Exam

Name_____

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

1) Which of the following statements about the atom $^{12}_{6}C$ is FALSE? 1) _____

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

Answer: A

2) Table 2.1 2) _____

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

Using the information in Table 2.1, calculate the molecular weight of ethanol, C_2H_5OH.

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

Answer: A

3) Antacids neutralize acid by the following reaction. Identify the salt in the following equation: 3) _____

$Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + H_2O$

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

Answer: D

4) Which of the following statements is FALSE? 4) _____

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

Answer: C

5) Which of the following is the type of bond holding K^+ and I^- ions in KI? 5) _____

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

Answer: A

6) Which of the following is the type of bond between molecules of water in a beaker of water? 6) _____
A) ionic bond B) covalent bond C) hydrogen bond

Answer: C

7) What is the type of bond holding hydrogen and oxygen atoms together in a single H_2O molecule? 7) _____
A) ionic bond B) covalent bond C) hydrogen bond

Answer: B

8) Identify the following reaction: Glucose + Fructose → Sucrose + Water 8) _____
A) dehydration synthesis reaction
B) hydrolysis reaction
C) exchange reaction
D) reversible reaction
E) ionic reaction

Answer: A

9) Identify the following reaction: Lactose + H_2O → Glucose + Galactose 9) _____
A) dehydration synthesis reaction
B) hydrolysis reaction
C) exchange reaction
D) reversible reaction
E) ionic reaction

Answer: B

10) Identify the following reaction: $HCl + NaHCO_3 \rightarrow NaCl + H_2CO_3$ 10) _____
A) dehydration synthesis reaction
B) hydrolysis reaction
C) exchange reaction
D) reversible reaction
E) ionic reaction

Answer: C

11) Identify the following reaction: $NH_4OH \rightleftharpoons NH_3 + H_2O$ 11) _____
A) dehydration synthesis reaction
B) hydrolysis reaction
C) exchange reaction
D) reversible reaction
E) ionic reaction

Answer: D

12) Which type of molecule contains the alcohol glycerol? 12) _____
A) protein B) phospholipids C) carbohydrate D) DNA

Answer: B

13) Which type of molecule is composed of (CH_2O) units? 13) _____
A) nucleic acid B) lipid C) carbohydrate D) protein

Answer: C

14) Which type of molecule contains $-NH_2$ (amino) groups? 14) _____

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

Answer: C

15) Which type of molecule NEVER contains a phosphate group? 15) _____

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

Answer: C

16) 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. 16) _____

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

Answer: B

17) Table 2.1 17) _____

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

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

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

Answer: B

18) Which of the following statements regarding protein structure is FALSE? 18) _____

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

Answer: B

19) Which of the following pairs is mismatched? 19) _____

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

Answer: B

20) Table 2.2 20) _____

$NaOH \rightleftharpoons Na^+ + OH^-$ — 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

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

Answer: A

21) What is the type of weak bond between the hydrogen of one molecule and the nitrogen of another molecule, where the two don't actively share an electron? 21) _____
A) hydrogen bond
B) hydrophobic bond
C) disulfide bond
D) covalent bond
E) ionic bond

Answer: A

22) What is the type of strong chemical bond between carbon, hydrogen, and oxygen atoms in a single organic molecule? 22) _____
A) hydrogen bond B) ionic bond C) covalent bond

Answer: C

23) What is the type of bond between ions in salt? 23) _____
A) hydrogen bond B) covalent bond C) ionic bond

Answer: C

24) 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? 24) _____
A) thymine B) guanine C) uracil D) nitrogen E) phosphate

Answer: C

25) Structurally, ATP is most like which type of molecule? 25) _____
A) carbohydrate B) lipid C) protein D) nucleic acid

Answer: D

26) What do genes consist of? 26) _____
A) carbohydrates B) lipids C) proteins D) nucleic acids

