

Chapter 02 The Basics of Life: Chemistry

Multiple Choice Questions

1. An atom that has gained electrons is a
- A. reactant.
 - B. negative ion.**
 - C. positive ion.
 - D. compound ion.

Bloom's Level: 2. Understand

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

2. An atom with twelve electrons, twelve protons, and fourteen neutrons has a mass number of
- A. fourteen.
 - B. twenty-four.
 - C. thirty-eight.
 - D. twenty-six.**

Bloom's Level: 2. Understand

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

Chapter 02 - The Basics of Life: Chemistry

3. A hydroxide ion has an oxygen atom
- A. only.
 - B. and an extra electron.
 - C. and a hydrogen atom, and an extra electron.
 - D. and a hydrogen atom, and an extra proton.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

4. A negative charge is characteristic of a(n)
- A. positive ion.
 - B. electron.
 - C. neutron.
 - D. proton.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

5. Solutions are always comprised of
- A. solvents and solute.
 - B. liquids and solids.
 - C. water and salts.
 - D. compounds and ions.

Bloom's Level: 2. Understand

Learning Outcome: Differentiate among solution, solvent, and solute.

Section: 02.07

Topic: Chemistry

6. The greatest amount of kinetic energy is found in

- A.** gases.
- B. liquids.
- C. solids.
- D. colloids.

Bloom's Level: 2. Understand

Learning Outcome: Summarize the difference between potential and kinetic energy.

Section: 02.03

Section: 02.04

Topic: Chemistry

7. All chemical reactions

- A. involve the creation of new atoms.
- B.** involve a change in chemical bonds.
- C. are dangerous.
- D. create energy.

Bloom's Level: 2. Understand

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.06

Topic: Chemistry

8. A covalent bond is

- A. the attraction that one atom has for another atom.
- B.** the attraction between two atoms, formed by the sharing of electrons.
- C. formed between the positive charge of a hydrogen atom in one molecule and the negative charge of a nitrogen atom in another nearby molecule.
- D. the attraction between a positive ion and a negative ion.

Bloom's Level: 1. Remember

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.06

Topic: Chemistry

9. Protons = 7, neutrons = 10, electrons = 7. The mass number of this atom is

- A. seven.
- B. ten.
- C. fourteen.
- D.** seventeen.

Bloom's Level: 3. Apply

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

10. An acid is a substance that, in solution, releases

- A. oxygen ions in H_2SO_4 .
- B.** hydrogen ions, for example, HCl .
- C. —COOR ions from beer.
- D. chloride ions from NaCl .

Bloom's Level: 1. Remember

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

11. A particle in the atom that has neither a negative nor a positive electrical charge is the

- A. electron.
- B. element.
- C. isotope.
- D.** neutron.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

12. In the expression $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$, the products are

- A. $\text{C}_6\text{H}_{12}\text{O}_6$.
- B. $\text{C}_6\text{H}_{12}\text{O}_6 + \text{zymase}$.
- C. $\text{zymase} + 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$.
- D.** $2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$.

Bloom's Level: 3. Apply

Learning Outcome: Explain the difference between reactants and products.

Section: 02.08

Topic: Chemistry

13. The correct symbol for a hydroxide ion is

- A. H^- .
- B. H^+ .
- C.** $(\text{OH})^-$.
- D. $(\text{OH})^+$.

Bloom's Level: 1. Remember

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

14. Kinetic energy is **best** defined as

- A. the energy of position.
- B. the energy of electrical charge.
- C.** the energy of motion.
- D. stored energy.

Bloom's Level: 2. Understand

Learning Outcome: Summarize the difference between potential and kinetic energy.

Section: 02.04

Topic: Chemistry

15. Which one of the following statements is false concerning matter?
- A. Matter is anything that has mass and takes up space.
 - B. Air is matter.
 - C. All matter has the same density.**
 - D. The phases of matter are determined by the relative amounts of energy in the matter's molecules.

Bloom's Level: 2. Understand
Learning Outcome: Contrast matter and energy.
Section: 02.01
Section: 02.02
Topic: Chemistry

16. When two atoms share a pair of electrons, this type of chemical bond is
- A. ionic.
 - B. covalent.**
 - C. hydrogen.
 - D. negative-positive.

