

FOOD SCIENCE B DIARY

School: _____ Team #: _____

Name 1: _____ Name 2: _____

Instructions

For multiple choice, write your answer on the line provided. For short answer, write your answer underneath the question. Tie-breaker questions are marked. For section III a periodic table should be used.

Part I: Multiple Choice (1 point each)

Choose the best answer

- 1) _____ **How much of the protein in cow milk is casein?**
 - a. 20%
 - b. 40%
 - c. 60%
 - d. 80%

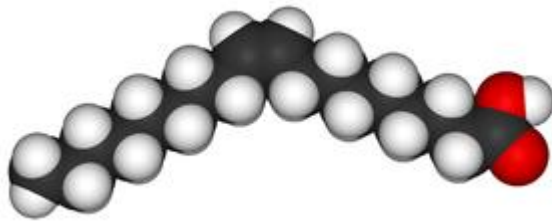
- 2) _____ **Yogurt is made through?**
 - a. Fermentation and then denaturing of proteins
 - b. Just fermentation
 - c. Dehydration synthesis
 - d. Pasteurization

- 3) _____ **What is used to make yogurt?**
 - a. Chemicals
 - b. Bacteria
 - c. Heat
 - d. Acids

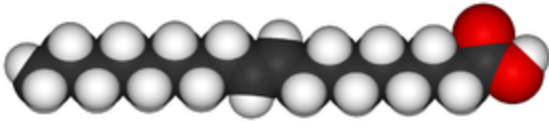
- 4) _____ **Cheese can be made from milk, what is a health benefit of cheese?**
 - a. Phosphorus
 - b. Vitamin C

- c. Bacteria
 - d. Cholesterol
- 5) _____ **Lactose is a...**
- a. Monomer
 - b. Polysaccharide
 - c. Disaccharide
 - d. Polypeptide
- 6) _____ **Ice cream is...**
- a. 60% water
 - b. 60% sugar
 - c. 40% water
 - d. 40% sugar
- 7) _____ **Lactose is composed of... [T1]**
- a. D-Galactose and D-Glucose
 - b. A-Galactose and B-Glucose
 - c. D-Galactose and C-Glucose
 - d. A-Galactose and A-Glucose
- 8) _____ **Lactose is broken down in the ... by ...**
- a. Stomach, HCl
 - b. Mouth, Amylase
 - c. Intestine, Lactase
 - d. Colon, Lactase
- 9) _____ **Lactose intolerant people can drink...**
- a. Goat Milk
 - b. Sheep Milk
 - c. Rice Milk
 - d. Plant-based milks
 - e. C&D

- 10) _____ **Which type of lactose intolerance is reversible? [T2]**
- a. *Primary hypolactasia*
 - b. *Secondary hypolactasia*
 - c. *Primary congenital alactasia*
 - d. *Secondary congenital alactasia*
- 11) _____ **Proteins are affected by...**
- a. Temperature
 - b. pH
 - c. Structure
 - d. All of the above
- 12) _____ **The ... structure of a protein is made from the hydrogen bonds**
- a. Primary
 - b. Secondary
 - c. Tertiary
 - d. Quaternary
- 13) _____ **How many moles of carbon are there per mole of lactose?**
- a. 1
 - b. 22
 - c. 11
 - d. 12
- 14) _____ **A dairy product with 35% fat is...**
- a. Whole Milk
 - b. Half and Half
 - c. Cream
 - d. Heavy Cream



- 15) _____ The geometry in this unsaturated fatty acid is ...
- a. Trans
 - b. Cis
 - c. Ionic
 - d. Polar



- 16) _____ The geometry in this unsaturated fatty acid is ...
- a. Trans
 - b. Cis
 - c. Ionic
 - d. Polar

- 17) _____ This type of cheese is developed through stretching
- a. Cheddar
 - b. Cottage
 - c. Feta
 - d. Mozzarella

- 18) _____ If you are pasteurizing milk at 90 degrees Celsius, how long will you need to hold that temperature for?
- a. 1.0 seconds
 - b. 0.5 seconds
 - c. 10 minutes
 - d. 1 minute

- 19) _____ **A short chain fatty acid found in milk is... [T3]**
- a. Oleic
 - b. Myristic
 - c. Stearic
 - d. Butyric
- 20) _____ **These are polysaccharides: (choose 2)**
- a. Maltose
 - b. Amylose
 - c. Xylose
 - d. Cellulose
 - e. Maltodextrins
- 21) _____ **Butter: (choose 3)**
- a. Is made up of fat from milk
 - b. The lipids are called glycerols
 - c. Must contain at least 75% butterfat to be sold
 - d. Refrigeration preserves butter
 - e. Ghee is clarified butter
- 22) _____ **How much potassium is there per 100g sample of 1% milk**
- a. 150mg
 - b. 150g
 - c. 155mg
 - d. 155g
- 23) _____ **Labels for milk must include: (Choose 2)**
- a. "Keep refrigerated after opening"
 - b. "Grade A"
 - c. Species of animal that produced the milk
 - d. Contains amount of lactose
 - e. Are always marked "reconstituted"

Part II: Short Answer (2 points each)

24) These are large macromolecules made from amino acids

25) Also known as triglycerides

26) List five of the essential amino acids found in milk

27) Amino acids consist of a central carbon surrounded by an amino group, a R-group, a hydrogen atom and?

