

Chapter 02: Chemistry of Life
Patton: The Human Body in Health & Disease, 8th Edition

MULTIPLE CHOICE

1. Which subatomic particle has a positive charge?
- Proton
 - Neutron
 - Electron
 - Nucleus

ANS: A PTS: 1 DIF: Memorization
REF: p. 25 TOP: Atoms

2. Which subatomic particle has no charge?
- Proton
 - Neutron
 - Electron
 - Nucleus

ANS: B PTS: 1 DIF: Memorization
REF: p. 25 TOP: Atoms

3. Which subatomic particle has a negative charge?
- Proton
 - Neutron
 - Electron
 - Nucleus

ANS: C PTS: 1 DIF: Memorization
REF: p. 25 TOP: Atoms

4. Which subatomic particle is found in the nucleus?
- Proton
 - Neutron
 - Electron
 - Both A and B

ANS: D PTS: 1 DIF: Memorization
REF: p. 25 TOP: Atoms

5. Electrons are found
- in the nucleus.
 - in orbitals.
 - at various distances from the nucleus called energy levels.
 - both B and C.

ANS: D PTS: 1 DIF: Application REF: p. 25
TOP: Atoms

6. The atomic number of an atom is the number of

- a. protons.
- b. neutrons.
- c. electrons.
- d. both A and B.

ANS: A PTS: 1 DIF: Memorization
REF: p. 25 TOP: Atoms

7. The atomic mass of an atom is the number of
- a. protons.
 - b. neutrons.
 - c. electrons.
 - d. sum of A and B.

ANS: D PTS: 1 DIF: Memorization
REF: p. 25 TOP: Atoms

8. The subatomic particle that determines how an atom unites with other atoms is the
- a. proton.
 - b. neutron.
 - c. electron.
 - d. both A and B.

ANS: C PTS: 1 DIF: Memorization
REF: p. 26 TOP: Atoms

9. An atom that contains 20 protons, 21 neutrons, and 20 electrons has an atomic number of
- a. 20.
 - b. 41.
 - c. 40.
 - d. 61.

ANS: A PTS: 1 DIF: Application REF: p. 25
TOP: Atoms

10. An atom that contains 20 protons, 21 neutrons, and 20 electrons has an atomic mass of
- a. 20.
 - b. 41.
 - c. 40.
 - d. 61.

ANS: B PTS: 1 DIF: Application REF: p. 25
TOP: Atoms

11. An atom that contains 20 protons, 21 neutrons, and 20 electrons has
- a. a positive charge.
 - b. a negative charge.
 - c. no charge (electrically neutral).
 - d. not enough information is given to determine its charge.

ANS: C PTS: 1 DIF: Application REF: p. 25
TOP: Atoms

12. Which of these elements is not one of the four elements that make up most of the human body?
- Carbon
 - Nitrogen
 - Oxygen
 - Calcium

ANS: D

PTS: 1

DIF: Memorization

REF: p. 26

TOP: Elements, molecules, and compounds

13. Bonds that usually dissociate in water to form electrolytes are _____ bonds.
- ionic
 - covalent
 - organic
 - both B and C

ANS: A

PTS: 1

DIF: Memorization

REF: p. 27

TOP: Ionic bonds

14. The bonds formed when electrons are shared are called
- electrolytes.
 - ionic bonds.
 - covalent bonds.
 - inorganic bonds.

ANS: C

PTS: 1

DIF: Memorization

REF: p. 27

TOP: Covalent bonds

15. The process of dehydration synthesis
- uses water to turn large molecules into smaller ones.
 - adds a molecule of water to the reactants.
 - converts smaller molecules into larger ones by removing water.
 - both A and B.

ANS: C

PTS: 1

DIF: Memorization

REF: p. 29

TOP: Water

16. The process of hydrolysis
- uses water to turn large molecules into smaller ones.
 - removes a molecule of water from the reactants.
 - converts smaller molecules into larger molecules by removing water.
 - both B and C.

ANS: A

PTS: 1

DIF: Memorization

REF: p. 29

TOP: Water

17. Acids have
- a pH less than 7.
 - more H^+ ions than OH^- ions.
 - more OH^- than H^+ ions.
 - both A and B.

ANS: D

PTS: 1

DIF: Memorization

REF: p. 30 TOP: Acids, bases, and salts

18. Bases have
- a pH less than 7.
 - more H^+ ions than OH^- ions.
 - a pH greater than 7.
 - both A and B.

ANS: C PTS: 1 DIF: Memorization
REF: p. 30 TOP: Acids, bases, and salts

19. A solution with a pH of 4
- has 100 times more H^+ ions than a solution with a pH of 2.
 - has 100 times fewer H^+ ions than a solution with a pH of 2.
 - has 100 times fewer H^+ ions than a solution with a pH of 6.
 - is basic.

ANS: B PTS: 1 DIF: Synthesis REF: p. 30
TOP: Acids, bases, and salts

20. The end product of a reaction between a strong acid and a strong base is
- water.
 - a salt.
 - a weak acid and a weak base.
 - both A and B.

ANS: D PTS: 1 DIF: Memorization
REF: p. 30 TOP: Acids, bases, and salts

21. Which of the following is an example of a monosaccharide?
- Sucrose
 - Glucose
 - Lactose
 - Glycogen

ANS: B PTS: 1 DIF: Memorization
REF: p. 31 TOP: Carbohydrates

22. Which of the following is an example of a polysaccharide?
- Sucrose
 - Glucose
 - Lactose
 - Glycogen

ANS: D PTS: 1 DIF: Memorization
REF: p. 31 TOP: Carbohydrates

23. Triglycerides
- are steroid lipids.
 - have a phosphorus-containing unit on one end.
 - have two fatty acids.
 - have three fatty acids.

ANS: D PTS: 1 DIF: Memorization
REF: p. 32 TOP: Lipids

24. Phospholipids
- contain glycerol.
 - contain two fatty acids.
 - contain three fatty acids.
 - both A and B.

ANS: D PTS: 1 DIF: Memorization
REF: p. 32 TOP: Lipids

25. Cholesterol
- contains three fatty acids.
 - contains two fatty acids.
 - is a steroid lipid.
 - contains glycerol.

ANS: C PTS: 1 DIF: Memorization
REF: p. 33 TOP: Lipids

26. Which of the following is not true of proteins?
- They have water-repelling tails.
 - They are made up of amino acids.
 - They contain nitrogen.
 - They contain peptide bonds.

ANS: A PTS: 1 DIF: Memorization
REF: p. 33 TOP: Proteins

27. Which of the following is a structural protein?
- Collagen
 - Keratin
 - Enzymes
 - Both A and B

ANS: D PTS: 1 DIF: Memorization
REF: p. 34 TOP: Proteins

28. Which of the following is a functional protein?
- Collagen
 - Keratin
 - Enzymes
 - Both A and B

ANS: C PTS: 1 DIF: Memorization
REF: p. 34 TOP: Proteins

29. Which of the following substances is not found in a DNA nucleotide?
- Phosphate unit
 - Glycerol molecule
 - Nitrogen base
 - A sugar

ANS: B PTS: 1 DIF: Memorization
REF: p. 35 TOP: Nucleic acids

30. Which substance is found only in DNA?

- a. Adenine
- b. Guanine
- c. Thymine
- d. Cytosine

ANS: C PTS: 1 DIF: Memorization
REF: p. 35 TOP: Nucleic acids

31. The nitrogen atom has a total of seven electrons. To have a full outer energy level, it would have to

- a. add one electron.
- b. lose one electron.
- c. add three electrons.
- d. lose two electrons.

ANS: C PTS: 1 DIF: Synthesis REF: p. 26
TOP: Atoms

32. Which type of chemical bond does not result in the formation of a new molecule?

- a. Hydrogen bond
- b. Ionic bond
- c. Covalent bond
- d. None of the above; all chemical bonds result in the formation of a new molecule.

ANS: A PTS: 1 DIF: Memorization
REF: p. 28 TOP: Hydrogen bonds

MATCHING

Match each part of the atom with its corresponding description.

- a. Protons
- b. Neutrons
- c. Electrons
- d. Both protons and neutrons

1. Part of the atom that is found in the nucleus
2. Part of the atom that is found in orbitals around the nucleus
3. Part of the atom that gives an atom its atomic number
4. Part of the atom that when combined with the protons gives the atom its atomic mass

- | | | |
|------------|------------|-------------------|
| 1. ANS: D | PTS: 1 | DIF: Memorization |
| REF: p. 25 | TOP: Atoms | |
| 2. ANS: C | PTS: 1 | DIF: Memorization |
| REF: p. 25 | TOP: Atoms | |
| 3. ANS: A | PTS: 1 | DIF: Memorization |
| REF: p. 25 | TOP: Atoms | |
| 4. ANS: B | PTS: 1 | DIF: Memorization |

REF: p. 25

TOP: Atoms

Match each organic compound with its corresponding description.

- a. Carbohydrates
 - b. Triglycerides
 - c. Phospholipids
 - d. Cholesterol
 - e. Proteins
 - f. RNA
 - g. DNA
5. Compound whose basic unit is a monosaccharide
 6. Nucleic acid that contains the nitrogen base uracil
 7. Lipid that is used to make hormones such as estrogen and testosterone
 8. Nucleic acid that contains the nitrogen base thymine
 9. Lipid that is composed of a molecule of glycerol and three fatty acids
 10. Lipid that has two fatty acids and is important in the cell membrane
 11. Can be enzymes

- | | | |
|------------|--------------------|-------------------|
| 5. ANS: A | PTS: 1 | DIF: Memorization |
| REF: p. 31 | TOP: Carbohydrates | |
| 6. ANS: F | PTS: 1 | DIF: Memorization |
| REF: p. 35 | TOP: Nucleic acids | |
| 7. ANS: D | PTS: 1 | DIF: Memorization |
| REF: p. 33 | TOP: Lipids | |
| 8. ANS: G | PTS: 1 | DIF: Memorization |
| REF: p. 35 | TOP: Nucleic acids | |
| 9. ANS: B | PTS: 1 | DIF: Memorization |
| REF: p. 32 | TOP: Lipids | |
| 10. ANS: C | PTS: 1 | DIF: Memorization |
| REF: p. 32 | TOP: Lipids | |
| 11. ANS: E | PTS: 1 | DIF: Memorization |
| REF: p. 34 | TOP: Proteins | |

Match each term with its corresponding description or definition.

- a. Nucleus
 - b. Ionic bond
 - c. Atomic mass
 - d. Compound
 - e. Electrolyte
 - f. Atomic number
 - g. Covalent bonds
 - h. Orbitals
 - i. Hydrolysis
 - j. Dehydration synthesis
 - k. Acid
 - l. Base
12. Part of the atom in which electrons are found
 13. Equal to the number of protons an atom has

14. Molecules that form ions when dissolved in water
15. Process by which reactants combine only after hydrogen and oxygen atoms have been removed
16. Compound that produces H^+ ions
17. Part of the atom in which protons are found
18. Bond formed when oppositely charged atoms are attracted to one another
19. Compound that produces OH^- ions
20. Equal to the number of protons and neutrons in an atom
21. Process by which water is used to break larger molecules into smaller molecules
22. Bond that is formed when electrons are shared
23. A molecule that contains more than one type of atom

12. ANS: H	PTS: 1	DIF: Memorization
REF: p. 25	TOP: Atoms	
13. ANS: F	PTS: 1	DIF: Memorization
REF: p. 25	TOP: Atoms	
14. ANS: E	PTS: 1	DIF: Memorization
REF: p. 27	TOP: Ionic bonds	
15. ANS: J	PTS: 1	DIF: Memorization
REF: p. 29	TOP: Water	
16. ANS: K	PTS: 1	DIF: Memorization
REF: p. 30	TOP: Acids, bases, and salts	
17. ANS: A	PTS: 1	DIF: Memorization
REF: p. 25	TOP: Atoms	
18. ANS: B	PTS: 1	DIF: Memorization
REF: p. 27	TOP: Ionic bonds	
19. ANS: L	PTS: 1	DIF: Memorization
REF: p. 30	TOP: Acids, bases, and salts	
20. ANS: C	PTS: 1	DIF: Memorization
REF: p. 25	TOP: Atoms	
21. ANS: I	PTS: 1	DIF: Memorization
REF: p. 29	TOP: Water	
22. ANS: G	PTS: 1	DIF: Memorization
REF: p. 27	TOP: Covalent bonds	
23. ANS: D	PTS: 1	DIF: Memorization
REF: p. 26	TOP: Elements, molecules, and compounds	

SHORT ANSWER

1. Name the three parts of the atom, and give a description of each.

ANS:

Answers will vary.

PTS: 1

DIF: Memorization

REF: p. 25

TOP: Atoms

2. Explain how an ionic bond forms.

ANS:

Answers will vary.

PTS: 1 DIF: Memorization REF: p. 27
TOP: Ionic bonds

3. Explain how a covalent bond forms.

ANS:
Answers will vary.

PTS: 1 DIF: Memorization REF: pp. 27-28
TOP: Covalent bonds

4. Explain the processes of dehydration synthesis and hydrolysis.

ANS:
Answers will vary.

PTS: 1 DIF: Memorization REF: p. 29
TOP: Water

5. Describe the difference between an acid solution and a base solution by comparing the types and relative concentrations of ions in each.

ANS:
Answers will vary.

PTS: 1 DIF: Memorization REF: p. 30
TOP: Acids, bases, and salts

6. Explain the relationship among H^+ ion concentration, OH^- ion concentration, and pH.

ANS:
Answers will vary.

PTS: 1 DIF: Memorization REF: p. 30
TOP: Acids, bases, and salts

7. Describe the structures of carbohydrates, and explain their use in the body.

ANS:
Answers will vary.

PTS: 1 DIF: Memorization REF: p. 31
TOP: Carbohydrates

8. Describe the three types of lipids, and give the function of each.

ANS:
Answers will vary.

PTS: 1 DIF: Memorization REF: pp. 32-33

TOP: Lipids

9. Describe the structure of a protein, and give examples of structural proteins and functional proteins.

ANS:

Answers will vary.

PTS: 1

DIF: Memorization

REF: pp. 33-34

TOP: Proteins

10. Explain the structure of a nucleic acid, and list the differences between RNA and DNA.

ANS:

Answers will vary.

PTS: 1

DIF: Memorization

REF: p. 35

TOP: Nucleic acids

TRUE/FALSE

1. Matter is anything that occupies space and has mass.

ANS: T

PTS: 1

DIF: Memorization

REF: p. 25

TOP: Levels of chemical organization

2. The mass of an atom is determined by the total number of protons and electrons.

ANS: F

PTS: 1

DIF: Memorization

REF: p. 25

TOP: Atoms

3. The two subatomic particles found in the nucleus of the atom are protons and neutrons.

ANS: T

PTS: 1

DIF: Memorization

REF: p. 25

TOP: Atoms

4. A full atomic orbital always contains eight electrons.

ANS: F

PTS: 1

DIF: Memorization

REF: p. 25

TOP: Atoms

5. The atomic number of an atom is the number of protons plus the number of electrons.

ANS: F

PTS: 1

DIF: Memorization

REF: p. 25

TOP: Atoms

6. The closer an orbital is to the nucleus of an atom, the higher its energy level.

ANS: F

PTS: 1

DIF: Memorization

REF: p. 25

TOP: Atoms

7. An atom with 11 protons, 12 neutrons, and 10 electrons has an atomic number of 11.