamin K

Identify the choices (one or more) that best completes the statement or answers the question. Record your answers on your answer sheet.

28. What are true about amino acids,
A. Amino acids having both the amine and the carboxylic acid groups attached to the first (alpha-) carbon atom are known as α -amino acids
B. Protein is composed of twenty-one amino acids, among which eleven are made by your body.
C. The amino acids that can be made by your body are called essential.
D. Milk contains all essential amino acids.
E. None of the above.

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29. Salt has multiple roles in cheese besides adding a salty flavor, which of the follows are true?

- A. destabilizes the fat globules, favoring their aggregation during the ripening process
- B. preserves cheese from spoiling
- C. the action of the salt on the cheese causes it to (partially) melt, absorbing latent heat and bringing the mixture below the freezing point of pure water
- D. draws moisture from the curd
- E. firms cheese's texture in an interaction with its proteins.

30. Which of the following are true about the role of protein,

- A. Protein builds and maintains muscles, organs, connective tissues, skin, bones, teeth, blood, and your DNA
- B. Protein contributes to the formation of enzymes
- C. antibodies in your blood is a kind of protein
- D. Protein is found in hormones
- E. Protein is your body and brain's main source of fuel
- F. None of the above

31. Which of the following contain saturated fat?

- A. fish oil
- B. lard
- C. butter
- D. peanut oil
- E. coconut oil

32. Milk is an outstanding source of what two elements important in bone growth?

- A. Sodium
- B. Phosphorus
- C. Potassium
- D. Magnesium
- E. Chloride
- F. Calcium

33. Which of the following must be listed in the ingredients list if they are used in the food in order for people with allergies be aware of?

- A. soy, B. milk, C. oil, D. rice, E. banana, F. caseinates, G. potato
- H. cucumber

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34. Which of the following foods make sense to buy organic?
A. onion, B. sweet corn, C. pineapple, D. mango, E. watermelon
F. eggplant, G. cheese, H. milk
35. What of the following are true about fat-soluble vitamins?
A. All essential fat-soluble vitamins are found in milk.
B. They are stored in the body's fatty tissue and in the liver, and they can be stored for long periods of time.
C. They are absorbed through the small intestine.
D. They are more prone to toxicity than the water-soluble vitamins.
E. In food, they are easily lost as a result of poor storage or excessive cooking.
36. Which of the following are true about butter?
A. The most common form of butter is made from cows' milk, but it can also be made from the milk of other mammals.
B. Ghee has a lower content of butterfat than butter.
C. Butter's density is similar to that of ice.
D. Butterfat consists of many moderate-sized, saturated hydrocarbon chain fatty acids, which are triglycerides.
E. None of the above.
37. Which of the following cheese are unripened cheese?
A. Swiss, B. cottage cheese, C. blue cheese, D. cheddar,
E. cream cheese, F. mozzarella, G. feta
38. The milk of what two animals would most likely have been used to make the earliest butter?
A. Cow, B. Sheep, C. Goat, D. Dog, E. Horse, F. Pig, G. Rabbit
39. What processes are used to kill bacteria and other microbes in dairy products?
A. Ultrafiltration
B. Maturation
C. Coagulation
D. Pasteurization
E. Homogenization
F. Microfiltration

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40. What are the two essential fatty acids that human must get from food?

- A. Myristoleic acid
- B. Palmitoleic acid
- C. Sapienic acid
- D. Oleic acid
- E. Vaccenic acid
- F. Elaidic acid
- G. Linoleic acid
- H. Linoelaidic acid
- I. α -Linolenic acid
- J. Arachidonic acid
- K. Eicosapentaenoic acid
- L. Erucic acid
- M. Docosahexaenoic acid

41. What is the two main steps for manufacturing cheese?

- A. Pasteurization
- B. Ultrafiltration
- C. Maturation
- D. Coagulation
- E. Homogenization
- F. Microfiltration

Short answer questions. Points value is indicated in each question. Total 25 points.

42. Other than acid, what else can be used in industry to make cheese? (1 point)

43. Fruity Co. is working on a new type of yogurt. Based on their research, orange flavor is the most popular. However, adding orange juice would destroy the texture. So they decide to use additives for orange flavor yogurt. (3 points)

- 1) What kind of compound should they use?
- 2) What is the general chemical formula for it?
- 3) Which specific one would bring in orange flavor?

44. Chemically, what is common to all unsaturated lipids? (1 point)

45. Proteins are composed of what type of small molecules? (1 point)

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46. What is missing from human body that made the two essential fatty acids essential? (1 point)

47. What is the type of the amino acid that contained the most in cow's whole milk? (1 point)

48. Milk casein precipitates at pH value 1)_____, and this pH value is known as 2)_____ . (2 points)

49. Why must one shake or agitate heavy cream in able to create butter? (1 point)

50. What is the chemical formula for lactose? (1 point)

51. What three key aroma substances are contained in butter? (3 points)

52. When starter bacteria are added to milk, milk sugars are converted to a chemical called _____. (1 point)

53. If one container of the following milk is used to make cheese, how many grams of cheese can be made under ideal conditions? Assume the moisture level of the yield cheese is 60%. Please show your work. (3 points)

Nutrition Facts	Amount / Serving	% Daily Value*	Amount / Serving	% Daily Value*
	Total Fat 0g		0%	Total Carbohydrate 18g
Serving Size 1 cup (236 mL)	Saturated Fat 0g	1%	Dietary Fiber 0g	0%
Servings Per Container 16	Trans Fat 0g		Sugars 18g	
Calories 130	Cholesterol 5mg	1%	Protein 13g	
Calories from Fat 0	Sodium 190mg	8%		
*Percent Daily Values are based on a 2,000 calorie diet.	Vitamin A 10% • Vitamin C 0%		Calcium 45% • Iron 0%	
	Vitamin D 25%			

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54. Based on the following nutrition label, please answer the following questions, (6 points)

Amount Per Serving		Calories from Fat	
Calories 150		100	
		% Daily Value*	
Total Fat	3g		5%
Saturated Fat	2g		10%
Trans Fat	0g		
Cholesterol	15mg		4%
Sodium	15mg		1%
Total Carbohydrate	1g		0%
Dietary Fiber	0g		0%
Sugars	1g		
Protein	1g		
Vitamin A	2%		Vitamin C 0%
Calcium	4%		Iron 0%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less Than	65g	80g
Sat Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carbohydrate	Less Than	300g	375g
Dietary Fiber		25g	30g
Protein		50g	65g

- 1) Calculate the Calories in one serving of this product
 - a) Calories from fat _____.
 - b) Calories from protein _____.
 - c) Total Calories in one serving _____.
- 2) If the daily value for Calcium is 1000 mg per day, calculate the amount (in mg) of Calcium contained in 2 servings of this product.
- 3) If % Daily Values are based on a 2,500 Calories diet instead of 2000, what should the % Daily Values be for Saturated Fat?
- 4) For an adult on a 2000 calorie diet, what is the maximum amount (in ml) of this product that he can consume per day based on Recommended Daily Limits listed on the label?

Tie breakers

1. Why is milk white?
2. What is the chemical structure of Vitamin C?