Bloom's Level: 2. Understand
Learning Outcome: Discriminate between atoms and elements; molecules and compounds.
Section: 02.06
Topic: Chemistry

17. Given that an unknown atom's mass number (AMU) is 27, its combination of particles could be
- A. 27 electrons, 16 neutrons, 16 protons.
 - B. 27 neutrons, 27 protons, 27 electrons.
 - C. 15 neutrons, 12 electrons, 15 protons.
 - D. 16 electrons, 11 neutrons, 16 protons.**

Bloom's Level: 3. Apply
Learning Outcome: Discriminate between atoms and elements; molecules and compounds.
Section: 02.02
Topic: Chemistry

18. A base can be defined as

- A. a hydroxide ion acceptor.
- B. an attraction between a positive ion and a negative ion.
- C. a substance that gives up hydrogen ions when dissolved in water.
- D.** a substance that gives up hydroxide groups in a solution.

Bloom's Level: 1. Remember

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

19. The smallest particle of an element that still retains the properties of that element is a(n)

- A.** atom.
- B. proton.
- C. electron.
- D. element.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

20. A chemical reactant is one that

- A.** enters into a chemical reaction.
- B. is the newly formed molecule.
- C. is at a point when both sides of the equation are equal.
- D. during photosynthesis, is one molecule of sugar and six molecules of oxygen.

Bloom's Level: 1. Remember

Learning Outcome: Explain the difference between reactants and products.

Section: 02.08

Topic: Chemistry

21. An isotope is an atom of an element that varies in mass number due to variation in the number of

- A. atoms.
- B. protons.
- C. neutrons.**
- D. electrons.

Bloom's Level: 2. Understand

Learning Outcome: Explain the difference between reactants and products.

Section: 02.02

Topic: Chemistry

22. A substance that is a solid

- A. contains a large amount of oxygen.
- B. contains molecules that are packed tightly together and vibrate in place.**
- C. is bonded very tightly (covalent).
- D. contains a large amount of hydrogen bonds.

Bloom's Level: 1. Remember

Learning Outcome: Describe the differences among liquids, solids, and gases.

Section: 02.05

Topic: Chemistry

23. An atom that has lost electrons is a

- A. cation.**
- B. neutral atom.
- C. molecule.
- D. anion.

Bloom's Level: 2. Understand

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

24. If a particular atom has 27 electrons, 27 protons, and 31 neutrons, its mass number would be

- A. 52.
- B. 54.
- C. 56.
- D.** 58.

Bloom's Level: 3. Apply

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

25. A solution that contains an excess of protons is(are)

- A. hydroxide ions.
- B.** an acid.
- C. a base.
- D. the pH.

Bloom's Level: 1. Remember

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

26. $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$. The AgNO_3 in the equation is called a(n)

- A.** reactant.
- B. acid.
- C. product.
- D. base.

Bloom's Level: 2. Understand

Learning Outcome: Explain the difference between reactants and products.

Section: 02.08

Topic: Chemistry

27. An isotope shows which of the following?

- A. A change in atomic number
- B. Inability to form compounds
- C. A change in mass number
- D. More electrons

Bloom's Level: 2. Understand

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

28. A material composed of atoms vibrating in place

- A. has high kinetic energy and is a gas.
- B. has low kinetic energy and is a liquid.
- C. has low kinetic energy and is a solid.
- D. has high kinetic energy and is a solid.

Bloom's Level: 2. Understand

Learning Outcome: Summarize the difference between potential and kinetic energy.

Section: 02.04

Topic: Chemistry

29. Which of the following is a chemical reaction that is also known as digestion?

- A. phosphorylation
- B. dehydration synthesis
- C. acid-base
- D. hydrolysis

Bloom's Level: 1. Remember

Learning Outcome: List the five types of chemical reactions associated with all living things.

Section: 02.08

Topic: Chemistry

30. Which kind of chemical reaction involves the attachment or removal of a phosphate group?

- A. oxidation-reduction
- B. acid phosphorylation
- C. phosphorylation**
- D. hydrolysis

Bloom's Level: 2. Understand

Learning Outcome: List the five types of chemical reactions associated with all living things.