28) Esterification forms what as a common product?

29) What do polysaccharides do to ice cream?

30) Formation of this product requires breaking the phospholipid layer of a fat globule

31) Breakdown of a protein through temperature or pH is known as

32) Name three minerals found in milk

33) The two bacteria required by law to be present in yogurt making are which?

34) What are some natural inhibitors in just secreted milk that prevent bacterial growth? [T4]

35) Does rock salt or table salt have greater freezing point depression?

36) **True/False** Milk has probiotics

37) **True/False** Evaporated milk contains no added sugars

38) pH of milk: (will accept a range)

39) Vitamin that fat free milk is fortified with

Part III: More fun stuff (points indicated in question)

This section has some calculations and long response questions

40) In a paragraph, describe the structure of proteins. Include the terms primary structure, secondary structure, tertiary structure, and quaternary structure. (4 points) [T5]

41) Discuss the differences of saturated and unsaturated fats. Describe the reaction that produces these fats. (4 points)

42) You are making ice cream!!! You want to add sugar for taste but your cousin wants to find out how much freezing point depression that the sugar you add will produce. The K_f for water is 1.86. You are using sucrose, $C_{12}H_{22}O_{11}$, which you have 123 grams of. You also have 2.00 liters of milk. You are to assume the liquid in milk is completely water and that other substances in the milk play no part in the freezing point depression. The density of water is 1.00g/ml. What will the freezing point drop to in Celsius? (7 points) In Kelvin? (1 bonus point) **SHOW ALL WORK** (1 point maximum if none is shown) [T6]

43) Your cousin hopes you aren't too tired after calculating that because now she wants you to describe to her what happens when you add acid to milk. Why does it curdle up? What is happening? (4 point)

44) Now she wants to know how to calculate her personal RDA for protein. Tell her how! Also tell her why there isn't a set amount. (4 points)

45) It's been a long day. You get a glass of milk and you remember your mother describing some nondairy milk products she buys since can't ingest lactose. Describe why your mother can't digest lactose. How is this different from her being allergic? What are examples of nondairy milk products? (5 points)

Answer Key:

1. D
2. A
3. B
4. A
5. C
6. A
7. A
8. C
9. E
10. B
11. D
12. B
13. D
14. C
15. B
16. A
17. D
18. B
19. D
20. B, D
21. A, D, E
22. A
23. A, B
24. Protein
25. Lipids
26. Possible answers include: Histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine
27. Carboxyl
28. Water (H₂O)
29. Increase viscosity
30. Butter
31. Denaturation
32. Answers can include: Calcium, Magnesium, phosphorus, potassium, selenium, zinc
33. *Lactobacillus bulgaricus* and *Streptococcus thermophiles*
34. Can include: lactoferrin, lactoperoxidase
35. Neither, as it should depend on molality/concentration not identity
36. False
37. True
38. 6.5 – 6.7
39. Vitamin A
40. Primary – from amino acid sequence, secondary – results from hydrogen bonding, tertiary – the geometric structure of the protein and determines function, quaternary – proteins with more than one polypeptide chain.
41. Answer should include description of how the single and double bonds are different. Any other valid differences that are scientific. The reaction that should be described is dehydration synthesis. The terms triglyceride and glycerol should be used.
42. -0.33418054 degrees Celsius, 272.81581946 Kelvin, rounding should be reasonable. Answers will change depending on the periodic table (I used 342.30 g/mol for the molar mass) and 273 vs 273.15 for the Kelvin calculation
43. Basically collapses the layer of charged particles around the fats and protein. Terms used should include whey, casein, curdles, denaturation.
44. *“The Recommended Dietary Allowance (RDA) for protein is a modest 0.8 grams of protein per kilogram of body weight. The RDA is the amount of a nutrient you need to meet your basic nutritional requirements. In a sense, it’s the minimum amount you need to keep from getting sick — not the specific amount you are supposed to eat every day. To determine your RDA for protein, you can multiply your weight in pounds by 0.36, or*

use this online protein calculator. For a 50-year-old woman who weighs 140 pounds woman and who is sedentary (doesn't exercise), that translates into 53 grams of protein a day." Quoting Harvard health blog for this one.

45. She doesn't produce lactase, blah, blah, blah. Allergies are to caseinates and proteins in milk, blah, blah, blah. Soy, rice, almond, are some examples.