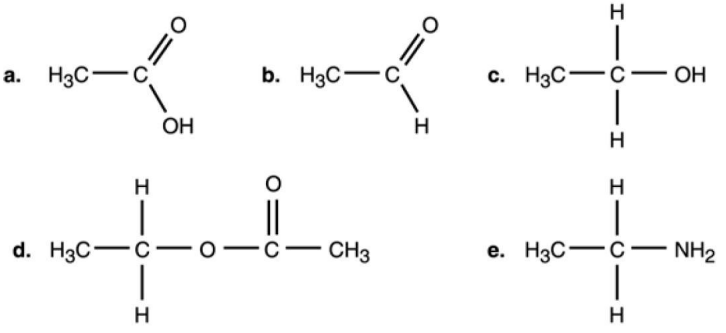
Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Figure 2.1




1) Which compound in Figure 2.1 is an ester? 1) _____

A) a B) b C) c D) d E) e

Answer: D

Explanation: A)
B)
C)
D)
E)

2) A scientist wants to perform a test that will indicate whether a nucleic acid sample is composed of RNA or DNA. Testing for the presence of which of the following is most appropriate in this situation? 2) _____

A) uracil B) nitrogen C) thymine D) guanine E) phosphate

Answer: A

Explanation: A)
B)
C)
D)
E)

3) The antimicrobial drug imidazole inhibits sterol synthesis. This would most likely interfere with 3) _____

A) prokaryotic plasma membranes.
B) eukaryotic plasma membranes.
C) bacterial cell walls.
D) genes.
E) fungal cell walls.

Answer: B

Explanation: A)
B)
C)
D)
E)

4) Radioisotopes are frequently used to label molecules in a cell. The fate of atoms and molecules in a cell can then be followed. Assume *Saccharomyces cerevisiae* is grown in a nutrient medium containing the radioisotope $^{35}S$. After a 48-hour incubation, the $^{35}S$ would most likely be found in the *S. cerevisiae's* 4) _____

A) water.
B) nucleic acids.
C) proteins.
D) carbohydrates.
E) lipids.

Answer: C
Explanation: A)
B)
C)
D)
E)

5) What is the type of bond between ions in salt? 5) _____

A) covalent bond B) hydrogen bond C) ionic bond

Answer: C
Explanation: A)
B)
C)

6) Antacids neutralize acid by the following reaction. Identify the salt in the following equation: 6) _____
$Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + H_2O$

A) HCl
B) $H_2O$
C) $MgCl_2$
D) $Mg(OH)_2$
E) None of the answers is correct.

Answer: C
Explanation: A)
B)
C)
D)
E)

7) Structurally, ATP is most like which type of molecule? 7) _____

A) carbohydrate B) lipid C) nucleic acid D) protein

Answer: C
Explanation: A)
B)
C)
D)

8) Identify the following reaction: $HCl + NaHCO_3 \rightarrow NaCl + H_2CO_3$ 8) _____

A) dehydration synthesis reaction
B) hydrolysis reaction
C) reversible reaction
D) ionic reaction
E) exchange reaction

Answer: E
Explanation: A)
B)
C)
D)
E)

Table 2.1

| $^{16}_{8}O$ | $^{12}_{6}C$ | $^{1}_{1}H$ |
|---|---|---|

9) Using the information in Table 2.1, calculate the number of moles in 92 grams of ethanol, $C_2H_5OH$. 9) _____

A) 1
B) 2
C) 3
D) 4
E) The answer cannot be determined.

Answer: B
Explanation: A)
B)
C)
D)
E)

Table 2.2

$NaOH \rightleftharpoons Na^+ + OH^-$ — base
$HF \rightleftharpoons H^+ + F^-$ — acid
$MgSO_4 \rightleftharpoons Mg^{2+} + SO_4^{2-}$ — salt
$KH_2PO_4 \rightleftharpoons K^+ H_2PO_4^-$ — acid
$H_2SO_4 \rightleftharpoons 2H^+ + SO_4^{2-}$ — salt

10) Which of the following statements about the reactions in Table 2.2 is FALSE? 10) _____
A) They are dissociation reactions.
B) They are exchange reactions.
C) They are reversible reactions.
D) They are ionization reactions.
E) They occur when the reactants are dissolved in water.