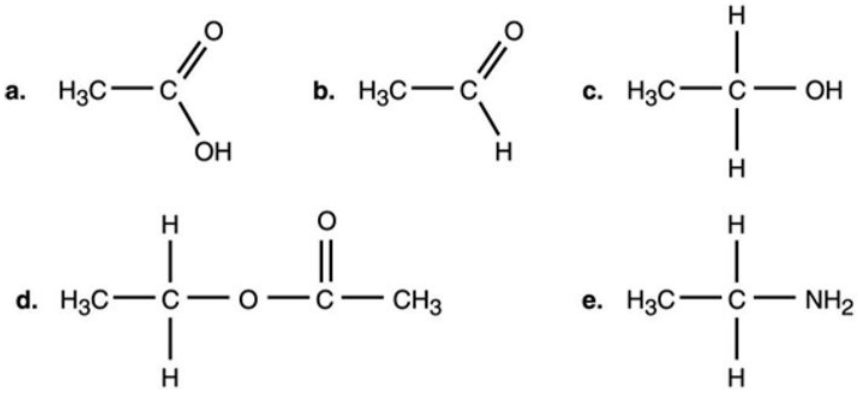
Answer: D

27) Which molecule is composed of a chain of amino acids? 27) _____
A) carbohydrate B) lipid C) protein D) nucleic acid
Answer: C

28) Which are the primary molecules making up plasma membranes in cells? 28) _____
A) carbohydrates B) lipids C) proteins D) nucleic acids
Answer: B

29) The antimicrobial drug imidazole inhibits sterol synthesis. This would most likely interfere with 29) _____
A) bacterial cell walls.
B) prokaryotic plasma membranes.
C) fungal cell walls.
D) genes.
E) eukaryotic plasma membranes.
Answer: E

Figure 2.1



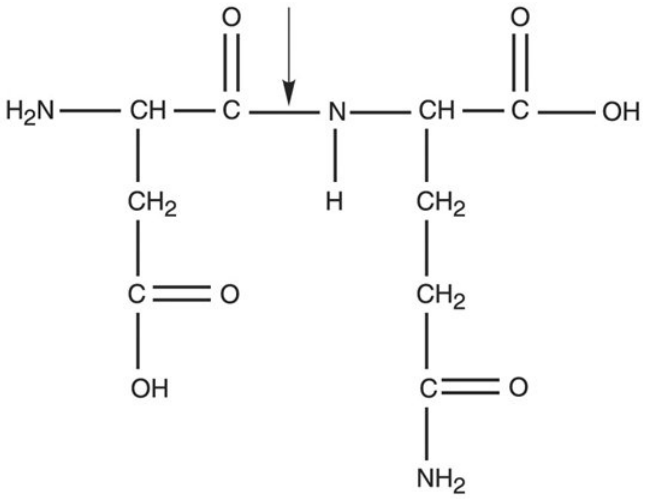
30) In Figure 2.1, which is an alcohol? 30) _____
A) a B) b C) c D) d E) e
Answer: C

31) Which compound in Figure 2.1 is an ester? 31) _____
A) a B) b C) c D) d E) e
Answer: D

32) Which compound in Figure 2.1 is an organic acid? 32) _____
A) a B) b C) c D) d E) e
Answer: A

33) Most amino acids found in cells demonstrate what type of chirality? 33) _____
A) A–isomers
B) L–isomers
C) D–isomers
D) C–isomers
E) B–isomers
Answer: B

34) Figure 2.3 34) _____



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

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

Answer: D

35) 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 to help it cope with the decrease in temperature? 35) _____

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

Answer: C

36) 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* 36) _____

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

Answer: A

37) 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* 37) _____

A) cell wall.
B) water.
C) proteins.
D) plasma membrane.
E) carbohydrates.

Answer: D

38) Starch, dextran, glycogen, and cellulose are polymers of 38) _____

A) amino acids.
B) fatty acids.
C) glucose.
D) acids.
E) nucleic acids.

