

Chapter 02 Chemical Basis of Life

Multiple Choice Questions

1. Matter is composed of elements, which are composed of _____.

- A.** atoms
- B. inorganic molecules
- C. organic molecules
- D. chemicals

Bloom's Level: 2. Understand

HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

2. The atomic number of an atom equals the number of _____ and the atomic weight equals the _____.

- A. neutrons; number of protons
- B. protons; weight of all the electrons
- C. neutrons; number of protons plus electrons
- D.** protons; number of protons plus neutrons

Bloom's Level: 2. Understand

HAPS Objective: C01.01d Distinguish among the terms atomic number, mass number and atomic weight with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

3. In a covalent bond

- A. one atom loses and another atom gains electrons.
- B.** atoms share a pair or more of electrons.
- C. oppositely charged atoms attract.
- D. like-charged atoms repel.

Bloom's Level: 2. Understand

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Section: 02.02

Topic: Chemical bonding

4. In an ionic bond

- A. each atom gains electrons.
- B. atoms share a pair or more of electrons.
- C.** oppositely charged atoms attract.
- D. like-charged atoms repel.

Bloom's Level: 2. Understand

HAPS Objective: C02.01a List each type of bond in order by relative strength with respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C02 Chemical bonding.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Chemical bonding

5. Sodium ions and calcium ions are examples of

- A.** cations.
- B. uncharged particles.
- C. anions.
- D. salts.

Bloom's Level: 2. Understand

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C01 Atoms and molecules.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Chemical bonding

Chapter 02 - Chemical Basis of Life

6.

When cations and anions meet, they

- A. repel.
- B. form ionic bonds.**
- C. form covalent bonds.
- D. form individual molecules.

Bloom's Level: 2. Understand

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Chemical bonding

7. Water causes ionically-bonded atoms to

- A. bond more strongly.
- B. dissociate.**
- C. bond covalently.
- D. decompose.

Bloom's Level: 2. Understand

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Chemical bonding

Chapter 02 - Chemical Basis of Life

8. Carbon can form ____ covalent bonds.

- A. 1
- B. 2
- C. 4**
- D. 8

Bloom's Level: 1. Remember

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

Topic: Chemical bonding

9. Which of the following isotopes has the longest half-life?

- A. Iodine-131
- B. Iron-59
- C. Phosphorus-32
- D. Cobalt-60**

Bloom's Level: 2. Understand

Boxed Reading: From Science to Technology 2.1

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

10. The _____ uses iodine in a synthesis reaction.

- A. spleen
- B. liver
- C. thymus
- D. thyroid gland**

Bloom's Level: 1. Remember

Boxed Reading: From Science to Technology 2.1

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

Chapter 02 - Chemical Basis of Life

11. The isotope most likely to be used to study the thyroid gland is

A.

iodine-131.

B.

iron-59.

C.

thallium-201.

D.

cobalt-60.

Bloom's Level: 2. Understand

Boxed Reading: From Science to Technology 2.1

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

12. Atomic radiation is useful for treating cancer because

A. radiation affects cancer cells but not normal cells.

B. radiation protects normal cells against the effects of cancer.

C. radiation harms cancer cells more readily than it does most non-cancer cells.

D. normal cells are not affected by radiation.

Bloom's Level: 2. Understand

Boxed Reading: From Science to Technology 2.2

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

13. Exposure to ionizing radiation may
- A. cloud the lens of the eye.
 - B. cause cancer.
 - C. interfere with normal growth.
 - D.** all of the above.

Bloom's Level: 1. Remember

Boxed Reading: From Science to Technology 2.2

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

14. Which of the following is not a source of ionizing radiation?
- A. Cosmic rays from outer space
 - B.** Cholesterol and triglycerides
 - C. Atomic and nuclear weapons
 - D. Smoke detectors

Bloom's Level: 1. Remember

Boxed Reading: From Science to Technology 2.2

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

Chapter 02 - Chemical Basis of Life

15. A CT scan differs from a conventional X-ray image because it is

A.

two-dimensional.

B.

three-dimensional.

C.

four-dimensional.

D. safer.

Bloom's Level: 2. Understand

Boxed Reading: From Science to Technology 2.3

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

16. PET imaging follows the emission of

A. positrons.

B. electrons.

C. neutrons.

D. protons.

Bloom's Level: 1. Remember

Boxed Reading: From Science to Technology 2.3

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

True / False Questions

17. The number of protons in an atom of an element always equals its atomic weight.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C01.01d Distinguish among the terms atomic number, mass number and atomic weight with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

18. Radioactive isotopes have stable nuclei.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

19. Sodium and chloride atoms combine readily because they both lose electrons.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atoms chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Objective: C02.01a List each type of bond in order by relative strength with respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Chemical bonding

20. The symbol Na^+ represents a sodium atom that has lost an electron.

TRUE

Bloom's Level: 2. Understand

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

21. Water is an example of a compound.

TRUE

Bloom's Level: 2. Understand

HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

Topic: Inorganic compounds and solutions

22. An atom with 10 protons and which has lost 2 electrons is electrically neutral.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

Fill in the Blank Questions

23. The parts of an atom that carry single negative electrical charges are called _____.

electrons

Bloom's Level: 1. Remember

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

24. The type of subatomic particle that does not have an electrical charge is a(n) _____.

neutron

Bloom's Level: 1. Remember

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

25. The type of chemical bond formed when ions with opposite electrical charges attract is a(n) _____ bond.

ionic

Bloom's Level: 2. Understand

HAPS Objective: C02.01a List each type of bond in order by relative strength with respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Chemical bonding

26. Two or more atoms bonding form a _____.
molecule

Bloom's Level: 2. Understand

HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

Multiple Choice Questions

27. Chemistry deals with
- A.** the composition and changes of substances that make up living as well as non-living matter.
 - B. the composition and changes of substances found in organisms only.
 - C. the composition of and changes of substances that make up non-living matter only.
 - D. the location of organs in body cavities.

Bloom's Level: 2. Understand

Learning Outcome: 02.01 Give examples of how the study of living materials requires an understanding of chemistry.

Section: 02.01

28. Chemistry is important to the study of physiology because
- A. the foods that we eat are chemicals.
 - B. body functions depend on cellular functions that reflect chemical changes.
 - C. chemical reactions enable our bodies to extract energy from nutrients.
 - D.** all of the above.

Bloom's Level: 2. Understand

Learning Outcome: 02.01 Give examples of how the study of living materials requires an understanding of chemistry.

Section: 02.01

29. Which of the following substances is an element?

- A. Iron**
- B. Water
- C. Sodium chloride
- D. Glucose

Bloom's Level: 2. Understand

HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

30.

Which of the following groups of elements accounts for more than 95% of the human body by weight?

- A. Carbon, hydrogen, oxygen, nitrogen**
- B. Calcium, hydrogen, oxygen, nitrogen
- C. Carbon, phosphorus, oxygen, hydrogen
- D. Calcium, phosphorus, hydrogen, nitrogen

Bloom's Level: 1. Remember

HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

31. The atoms of different elements have

- A. the same atomic number and same atomic weight.
- B. the same atomic number but different atomic weights.
- C. different atomic numbers.**
- D. different atomic numbers but the same number of electrons.

Bloom's Level: 2. Understand

HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

32. Isotopes of an element have

- A. the same atomic number and same atomic weight.
- B.** the same atomic number but different atomic weights.
- C. different atomic numbers but the same atomic weight.
- D. different atomic numbers and different atomic weights.

Bloom's Level: 1. Remember

HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

33. Which of the following is(are) ionizing radiation?

- A. Cosmic radiation only
- B. Gamma radiation only
- C.** Both cosmic radiation and gamma radiation
- D. Neither cosmic nor gamma radiation

Bloom's Level: 1. Remember

Boxed Reading: From Science to Technology 2.2

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

34. The atomic weight of an element whose atoms contain 8 protons, 8 electrons, and 8 neutrons is

- A. 8.
- B.** 16.
- C. 24.
- D. 32.

Bloom's Level: 3. Apply

HAPS Objective: C01.01d Distinguish among the terms atomic number, mass number and atomic weight with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

35. The atoms of the isotopes of a particular element vary in the number of
- A. electrons.
 - B. protons.
 - C. neutrons.**
 - D. nuclei.

Bloom's Level: 2. Understand

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

36. The first electron shell of an atom can hold a maximum of
- A. 1 electron.
 - B. 2 electrons.**
 - C. 4 electrons.
 - D. 8 electrons.

Bloom's Level: 1. Remember

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atoms chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

37. When forming a bond, an atom that has 3 electrons in its second shell and a filled first shell will
- A. lose 3 electrons from its second shell.**
 - B. lose all of the electrons from its first shell.
 - C. lose all of the electrons from both its first and second shells.
 - D. gain 5 electrons in its second shell.

Bloom's Level: 3. Apply

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atoms chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

38. The formula H_2O refers to

- A. Two hydrogen molecules and one oxygen molecule.
- B. One hydrogen molecule and two oxygen molecules.
- C.** A molecule that contains two hydrogen atoms and one oxygen atom.
- D. A molecule that contains one hydrogen atom and two oxygen atoms.

Bloom's Level: 2. Understand

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Explain how molecular and structural formulas symbolize the composition of compounds.

Section: 02.02

Topic: Atoms and molecules

39. A decomposition reaction can be symbolized by

- A. $\text{A} + \text{B} \rightarrow \text{C} + \text{D}$.
- B. $\text{A} + \text{B} \rightarrow \text{AB}$.
- C.** $\text{AB} \rightarrow \text{A} + \text{B}$.
- D. $\text{C} + \text{D} \rightarrow \text{AB}$.

Bloom's Level: 1. Remember

Learning Outcome: 02:02 Describe three types of chemical reactions.

Section: 02.02

Topic: Atoms and molecules

40. A water solution that contains equal numbers of hydrogen ions and hydroxide ions is

- A. acidic.
- B. basic.
- C. alkaline.
- D.** neutral.

Bloom's Level: 2. Understand

HAPS Objective: C03.05 State acidic, neutral, and alkaline pH values.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Section: 02.02

Topic: Atoms and molecules

Chapter 02 - Chemical Basis of Life

41. Electrolytes that release hydrogen ions in water are

- A. bases.
- B. nucleotides.
- C. acids.**
- D. electrons.

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Section: 02.02

Topic: Atoms and molecules

42. The difference in hydrogen ion concentration between solutions with pH 4 and pH 5 is

- A. twofold.
- B. fivefold.
- C. tenfold.**
- D. twentyfold.

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Learning Outcome: 02:02 Explain the pH scale.

Section: 02.02

Topic: Atoms and molecules

43. A chemical reaction in which parts of different molecules trade positions is a(n)

- A. decomposition reaction.
- B. exchange reaction.**
- C. reversible reaction.
- D. synthesis reaction.

Bloom's Level: 1. Remember

Learning Outcome: 02:02 Describe three types of chemical reactions.

Section: 02.02

Topic: Atoms and molecules

Chapter 02 - Chemical Basis of Life

44.

Consider the following list of commonly found items and their pH values:

Battery acid	1.0
Vinegar	2.2
Grapes	3.5-4.5
Tomato	4.0-4.5
Beer	4.2
Coffee	5.0
White bread	5.0-6.0
Butter	6.1-6.4
Egg whites	7.6-8.0
Baking soda	8.3
Milk of magnesia	10.6
Bleach	12.8

Which of the following choices includes all acids?

- A. Egg whites, baking soda, milk of magnesia, and bleach
- B. Tomatoes, egg whites, and baking soda
- C. Vinegar, grapes, tomatoes, and coffee**
- D. Beer, butter, and baking soda

Bloom's Level: 3. Apply

HAPS Objective: C03.05 State acidic, neutral, and alkaline pH values.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Explain the pH scale.

Section: 02.02

Topic: Atoms and molecules

45. Electrolytes are substances that

- A. form covalent bonds with water.
- B. ionize in water.**
- C. cannot conduct electricity in solution.
- D. form bonds that are stable in water.

Bloom's Level: 2. Understand

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:03 List the major inorganic chemicals common in cells and explain the function (s) of each.

Section: 02.03

Topic: Inorganic compounds and solutions

46. The pH scale measures the
- A.** concentration of hydrogen ions in solution.
 - B. number of molecules of salts dissolved in water.
 - C. number of hydroxide ions in water.
 - D. strength of an electrical current that a solution carries.

Bloom's Level: 1. Remember

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Explain the pH scale.

Section: 02.02

Topic: Inorganic compounds and solutions

47. Which of the following is the most abundant inorganic substance in the body?
- A. Carbohydrate
 - B.** Water
 - C. Lipid
 - D. Protein

Bloom's Level: 2. Understand

HAPS Objective: C03.01 Discuss the physiologically important properties of water.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:03 List the major inorganic chemicals common in cells and explain the function (s) of each.

Section: 02.03

Topic: Inorganic compounds and solutions

48. A person has alkalosis if the blood pH
- A. is above 7.0.
 - B. is below 7.0.
 - C.** rises above 7.5.
 - D. drops below 7.3.

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Objective: C03.05 State acidic, neutral, and alkaline pH values.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Learning Outcome: 02:02 Explain the pH scale.

Section: 02.02

Topic: Atoms and molecules

Chapter 02 - Chemical Basis of Life

49.

A complete atom is electrically neutral because

A.

the number of protons equals the number of neutrons.

B.

the number of electrons equals the number of neutrons.

C.

the number of electrons equals the number of protons.

D. electrons is greater than the number of protons.

Bloom's Level: 2. Understand

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

50. Synthesis reactions are particularly important in the body for

A. release of energy.

B. digestion of food products.

C. growth of body parts.

D. neutralization of acids by buffers.

Bloom's Level: 2. Understand

Learning Outcome: 02:02 Describe three types of chemical reactions.

Section: 02.02

Topic: Atoms and molecules

51. On the pH scale

- A. a tenfold difference in hydrogen ion concentration separates each whole number.
- B. the lower the whole number on the scale, the greater the H^+ concentration.
- C. pH values above 7 are basic (alkaline).
- D.** all of the above.

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Explain the pH scale.

Section: 02.02

Topic: Atoms and molecules

52. An acid reacting with a base is

- A. a synthesis reaction.
- B. hydrolysis.
- C. a decomposition reaction.
- D.** an exchange reaction.

Bloom's Level: 2. Understand

HAPS Objective: C03.03 Define the term salt and give examples of physiological significance.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Section: 02.02

Topic: Atoms and molecules

53. Bases reacting with acids form _____ and water.

- A. buffers
- B.** salts
- C. new elements
- D. proteins

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Section: 02.02

Topic: Atoms and molecules

54. The secondary structure of a protein molecule is the result of

- A. oxygen double bonds.
- B. covalent bonds.
- C. ionic bonds.
- D. hydrogen bonds.**

Bloom's Level: 2. Understand

HAPS Objective: C04.05 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

55. In the body, oxygen

- A. reacts with water to form carbonic acid.
- B. is used during cellular respiration.**
- C. is a major electrolyte.
- D. is produced by cells.

Bloom's Level: 2. Understand

HAPS Objective: C11.02 With respect to glycolysis, the Krebs (citric acid or TCA) cycle, and the electron transport chain: compare and contrast energy input, efficiency of energy production, oxygen use, by-products and cellular location.

HAPS Topic: Module C11 Cellular respiration.

Learning Outcome: 02:03 List the major inorganic chemicals common in cells and explain the function (s) of each.

Section: 02.03

Topic: Cellular respiration

Topic: Organic compounds

56. Which of the following is characteristic of carbohydrates?

- A. They contain C, H, O, with twice as many hydrogen as oxygen atoms.
- B. They provide much of the energy that the cell requires.
- C. They include sugars and starches.
- D. all of the above.**

Bloom's Level: 1. Remember

HAPS Objective: C04.02 Explain the relationship between monomers and polymers.

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

57. A simple carbohydrate

- A.** has a molecular formula of $C_6H_{12}O_6$.
- B. is a building block of protein.
- C. consists of several joined chains.
- D. has only one nucleotide.

Bloom's Level: 2. Understand

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

58. Lipids

- A. are insoluble in water.
- B. include phospholipids, cholesterol, and fats.
- C. contain C, H, and O, but with proportionately less oxygen than in carbohydrates.
- D.** all of the above.

Bloom's Level: 1. Remember

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

59. Proteins denature when

- A. bonds between carbon and oxygen break.
- B.** hydrogen bonds break.
- C. peptide bonds break.
- D. peptide bonds form.

Bloom's Level: 2. Understand

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.05 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

60. Which of the following is not organic?

- A.** Sodium chloride
- B. Lipids
- C. Nucleic acids
- D. Enzymes

Bloom's Level: 2. Understand

HAPS Objective: C04.01 Define the term organic molecule.

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C03 Inorganic compounds and solutions.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Inorganic compounds and solutions

Topic: Organic compounds

61. Saturated fats _____ than unsaturated fats.

- A. contain more water
- B. have more glycerol
- C.** have more single carbon-carbon bonds
- D. have fewer hydrogen atoms bonded to carbon atoms

Bloom's Level: 2. Understand

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

62. Proteins

- A. are structural materials.
- B. can function as enzymes.
- C. contain C, H, O, and N, and sometimes S.
- D.** all of the above.

Bloom's Level: 1. Remember

HAPS Objective: C04.04e Discuss physiological and structural roles in the human body of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

63. An enzyme is a _____.

- A.** protein that speeds up chemical reactions without being changed or depleted
- B. protein that functions as a hormone
- C. protein that inhibits chemical reactions by being changed or depleted
- D. fibrous protein that is part of certain tissues in the body

Bloom's Level: 2. Understand

HAPS Objective: C04.06 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

64. The parts of a protein that change when it denatures are

- A. the primary and secondary structures.
- B.** the secondary and tertiary structures.
- C. the amino acid sequence and the secondary structure.
- D. the tertiary and quaternary structures.

Bloom's Level: 2. Understand

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

65. DNA

- A. is a protein.
- B. plays no role in the synthesis of fats.
- C.** stores genetic information, including instructions for enzymes that synthesize fats and carbohydrates.
- D. is routinely broken down to provide cellular energy.

Bloom's Level: 1. Remember

HAPS Objective: C04.04e Discuss physiological and structural roles in the human body of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Nucleic acids: DNA and RNA

Topic: Organic compounds

66. Nucleic acids are

- A. very small, simple molecules.
- B. structural molecules that have no function other than support.
- C.** composed of building blocks called nucleotides.
- D. primary sources of cellular energy.

Bloom's Level: 1. Remember

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Nucleic acids: DNA and RNA

Topic: Organic compounds

67. The informational content of DNA and RNA is in the nitrogenous bases because

- A.** the bases are of several types and therefore can form a code sequence.
- B. they all contain nitrogen.
- C. the sugars and phosphates vary.
- D. the bases are also parts of amino acids.

Bloom's Level: 2. Understand

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04e Discuss physiological and structural roles in the human body of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Nucleic acids: DNA and RNA

Topic: Organic compounds

68. In phenylketonuria, an individual cannot break down the amino acid phenylalanine. Molecules that include phenylalanine build up in the blood, which causes intellectual disability and other symptoms. This inherited disease can be controlled by following a diet that is very low in

- A. carbohydrates.
- B. cholesterol.
- C. protein.**
- D. nucleic acids.

Bloom's Level: 3. Apply

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

69. Table sugar breaking down into glucose and fructose is a(n) _____ reaction.

- A. synthesis
- B. hydrolysis**
- C. acid-base
- D. exchange reaction

Bloom's Level: 3. Apply

HAPS Objective: C04.03 Define and give examples of dehydration synthesis and hydrolysis reactions.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

70. Nucleic acids include

- A. proteins and DNA.
- B. RNA and DNA.**
- C. enzymes and RNA.
- D. steroids and triglycerides.

Bloom's Level: 1. Remember

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Nucleic acids: DNA and RNA

Topic: Organic compounds

71. DNA and RNA differ in that

- A. RNA has deoxyribose and DNA has ribose.
- B. RNA is double-stranded and DNA is single-stranded.
- C. DNA holds genetic information and RNA uses that information to synthesize protein.**
- D. RNA is found only in the nucleus and DNA is found only in the cytoplasm.

Bloom's Level: 2. Understand

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Nucleic acids: DNA and RNA

Topic: Organic compounds

72. The type of organic molecule that can replicate is a

- A. protein.
- B. lipid.
- C. carbohydrate.
- D. nucleic acid.**

Bloom's Level: 1. Remember

HAPS Objective: C04.04e Discuss physiological and structural roles in the human body of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Nucleic acids: DNA and RNA

Topic: Organic compounds

73. Conformation is

A.

the three-dimensional shape of a molecule, such as a protein.

B. the energy held in the bonds of an organic molecule, such as a protein.

C. the ability of DNA to copy itself.

D. the amino acid sequence (primary structure) of a protein.

Bloom's Level: 2. Understand

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.05 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

74. An organic compound always contains

A. carbon and hydrogen.

B. oxygen and nitrogen.

C. carbon and oxygen.

D. nitrogen and hydrogen.

Bloom's Level: 1. Remember

HAPS Objective: C04.01 Define the term organic molecule.

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

75. Which of these is not a monosaccharide?

- A. Glucose
- B. Ribose
- C. 6-carbon sugar
- D. Sucrose**

Bloom's Level: 1. Remember

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

76. Glycogen is stored in the liver and _____.

- A. spleen
- B. skeletal muscles**
- C. pancreas
- D. heart

Bloom's Level: 1. Remember

HAPS Objective: C04.04e Discuss physiological and structural roles in the human body of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

77. A triglyceride consists of

- A. 3 glycerols and 1 fatty acid.
- B. 3 glucose molecules.
- C. 3 fatty acids and 3 phosphate groups.
- D. 3 fatty acids and 1 glycerol.**

Bloom's Level: 1. Remember

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

78. Which of the following groups of compounds is hydrophobic?

- A. Carbohydrates
- B. Lipids**
- C. Proteins
- D. Nucleic Acids

Bloom's Level: 2. Understand

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

79. Which of the following molecules does not have a polar region?

- A. Water
- B. Triglyceride**
- C.

Water-soluble amino acid

D. Glucose

Bloom's Level: 3. Apply

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:02 Explain how molecular and structural formulas symbolize the composition of compounds.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

80. A biomarker is

- A. a gene that encodes a particular protein.
- B. always a protein.
- C. a body chemical associated with a particular disease or exposure to a toxin.**
- D. any chemical in the body.

Bloom's Level: 2. Understand

Boxed Reading: Vignette

Learning Outcome: 02.01 Give examples of how the study of living materials requires an understanding of chemistry.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.01

Section: 02.03

Topic: Organic compounds

81. An example of a biomarker is

- A.** cholesterol.
- B. any DNA sequence.
- C. sodium chloride.
- D. hydrogen.

Bloom's Level: 1. Remember

Boxed Reading: Vignette

Learning Outcome: 02.01 Give examples of how the study of living materials requires an understanding of chemistry.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.01

Section: 02.03

Topic: Organic compounds

82. A biomarker test for cancer should ideally be

- A. inexpensive.
- B. easy to perform.
- C. specific.
- D.** all of the above.

Bloom's Level: 1. Remember

Boxed Reading: Vignette

Learning Outcome: 02.01 Give examples of how the study of living materials requires an understanding of chemistry.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.01

Section: 02.03

Topic: Organic compounds

True / False Questions

83. Chemistry is the study of the composition of matter and how matter changes.

TRUE

Bloom's Level: 1. Remember

Learning Outcome: 02.01 Give examples of how the study of living materials requires an understanding of chemistry.

Section: 02.01

84. An atom that has gained or lost electrons is called an ion.

TRUE

Bloom's Level: 1. Remember

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Learning Outcome: 02:02 Explain how molecular and structural formulas symbolize the composition of compounds.

Section: 02.02

Topic: Atoms and molecules

85. A substance that releases hydrogen ions in water is a base.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Learning Outcome: 02:02 Explain how molecular and structural formulas symbolize the composition of compounds.

Section: 02.02

Topic: Atoms and molecules

86. A strong acid reacting with a strong base produces a salt.

TRUE

Bloom's Level: 1. Remember

HAPS Objective: C03.03 Define the term salt and give examples of physiological significance.

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Section: 02.02

Topic: Atoms and molecules

87. Chemically inert atoms always have their outermost electron shell full.

TRUE

Bloom's Level: 2. Understand

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02.02 Describe the relationships among matter, atoms, and compounds.