Section: 02.08

Topic: Chemistry

31. Which of the following is an acid?

- A. K_2SO_4
- B. $NaNO_3$
- C. $CaCO_3$
- D. H_3PO_4**

Bloom's Level: 1. Remember

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

32. An atomic particle with a weight of one, and a positive electrical charge is a(n)

- A. electron.
- B. proton.**
- C. neutron.
- D. isotope.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

33. $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_2 + 6\text{O}_2$. In this reaction O_2 is

- A. a reactant.
- B. a product.**
- C. a reactant and a product.
- D. neither a reactant nor a product.

Bloom's Level: 2. Understand

Learning Outcome: Explain the difference between reactants and products.

Section: 02.08

Topic: Chemistry

34. One atom of sodium has a mass number of 22 units; another atom of sodium is 23 units. These two atoms are

- A. nonreactive.
- B. unstable.
- C. ions.
- D. isotopes.**

Bloom's Level: 1. Remember

Learning Outcome: Explain the difference between reactants and products.

Section: 02.02

Topic: Chemistry

35. Which kind of attractive force holds two molecules together?

- A. ionic bond
- B. hydrogen bond**
- C. covalent bond
- D. sticky bond

Bloom's Level: 1. Remember

Learning Outcome: Explain how atoms stick together to form compounds.

Section: 02.06

Topic: Chemistry

36. A solution with a high concentration of hydrogen ions could have a pH of

- A. 2.
- B. 6.
- C. 9.
- D. 11.

Bloom's Level: 1. Remember

Learning Outcome: Work with the pH scale.

Section: 02.09

Topic: Chemistry

37. The attraction between a positively charged atom and a negatively charged atom within the same molecule is

- A. ionic bonding.
- B. hydrogen bonding.
- C. covalent bonding.
- D. ions.

Bloom's Level: 2. Understand

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.06

Topic: Chemistry

38. A scale used to indicate the strength of an acid or base is called a ____ scale.

- A. thermodynamic
- B. aquatic
- C. pH
- D. reduction

Bloom's Level: 1. Remember

Learning Outcome: Work with the pH scale.

Section: 02.09

Topic: Chemistry

39. The part of an atom without a charge is a(n)

- A. ion.
- B. neutron.**
- C. electron.
- D. molecule.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

40. Which of the following indicates "reactant"? $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + 6\text{H}_2\text{O}$

- A. $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$**
- B. H_2O
- C. CO_2
- D. None of the choices is correct.

Bloom's Level: 2. Understand

Learning Outcome: Explain the difference between reactants and products.

Section: 02.08

Topic: Chemistry

41. In the expression $2\text{H}_2\text{S} + 3\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{SO}_2$, which is the acid?

- A. H_2S**
- B. O_2
- C. SO_2
- D. H_2O

Bloom's Level: 3. Apply

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

42. An ion having eleven protons, twelve neutrons, and ten electrons will have a charge of

- A. +.
- B. -.
- C. ++.
- D. --.

Bloom's Level: 2. Understand

Learning Outcome: Differentiate among atomic weight, atomic number, atomic mass, and mass number.

Section: 02.02

Section: 02.06

Topic: Chemistry

43. A list of all of the elements in order of increasing atomic number is called the

- A. pH.
- B. law of thermodynamics.
- C. phase of matter.
- D. periodic table.

Bloom's Level: 1. Remember

Learning Outcome: Describe the information found in the periodic table of the elements.

Section: 02.02

Topic: Chemistry

44. The mass of a given volume of matter is expressed as

- A. weight.
- B. energy.
- C. density.
- D. gravity.

Bloom's Level: 1. Remember

Learning Outcome: Describe the differences among liquids, solids, and gases.

Section: 02.01

Section: 02.05

Topic: Chemistry

45. The reaction $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + 6\text{H}_2\text{O}$ is which type of chemical reaction?

- A. hydrolysis
- B. transfer
- C. dehydration synthesis
- D.** oxidation-reduction

Bloom's Level: 1. Remember

Learning Outcome: Explain the difference between reactants and products.

Section: 02.08

Topic: Chemistry

46. Which rule states that atoms attempt to acquire an outermost energy level with eight electrons through chemical reactions?

- A.** octet
- B. atomic stability
- C. hybridization
- D. full energy level

Bloom's Level: 2. Understand

Learning Outcome: Describe the information found in the periodic table of the elements.

Section: 02.02

Topic: Chemistry

47. A person jogging displays what kind of energy?

- A. potential
- B.** kinetic
- C. nuclear
- D. sweat

Bloom's Level: 5. Evaluate

Learning Outcome: List the five types of chemical reactions associated with all living things.