Answer: C

39) Which of the following is a base? 39) _____

A) H_2CO
B) $C_2H_5OCOOH \rightarrow H^+ + C_2H_5OCOO^-$
C) $NaOH \rightarrow Na^+ + OH^-$
D) $H_2O \rightarrow H^+ + OH^-$
E) C_2H_5OH

Answer: C

40) Two glucose molecules are combined to make a maltose molecule. What is the chemical formula for maltose? 40) _____

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

Answer: E

41) If an amino acid contained a hydrocarbon (a group of multiple carbons and hydrogens linked together) as its side group, in which of the following categories could it be appropriately designated? 41) _____

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

Answer: B

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

42) Elements only achieve the full complement of electrons in outermost energy cells by donating away or sharing electrons. 42) _____
Answer: True False

43) Covalent bonds are always shared equally. 43) _____
Answer: True False

44) Individual covalent bonds are stronger than individual ionic bonds. 44) _____
Answer: True False

45) All chemical reactions are, in theory, reversible. 45) _____
Answer: True False

46) The formation of ADP from ATP can be defined as a hydrolytic reaction. 46) _____
Answer: True False

47) The density of liquid water is greater than the density of ice. 47) _____
Answer: True False

48) A basic solution is expected to contain more hydrogen ions than hydroxyl ions. 48) _____
Answer: True False

49) All forms of life function optimally at a pH of 7. 49) _____
Answer: True False

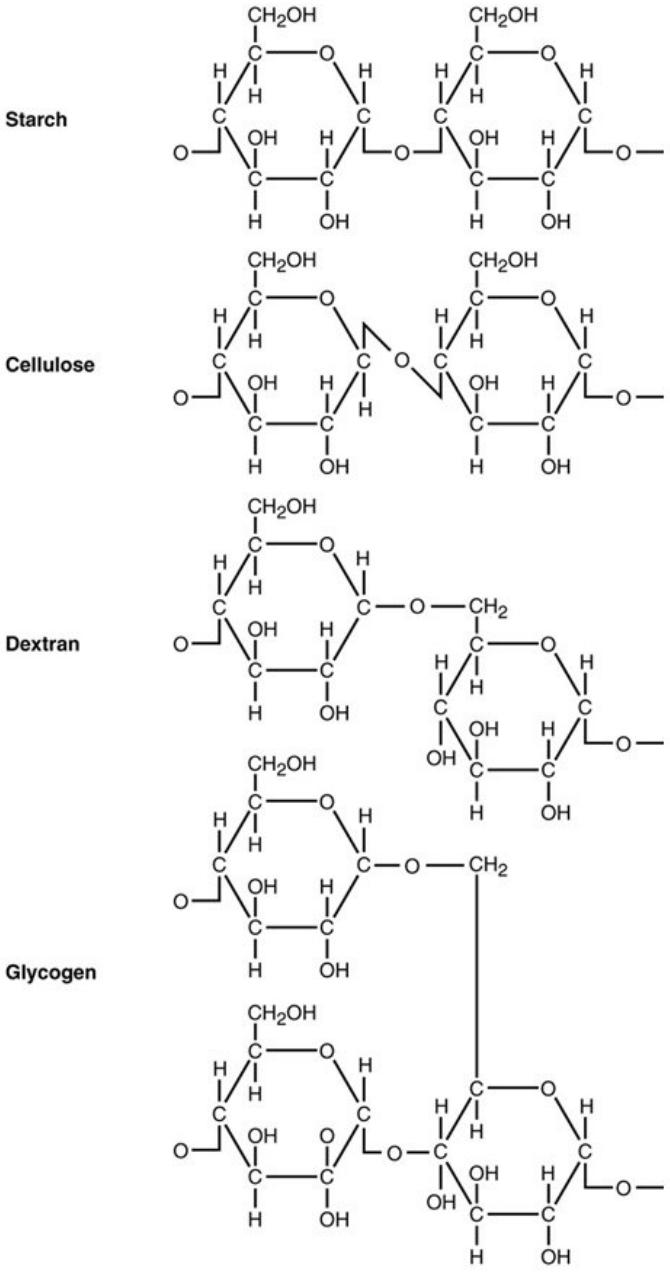
50) There are some forms of life on Earth that can survive without water. 50) _____
Answer: True False

51) Any compound that contains carbon is considered to be strictly organic. 51) _____
Answer: True False

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

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

53) Figure 2.5



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:

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

Answer:

55) 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:

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: