Chapter 2 Test

Objective Questions

b

Understanding

1. Which of the following statements is not true about the atom \( ^{12}\text{C} \)?
   a. It has 6 protons in its nucleus.
   b. It has 12 neutrons in its nucleus.
   c. It has 6 electrons orbiting the nucleus.
   d. Its atomic number is 6.
   e. Its atomic weight is 12.


b

Analysis

2. Calculate the molecular weight of ethyl alcohol, \( \text{C}_2\text{H}_5\text{OH} \), using the information in the box at the right.
   \[ \begin{array}{c}
   \text{O}^{16} \\
   \text{C}^{12} \\
   \text{H}^1 \\
   \end{array} \]
   a. 96
   b. 46
   c. 34
   d. 33
   e. Can’t tell


c

Recall

3. Which of the following is not true about enzymes?
   a. Enzymes are made of proteins.
   b. Enzymes lower the activation energy of a reaction.
   c. Enzymes increase the number of collisions in a chemical reaction.
   d. Enzymes are not used up in a reaction.
   e. None of the above.


b

Recall

4. Which of the following is not true?
   a. Salts readily dissolve in water.
   b. Water molecules are formed by hydrolysis.
   c. Water freezes from the top down.
   d. Water is a part of a dehydration reaction.
   e. Water is a polar molecule.

Analysis

Match the following choices to questions 5 through 7.
   a. Ionic bond
   b. Covalent bond
   c. Hydrogen bond

a

5. The type of bond holding \( \text{K}^+ \) and \( \text{I}^- \) ions in \( \text{KI} \).

c

6. The type of bond between molecules of water in a beaker of water.

b

7. The type of bonds holding hydrogen and oxygen atoms in the molecule \( \text{H}_2\text{O} \).
Analysis

Use the following choices to identify the reactions shown in questions 8 through 11. Choices may be used once, more than once, or not at all.

- Synthesis reaction
- Hydrolysis reaction
- Exchange reaction
- Reversible reaction
- Dehydration reaction

8. Glucose + fructose $\rightarrow$ sucrose + water

9. Lactose + H$_2$O $\rightarrow$ glucose + galactose

10. HCl + NaHCO$_3$ $\rightarrow$ NaCl + H$_2$CO$_3$

11. NH$_4$OH $\rightarrow$ NH$_3$ + H$_2$O

Recall

Use the following choices to identify the types of molecules described in questions 12 through 15. Choices may be used once, more than once, or not at all.

- Carbohydrates
- Lipids
- Nucleic acids
- Proteins
- None of the above

12. Contains the alcohol glycerol.

13. Composed of (CH$_2$O) units.

14. Contains $\sim$NH$_2$ groups.

15. Never contains a phosphate group.

16. Which of the following statements is not true about the atom $^{16}$O? 
   - It has 8 protons in its nucleus.
   - It has 8 electrons in its nucleus.
   - It has 8 neutrons in its nucleus.
   - Its atomic number is 8.
   - Its atomic weight is 16.

17. Calculate the number of moles in 92 grams of ethyl alcohol, C$_2$H$_5$OH, using the information in the box at the right.
   - 1
   - 2
   - 3
   - 4
   - Can't tell
18. Which of the following statements is not true?
   a. Enzymes are made of proteins.
   b. Enzymes are used up in a chemical reaction.
   c. Enzymes lower the activation energy required for a reaction.
   d. Enzymes increase the probability of a reaction.
   e. None of the above.

19. Which of the following pairs is mismatched?
   a. NaOH $\rightarrow \text{Na}^+ + \text{OH}^-$ — base
   b. HF $\rightarrow \text{H}^+ + \text{F}^-$ — acid
   c. MgSO$_4$ $\rightarrow \text{Mg}^{2+} + \text{SO}_4^{2-}$ — salt
   d. KH$_2$PO$_4$ $\rightarrow \text{K}^+ + \text{H}_2\text{PO}_4^-$ — acid
   e. H$_2$SO$_4$ $\rightarrow 2\text{H}^+ + \text{SO}_4^{2-}$ — acid

20. Which of the following is not true about the reactions listed in question 19?
   a. They are exchange reactions.
   b. They are ionization reactions.
   c. They occur when the reactants are dissolved in water.
   d. They are dissociation reactions.
   e. They are reversible reactions.

Recall
Match the following choices to questions 21 through 23.
   a. Ionic bond
   b. Covalent bond
   c. Hydrogen bond

21. The type of bond between the hydrogen of one molecule and the nitrogen of another molecule.

22. The type of bonds between carbon, hydrogen, and oxygen atoms in organic molecules.

23. The type of bond between ions in a salt.

Analysis
Use the following choices to identify the reactions shown in questions 24 through 26. Choices may be used once, more than once, or not at all.
   a. Synthesis reaction
   b. Hydrolysis reaction
   c. Exchange reaction
   d. Reversible reaction
   e. Dehydration reaction

24. H$_2$O + CO$_2$ $\rightarrow$ H$_2$CO$_3$

25. Glycine + lysine $\rightarrow$ dipeptide + H$_2$O

26. Sucrose + H$_2$O $\rightarrow$ glucose + fructose
Recall

Use the following choices to identify the molecules described in questions 27 through 30. Choices may be used once, more than once, or not at all.

- Carbohydrates
- Lipids
- Proteins
- Nucleic acids
- None of the above

27. Structurally, ATP is most like this type of molecule.

28. Chemicals in genes.

29. Composed of a chain of amino acids.

30. Primary molecules making up plasma membranes in cells.

31. Oil-degrading bacteria are naturally present in the environment but cannot degrade an oil spill fast enough to avoid ecological damage. The actions of these bacteria can be speeded up by

- Providing oil for them.
- Providing sugar as a carbon source.
- Providing nitrogen and phosphorus.
- Adding water.
- All of the above.

Analysis

Use the following choices to answer questions 32 through 34. Choices may be used once, more than once, or not at all.

- An alcohol
- An ester
- An organic acid
35. Archaea differ from eubacteria in the composition of the cell membrane lipids. Archaea have ether-bonded lipids shown in 1 below and eubacteria have ester-bonded lipids shown in 2 below.

(a) \[ \text{ } \]
(b) \[ \text{ } \]
(c) \[ \text{ } \]
(d) \[ \text{ } \]

a. 1-b; 2-a
b. 1-b; 2-c
c. 1-a; 2-c
d. 1-c; 2-d
e. None of the above

Analysis

Use the following choices to answer questions 36 and 37. Choices may be used once, more than once, or not at all.

- Ionic bond
- Hydrogen bond
- Peptide bond
- Double covalent bond
- None of the above
36. Which kind of bond is this:

37. Which kind of bond is this:

38. 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?
   a. Increase the number of phosphate groups.
   b. Increase the viscosity.
   c. Increase the number of saturated chains.
   d. Increase the number of unsaturated chains.
   e. No changes are necessary.

39. Assume Saccharomyces cerevisiae is grown in a nutrient medium containing the radioisotope 35S. After 48 hr incubation, the 35S would most likely be found in the S. cerevisiae’s
   a. Carbohydrates.
   b. Nucleic acids.
   c. Water.
   d. Lipids.
   e. Proteins.
a Understanding

40. Assume *Saccharomyces cerevisiae* is grown in a nutrient medium containing the radioisotope $^{32}\text{P}$. After 48 hr incubation, the $^{32}\text{P}$ would most likely be found in the *S. cerevisiae*’s
   b. Cell wall.
   c. Water.
   d. Proteins.
   e. None of the above.

b Recall

41. Starch, dextran, glycogen, and cellulose are polymers of
   a. Amino acids.
   b. Glucose.
   c. Fatty acids.
   d. Nucleic acids.
   e. None of the above.

c Analysis

42. Which of the following is a base?
   a. $\text{C}_2\text{H}_5\text{OCOOH} \rightarrow \text{H}^+ + \text{C}_2\text{H}_5\text{OCOO}^-$
   b. $\text{C}_2\text{H}_5\text{OH}$
   c. $\text{NaOH} \rightarrow \text{Na}^+ + \text{OH}^-$
   d. $\text{H}_2\text{O} \rightarrow \text{H}^+ + \text{OH}^-$
   e. All of the above

d Analysis

43. Two glucose molecules are combined to make a maltose molecule. The chemical formula for maltose is
   a. $\text{C}_3\text{H}_6\text{O}_3$
   b. $\text{C}_6\text{H}_{12}\text{O}_6$
   c. $\text{C}_{12}\text{H}_{24}\text{O}_{12}$
   d. $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
   e. $\text{C}_{12}\text{H}_{23}\text{O}_{10}$

d Understanding

44. *Desulfovibrio* bacteria can perform the following reaction:
    $\text{S}^6^- \rightarrow \text{S}^2^-$
    These bacteria are
    a. Synthesizing sulfur.
    b. Reducing sulfur.
    c. Hydrolyzing sulfur.
    d. Oxidizing sulfur.

c Analysis

45. The antimicrobial drug imidazole inhibits sterol synthesis. This would most likely interfere with
   a. Bacterial cell walls.
   b. Fungal cell walls.
   c. Eucaryotic plasma membranes.
   d. Procaryotic plasma membranes.
   e. Genes.