Answer: B
Explanation: A)
B)
C)
D)
E)

11) Identify the following reaction: Glucose + Fructose →Sucrose + Water 11) _____
A) hydrolysis reaction
B) reversible reaction
C) ionic reaction
D) dehydration synthesis reaction
E) exchange reaction

Answer: D
Explanation: A)
B)
C)
D)
E)

12) Most amino acids found in cells demonstrate what type of chirality? 12) _____
A) D-isomers
B) A-isomers
C) L-iosmers
D) B-isomers
E) C-isomers

Answer: C
Explanation: A)
B)
C)
D)
E)

13) Which of the following is a base? 13) _____

A) $C_2H_5OCOOH \rightarrow H^+ + C_2H_5OCOO^-$

B) $NaOH \rightarrow Na^+ + OH^-$

C) $C_2H_5OH$

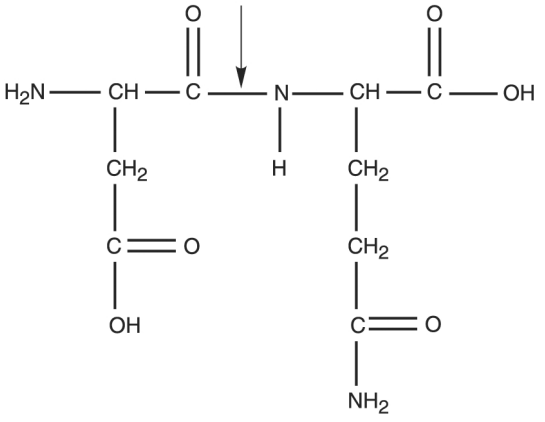
D) $H_2O \rightarrow H^+ + OH^-$

E) $H_2CO$

Answer: B

Explanation: A)
B)
C)
D)
E)

Figure 2.3



14) What kind of bond is at the arrow in Figure 2.3? 14) _____

A) double covalent bond
B) hydrogen bond
C) peptide bond
D) disulfide bridge
E) ionic bond

Answer: C

Explanation: A)
B)
C)
D)
E)

15) What is the type of bond holding hydrogen and oxygen atoms in the $H_2O$ molecule? 15) _____

A) ionic bond B) hydrogen bond C) covalent bond

Answer: C

Explanation: A)
B)
C)

16) Identify the following reaction: $NH_4OH \rightleftharpoons NH_3 + H_2O$ 16) _____

A) dehydration synthesis reaction
B) exchange reaction
C) reversible reaction
D) hydrolysis reaction
E) ionic reaction

Answer: C
Explanation: A)
B)
C)
D)
E)

17) What do genes consist of? 17) _____

A) nucleic acids B) proteins C) carbohydrates D) lipids

Answer: A
Explanation: A)
B)
C)
D)

18) An *E. coli* culture that has been growing at 37°C is moved to 25°C. Which of the following changes must be made in its plasma membrane? 18) _____

A) The number of saturated chains must increase.
B) The number of phosphate groups must increase.
C) The viscosity must increase.
D) The number of unsaturated chains must increase.
E) No changes are necessary.

Answer: D
Explanation: A)
B)
C)
D)
E)

19) Two antiparallel strands of DNA combine to form a double helix. The specific interactions that permit this phenomenon occur by way of _____ bonds between _____. 19) _____

A) ionic; deoxyriboses
B) hydrogen; deoxyriboses
C) ionic; phosphate groups
D) hydrogen; nitrogenous bases
E) ionic; nitrogenous bases

Answer: D
Explanation: A)
B)
C)
D)
E)

Table 2.1

$^{16}_{8}O$ $^{12}_{6}C$ $^{1}_{1}H$

20) Using the information in Table 2.1, calculate the molecular weight of ethanol, $C_2H_5OH$. 20) _____

A) 33
B) 34
C) 96
D) 46
E) The answer cannot be determined.

Answer: D
Explanation: A)
B)
C)
D)
E)

21) What is the type of bond between carbon, hydrogen, and oxygen atoms in organic molecules? 21) _____

A) ionic bond B) hydrogen bond C) covalent bond

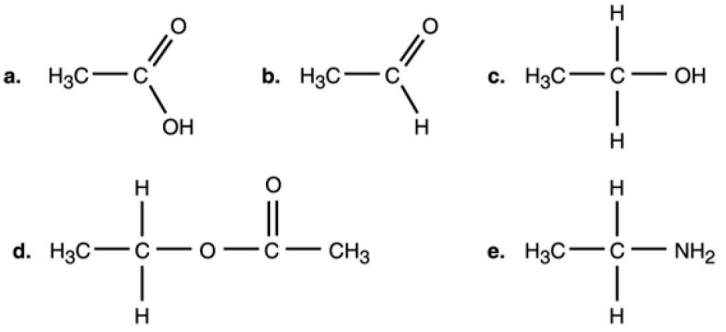
Answer: C
Explanation: A)
B)
C)

22) Which of the following statements is FALSE? 22) _____

A) Water molecules are formed by hydrolysis.
B) Salts readily dissolve in water.
C) Water freezes from the top down.
D) Water is a polar molecule.
E) Water is a part of a dehydration synthesis reaction.

Answer: A
Explanation: A)
B)
C)
D)
E)

Figure 2.1




23) Which compound in Figure 2.1 is an organic acid? 23) _____

A) a B) b C) c D) d E) e

Answer: A

Explanation: A)
B)
C)
D)
E)

24) In Figure 2.1, which is an alcohol? 24) _____

A) a B) b C) c D) d E) e

Answer: C

Explanation: A)
B)
C)
D)
E)

25) Which type of molecule is composed of $(CH_2O)$ units? 25) _____

A) lipid B) protein C) carbohydrate D) nucleic acid

Answer: C

Explanation: A)
B)
C)
D)

26) What is the type of bond between the hydrogen of one molecule and the nitrogen of another molecule? 26) _____

A) ionic bond
B) hydrophobic bond
C) hydrogen bond
D) disulfide bond
E) covalent bond

Answer: C

Explanation: A)
B)
C)
D)
E)

27) Which type of molecule NEVER contains a phosphate group? 27) _____

A) nucleic acid B) triglycerides C) lipid D) ATP

Answer: B

Explanation: A)
B)
C)
D)

28) Which of the following statements regarding protein structure is FALSE? 28) _____

A) Secondary structures are formed only from hydrogen bonds.
B) Tertiary structures are formed only from covalent bonds.
C) Quaternary structures involved multiple polypeptides.
D) The primary structure is formed by covalent bonding between amino acid subunits.

Answer: B

Explanation: A)
B)
C)
D)

29) Which of the following pairs is mismatched? 29) _____

A) $H_2SO_4 \rightleftharpoons 2H^+ + SO_4^{2-}$ — acid

B) $MgSO_4 \rightleftharpoons Mg^{2+} + SO_4^{2-}$ — salt

C) $KH_2PO_4 \rightleftharpoons K^+ + H_2PO_4^-$ — acid

D) $NaOH \rightleftharpoons Na^+ + OH^-$ — base

E) $HF \rightleftharpoons H^+ + F^-$ — acid

Answer: C

Explanation: A)
B)
C)
D)
E)

30) Which type of molecule contains $-NH_2$ groups? 30) _____

A) nucleic acid B) protein C) triglycerides D) carbohydrate

Answer: B

Explanation: A)
B)
C)
D)

31) Which of the following is the type of bond between molecules of water in a beaker of water? 31) _____

A) covalent bond B) hydrogen bond C) ionic bond

Answer: B

Explanation: A)
B)
C)