Section: 02.08

Topic: Chemistry

48. $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$. This reaction is an example of a(n)

- A. oxidation/reduction reaction.
- B. hydrolysis reaction.
- C. phosphorylation reaction.
- D.** acid-base reaction.

Bloom's Level: 2. Understand

Learning Outcome: Explain the difference between reactants and products.

Section: 02.08

Topic: Chemistry

49. The atomic number for carbon is 6. The isotope ^{14}C has ____ neutrons.

- A. 6
- B.** 8
- C. 14
- D. 20

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

50. Given that an unknown atom's mass is 11, its combination of subatomic particles could be

- A. 11 protons, 11 neutrons, and 11 electrons.
- B. 6 protons, 5 neutrons, and 11 electrons.
- C. 4 protons, 3 neutrons, and 4 electrons.
- D.** 5 protons, 6 neutrons, and 5 electrons.

Bloom's Level: 3. Apply

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

51. One molecule of sodium nitrate (NaNO_3) contains ____ atoms.

- A. 6
- B. 5**
- C. 4
- D. 3

Bloom's Level: 4. Analyze

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

52. The statement that energy is never created or destroyed is known as

- A. thermodynamics.
- B. kinetic molecular theory.
- C. first law of matter and energy.
- D. law of conservation of energy.**

Bloom's Level: 1. Remember

Learning Outcome: Contrast matter and energy.

Section: 02.01

Topic: Chemistry

53. Which one of the following rows **best** represents a gas in relation to a solid or liquid of the same compound?

	Attraction between Molecules	Kinetic Energy	Distance between Molecules
1	strong	high	great
2	weak	low	slight
3	strong	low	slight
4	weak	high	great

- A. Row 1
- B. Row 2
- C. Row 3
- D. Row 4**

Bloom's Level: 5. Evaluate

Learning Outcome: Describe the differences among liquids, solids, and gases.

Section: 02.05

Topic: Chemistry

54. Which one of the following is true with regard to the numbers of subatomic particles in an atom?

- A. The number of neutrons always equals the number of protons.
- B. The number of electrons always equals the number of neutrons.
- C. The atomic number always equals the number of protons.
- D. The atomic number always equals the number of neutrons.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

55. The fact that all matter is made up of tiny particles that are in constant motion is known as the

- A. first law of thermodynamics.
- B. energy motion theory.
- C. kinetic molecular theory.
- D. first law of solids.

Bloom's Level: 2. Understand

Learning Outcome: Describe the differences among liquids, solids, and gases.

Section: 02.01

Section: 02.05

Topic: Chemistry

56. The formulation $\text{Ca}^{++}\text{Cl}_2^-$, indicates

- A. covalent bonding between one calcium atom and two chlorine atoms.
- B. one calcium ion that has gained two electrons and formed ionic bonds with two chloride ions that have each lost one electron.
- C. one calcium atom with two protons and two chlorine atoms that share one electron.
- D. one calcium ion that has lost two electrons and formed ionic bonds with two chloride ions that have each gained one electron.

Bloom's Level: 3. Apply

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.06

Topic: Chemistry

57. One atomic mass unit (AMU) approximately equals the mass of one
- A.** proton.
 - B. electron.
 - C. nucleus.
 - D. proton plus the mass of one neutron.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

58. A bond in which the positive end of one polar molecule is attracted to the negative end of another polar molecule is a(n)
- A. covalent bond.
 - B. ionic bond.
 - C. electron bond.
 - D.** hydrogen bond.

Bloom's Level: 2. Understand

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.06

Topic: Chemistry

59. When a pencil falls from a tabletop to the floor
- A. kinetic energy is converted to potential energy.
 - B.** potential energy is converted to kinetic energy.
 - C. energy is created.
 - D. energy is destroyed.

Bloom's Level: 3. Apply

Learning Outcome: Summarize the difference between potential and kinetic energy.

Section: 02.03

Section: 02.04

Topic: Chemistry

60. The pH of a strong base is closest to

- A. 2.
- B. 6.
- C. 9.
- D. 12.**

Bloom's Level: 3. Apply

Learning Outcome: Work with the pH scale.

Section: 02.09

Topic: Chemistry

61. A neutral atom with an atomic number of 15 will have ____ electrons in its outermost energy level.

- A. 3
- B. 5**
- C. 8
- D. 15

Bloom's Level: 2. Understand

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

62. Which one of the following represents the correct mass, location, and charge of a proton?

	Mass (AMU)	Location	Charge
1	1	nucleus	+
2	0	nucleus	+
3	1	nucleus	-
4	0	Orbitals	-

- A. Row 1**
- B. Row 2
- C. Row 3
- D. Row 4

Bloom's Level: 5. Evaluate

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

63. The higher the pH,
A. the greater the hydroxide ion concentration.
B. the more acidic the solution.
C. the greater the hydrogen ion concentration.
D. the lower the pH number.

Bloom's Level: 2. Understand
Learning Outcome: Work with the pH scale.
Section: 02.09
Topic: Chemistry

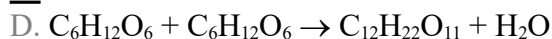
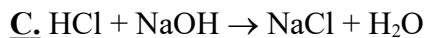
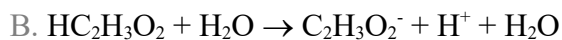
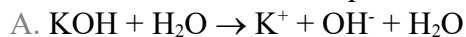
64. A difference between an acid and a base is that
A. acids are harmful and bases are not.
B. acids release hydroxide ions and bases release hydrogen ions.
C. acids have a high pH value and bases have a low pH value.
D. acids have a low pH value and bases have a high pH value.

Bloom's Level: 2. Understand
Learning Outcome: Identify compounds that are acids, bases, or salts.
Learning Outcome: Work with the pH scale.
Section: 02.09
Topic: Chemistry

65. A magnesium ion contains twelve protons and ten electrons. A chloride ion contains seventeen protons and eighteen electrons. Given this information, the chemical formula for magnesium chloride is
A. MgCl.
B. Mg₂Cl.
C. MgCl₂.
D. Mg₂Cl₂.

Bloom's Level: 3. Apply
Learning Outcome: Describe the information found in the periodic table of the elements.
Section: 02.02
Topic: Chemistry

66. Which reaction below produces a salt?



Bloom's Level: 2. Understand

Learning Outcome: Explain the difference between reactants and products.

Section: 02.08

Topic: Chemistry

67. Fluorine has the atomic number 9. The correct notation for a fluoride ion is



Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

68. The energy level listed below with the most energetic electrons is

A. 1.

B. 2.

C. 3.

D. None of these. All energy levels contain electrons of equal energy.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

69. An atom that contains 8 electrons in its outermost energy level is said to be
A. inert.
B. reactive.
C. a cation.
D. a molecule.

Bloom's Level: 1. Remember

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

70. Which of the following is monatomic?
A. He
B. H₂
C. O₂
D. N₂

Bloom's Level: 2. Understand

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

Short Answer Questions

71. List and define two types of chemical bonds.

COVALENT--attractive force between two atoms that share electrons

IONIC--attractive force between ions of opposite charge

HYDROGEN--attractive force between polar molecules

Bloom's Level: 1. Remember

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.06

Topic: Chemistry

Multiple Choice Questions

72. In which one of the following situations do the molecules have the greatest amount of energy?

- A. Ice in a Coke
- B. Cold tap water
- C. Water vapor**
- D. Water condensed on your windshield

Bloom's Level: 3. Apply

Learning Outcome: Summarize the difference between potential and kinetic energy.

Section: 02.04

Topic: Chemistry

73. If an atom has the atomic number 4 and the atomic mass 9.012 it will

- A. have 5 electrons.
- B. have 5 neutrons.**
- C. have 9 electrons.
- D. weigh 13.012 atomic mass units.

Bloom's Level: 2. Understand

Learning Outcome: Discriminate between atoms and elements; molecules and compounds.

Section: 02.02

Topic: Chemistry

74. A measure of the average kinetic energy of the molecules making up a substance is known as

- A. temperature.**
- B. heat.
- C. potential.
- D. phase of matter.

Bloom's Level: 1. Remember

Learning Outcome: Summarize the difference between potential and kinetic energy.

Section: 02.01

Section: 02.03

Topic: Chemistry

75. Which of the following would have the smallest number of hydrogen ions (H^+)?

- A. A solution with the pH 2
- B. A solution with the pH 6
- C. A container of acetic acid (vinegar)
- D.** A container of a strong base

Bloom's Level: 2. Understand

Learning Outcome: Work with the pH scale.