Section: 02.02

Topic: Atoms and molecules

88. An acid is an electrolyte that releases hydroxide ions (OH^-) in water.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Section: 02.02

Topic: Atoms and molecules

89. A base is an electrolyte that releases ions that combine with hydrogen ions.

TRUE

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C01 Atoms and molecules.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Section: 02.02

Topic: Atoms and molecules

90. An electrolyte ionizes in water.

TRUE

Bloom's Level: 2. Understand

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes, and radioisotopes

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:03 List the major inorganic chemicals common in cells and explain the function (s) of each.

Section: 02.03

Topic: Inorganic compounds and solutions

91. A person with alkalosis has a blood pH less than 7.3.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C01 Atoms and molecules.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Learning Outcome: 02:02 Describe the differences among acids, bases and salts.

Learning Outcome: 02:02 Explain the pH scale.

Learning Outcome: 02:03 List the major inorganic chemicals common in cells and explain the function (s) of each.

Section: 02.02

Section: 02.03

Topic: Atoms and molecules

Topic: Inorganic compounds and solutions

92. A complex carbohydrate consists of a phosphate group attached to a sugar molecule.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C04.02 Explain the relationship between monomers and polymers.

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

93. Cholesterol, a type of lipid, is composed of 3 fatty acid chains attached to glycerol.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

94. Glycogen is a complex carbohydrate that we get directly by eating plants.

FALSE

Bloom's Level: 1. Remember

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04d Identify dietary sources of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

95. A phospholipid differs structurally from a triglyceride in that it has three phosphate groups attached to the glycerol molecule rather than three fatty acid chains.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

96. Nucleic acids are composed of building blocks called amino acids.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

97. A protein is formed from a sequence of amino acids.

TRUE

Bloom's Level: 2. Understand

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

98. Proteins encode nucleic acids.

FALSE

Bloom's Level: 2. Understand

HAPS Objective: C04.04e Discuss physiological and structural roles in the human body of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

99. DNA and RNA are nucleic acids.

TRUE

Bloom's Level: 1. Remember

HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

Fill in the Blank Questions

100. When atoms form chemical bonds, the subatomic particles that directly interact are the

electrons

Bloom's Level: 2. Understand

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atoms chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

HAPS Topic: Module C02 Chemical bonding.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Section: 02.02

Topic: Atoms and molecules

Topic: Chemical bonding

101. The opposite of a decomposition reaction is a _____ reaction.
synthesis

Bloom's Level: 2. Understand
Learning Outcome: 02:02 Describe three types of chemical reactions.
Section: 02.02
Topic: Atoms and molecules

102. The midpoint of the pH scale is pH ____.
7

Bloom's Level: 1. Remember
HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
HAPS Topic: Module C01 Atoms and molecules.
Learning Outcome: 02:02 Explain the pH scale.
Section: 02.02
Topic: Atoms and molecules

103. Apricots have a pH of 3.8. Therefore, they are _____.
acidic or
acid

Bloom's Level: 3. Apply
HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
HAPS Topic: Module C01 Atoms and molecules.
Learning Outcome: 02:02 Explain the pH scale.
Topic: Atoms and molecules

104. Amino acids are building blocks of _____.
protein

Bloom's Level: 1. Remember
HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.
HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.
HAPS Topic: Module C04 Organic compounds.
Learning Outcome: 02:02 Describe how atomic structure determines how atoms interact.
Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.
Topic: Organic compounds

Chapter 02 - Chemical Basis of Life

105. The amino acid sequence of a protein is its _____ structure.

primary

Bloom's Level: 1. Remember

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

106. _____ are building blocks of nucleic acids.

nucleotides

Bloom's Level: 1. Remember

HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.

HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds

107. ____ has the unique ability among types of organic molecules to replicate.

DNA or

Deoxyribonucleic acid

Bloom's Level: 2. Understand

HAPS Objective: C04.04e Discuss physiological and structural roles in the human body of carbohydrates, proteins, lipids and nucleic acids.

HAPS Topic: Module C04 Organic compounds.

Learning Outcome: 02.02 Describe how atomic structure determines how atoms interact.

Learning Outcome: 02:03 Describe the general functions of the main classes of organic molecules in cells.

Section: 02.03

Topic: Organic compounds