32) Two glucose molecules are combined to make a maltose molecule. What is the chemical formula for maltose? 32) _____

A) $C_{12}H_{22}O_{11}$
B) $C_{12}H_{24}O_{12}$
C) $C_{12}H_{23}O_{10}$
D) $C_6H_{12}O_6$
E) $C_3H_6O_3$

Answer: A
Explanation: A)
B)
C)
D)
E)

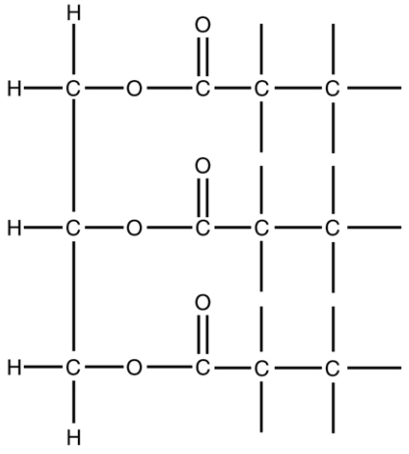
33) If an amino acid contained a hydrocarbon as its side group, in which of the following categories could it be appropriately designated? 33) _____

A) polar
B) basic
C) hydrophilic
D) acidic
E) nonpolar

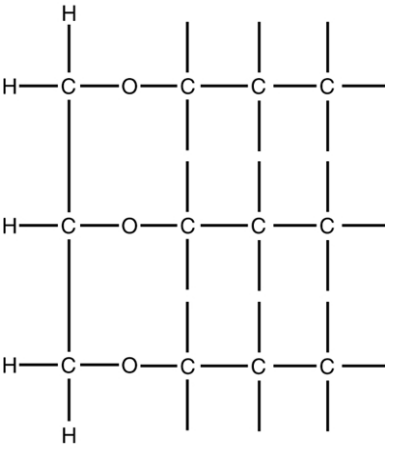
Answer: E
Explanation: A)
B)
C)
D)
E)

Figure 2.2

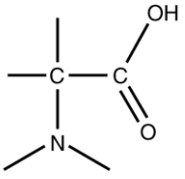
a.



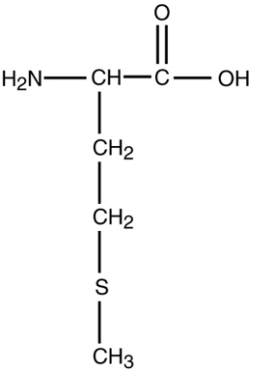
b.



c.



d.



34) Archaea differ from bacteria in the composition of the cell membrane lipids. Archaea have ether-bonded lipids, shown in part _____ of Figure 2.2, and bacteria have ester-bonded lipids, shown in part _____ of Figure 2.2. 34) _____

A) b; c B) d; c C) a; d D) b; a E) c; d

Answer: D

Explanation: A)
B)
C)
D)
E)

35) Which type of molecule contains the alcohol glycerol? 35) _____

A) carbohydrate B) protein C) phospholipids D) DNA

Answer: C

Explanation: A)
B)
C)
D)

36) Starch, dextran, glycogen, and cellulose are polymers of 36) _____
A) amino acids.
B) fatty acids.
C) glucose.
D) acids.
E) nucleic acids.

Answer: C
Explanation: A)
B)
C)
D)
E)

37) Which molecule is composed of a chain of amino acids? 37) _____
A) nucleic acid B) lipid C) protein D) carbohydrate

Answer: C
Explanation: A)
B)
C)
D)

38) *Desulfovibrio* bacteria can perform the following reaction: $S^{6-} \rightarrow S^{2-}$. These bacteria are 38) _____
A) hydrolyzing sulfur. B) oxidizing sulfur.
C) synthesizing sulfur. D) reducing sulfur.

Answer: B
Explanation: A)
B)
C)
D)

39) Radioisotopes are frequently used to label molecules in a cell. The fate of atoms and molecules in a cell can then be followed. Assume *Saccharomyces cerevisiae* is grown in a nutrient medium containing the radioisotope $^{32}P$. After a 48-hour incubation, the majority of the $^{32}P$ would be found in the *S. cerevisiae's* 39) _____
A) water.
B) carbohydrates.
C) cell wall.
D) proteins.
E) plasma membrane.

Answer: E
Explanation: A)
B)
C)
D)
E)

40) If you viewed one single protein using a microscope, you would observe multiple _____ structures. 40) _____

A) secondary
B) tertiary
C) primary
D) primary and secondary
E) secondary and tertiary

Answer: A
Explanation: A)
B)
C)
D)
E)

41) Identify the following reaction: Lactose + $H_2O \rightarrow$ Glucose + Galactose 41) _____

A) exchange reaction
B) dehydration synthesis reaction
C) reversible reaction
D) ionic reaction
E) hydrolysis reaction

Answer: E
Explanation: A)
B)
C)
D)
E)

42) Which are the primary molecules making up plasma membranes in cells? 42) _____

A) nucleic acids B) carbohydrates C) lipids D) proteins

Answer: C
Explanation: A)
B)
C)
D)

43) Which of the following statements about the atom $^{12}_{6}C$ is FALSE? 43) _____

A) Its atomic weight is 12.
B) Its atomic number is 6.
C) It has 12 neutrons in its nucleus.
D) It has 6 protons in its nucleus.
E) It has 6 electrons orbiting the nucleus.

Answer: C
Explanation: A)
B)
C)
D)
E)

44) Based upon the valence numbers of the elements magnesium (2) and hydrogen (1), predict how many covalent bonds would form between these atoms to achieve the full complement of electrons in their outermost energy shells. 44) _____

A) one B) two C) three D) four

Answer: B

Explanation: A)
B)
C)
D)

45) Which of the following is the type of bond holding $K^+$ and $I^-$ ions in KI? 45) _____

A) covalent bond B) ionic bond C) hydrogen bond

Answer: B

Explanation: A)
B)
C)

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

46) Any compound that contains carbon is only considered to be organic. 46) _____

Answer: True False

Explanation:

47) The density of liquid water is greater than the density of ice. 47) _____

Answer: True False

Explanation:

48) Elements only achieve the full complement of electrons in outermost energy cells by donating or sharing electrons. 48) _____

Answer: True False

Explanation:

49) All forms of life function optimally at a pH of 7. 49) _____

Answer: True False

Explanation:

50) The formation of ADP from ATP can be defined as a hydrolytic reaction. 50) _____

Answer: True False

Explanation:

51) There are some forms of life on Earth that can survive without water. 51) _____

Answer: True False

Explanation:

52) Individual covalent bonds are stronger than individual ionic bonds. 52) _____

Answer: True False

Explanation:

53) Covalent bonds are always shared equally. 53) _____

Answer: True False
Explanation:

54) All chemical reactions are, in theory, reversible. 54) _____

Answer: True False
Explanation:

55) A basic solution is expected to contain more hydrogen ions than hydroxyl ions. 55) _____

Answer: True False
Explanation:

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

56) A bacterium that grows at a temperature of 37°C transports both glucose and NaCl into its cytoplasm. Which is most easily dissolved in the cytoplasm? Explain how the bonds of these molecules impact disassociation rate.

Answer:

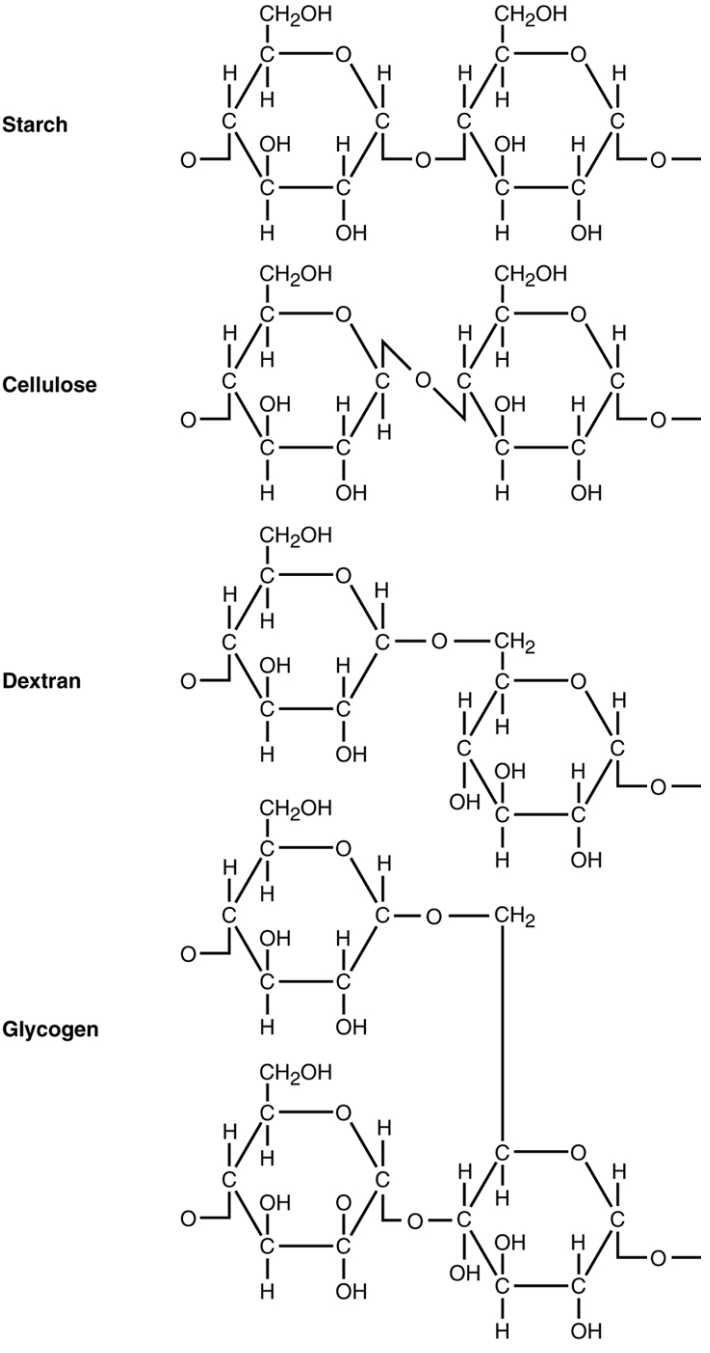
57) Describe how the properties of phospholipids make these molecules well suited for plasma membranes.

Answer:

58) A scientist claims that when a protein is denatured, it can be expected that its secondary structure will more likely be retained when compared to all other levels of protein structure structures. Do you agree? Explain.

Answer:

Figure 2.5




59) Use Figure 2.5 to answer the following. Starch, cellulose, dextran, and glycogen are polysaccharides. How are they similar? To what are their different properties due? Why can't an enzyme that hydrolyzes starch degrade cellulose?

Answer:

60) Compare a molecule of a nucleotide to ATP. Could a cell simply insert ATP into DNA without altering it? Explain.

Answer:

Answer Key
Testname: C2

1) D
2) A
3) B
4) C
5) C
6) C
7) C
8) E
9) B
10) B
11) D
12) C
13) B
14) C
15) C
16) C
17) A
18) D
19) D
20) D
21) C
22) A
23) A
24) C
25) C
26) C
27) B
28) B
29) C
30) B
31) B
32) A
33) E
34) D
35) C
36) C
37) C
38) B
39) E
40) A
41) E
42) C
43) C
44) B
45) B
46) FALSE
47) TRUE
48) FALSE
49) FALSE
50) TRUE

Answer Key
Testname: C2

51) FALSE
52) TRUE
53) FALSE
54) TRUE
55) FALSE
56)
57)
58)
59)
60)