Section: 02.09

Topic: Chemistry

76. In which one of the following situations do the molecules have the greatest attraction for one another?

- A.** An ice cube
- B. Cold tap water
- C. Water vapor
- D. Water condensed on your windshield

Bloom's Level: 2. Understand

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.03

Section: 02.06

Topic: Chemistry

77. If an atom has the atomic number 4 and the atomic mass 9.012 it will have _____ electrons in the **first** energy level.

- A.** 1
- B. 2
- C. 3
- D. 4

Bloom's Level: 2. Understand

Learning Outcome: Describe the information found in the periodic table of the elements.

Section: 02.02

Topic: Chemistry

78. If an atom has the atomic number 11 and the atomic mass 22.99, it will have

- A. 1 electron in the third energy level.
- B. 1 electron in the second energy level.
- C. 3 electrons in the fourth energy level.
- D. 1 electron in the first energy level.

Bloom's Level: 3. Apply

Learning Outcome: Describe the information found in the periodic table of the elements.

Section: 02.02

Topic: Chemistry

79. Which of the following would have the largest number of hydrogen ions (H^+)?

- A. A solution with the pH 11
- B. A solution with the pH 8
- C. A container of acetic acid (vinegar)
- D. A container of a strong base

Bloom's Level: 1. Remember

Learning Outcome: Work with the pH scale.

Section: 02.09

Topic: Chemistry

80. Which combination of elements is most likely to undergo a chemical reaction based on their positions in the Periodic Table of the Elements?

- A. Na and Cl
- B. Na and Mg
- C. F and Ne
- D. All would react.

Bloom's Level: 3. Apply

Learning Outcome: Describe the information found in the periodic table of the elements.

Section: 02.02

Topic: Chemistry

81. The lower the _____, the slower the molecules are moving.

- A. density
- B. temperature**
- C. potential energy
- D. gravity

Bloom's Level: 2. Understand

Learning Outcome: Summarize the difference between potential and kinetic energy.

Section: 02.03

Topic: Chemistry

82. The fact that the atomic weight of carbon is 12.0112 probably indicates that carbon atoms vary in the number of _____ they contain.

- A. electrons
- B. protons
- C. neutrons**
- D. nuclei

Bloom's Level: 2. Understand

Learning Outcome: Describe how isotopes differ from one another.

Section: 02.02

Topic: Chemistry

83. Human blood has a pH of about 7.4. If the pH should change to 7.0, this would indicate

- A. a decrease in pH.
- B. an increase in acidity.
- C. a change in electrolytes.
- D. All the choices are correct.**

Bloom's Level: 3. Apply

Learning Outcome: Work with the pH scale.

Section: 02.09

Topic: Chemistry

84. When you sprinkle table salt on your food, the salt

- A. ionizes.
- B. dissociates.**
- C. forms covalent bonds with the food.
- D. undergoes an acid-base reaction.

Bloom's Level: 3. Apply

Learning Outcome: Explain how atoms stick together to form compounds.

Section: 02.06

Section: 02.08

Topic: Chemistry

85. The type of chemical bond that holds OH^- and H^+ together is

- A. ionic.**
- B. covalent.
- C. hydrogen.
- D. All the choices are correct.

Bloom's Level: 2. Understand

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.06

Topic: Chemistry

86. Which of the following is a base or alkaline material?

- A. NaOH**
- B. HCl
- C. H_2SO_4
- D. NaCl

Bloom's Level: 1. Remember

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

87. Which of the following is an acid?

- A. NaOH
- B. HOH
- C. H_2SO_4**
- D. NaCl

Bloom's Level: 1. Remember

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

88. Which of the following is a salt?

- A. NaOH
- B. HOH
- C. H_2SO_4
- D. MgCl_2**

Bloom's Level: 1. Remember

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

89. What is happening here? $\text{Water} + \text{NaCl} \rightarrow \text{Na}^+ + \text{Cl}^-$

- A. A solution of ions is prepared.
- B. The dissociation of ions.
- C. Movement of an electron from the outermost energy level of Na to the outermost energy level of Cl.
- D. All the choices are true.**

Bloom's Level: 3. Apply

Learning Outcome: Understand the roles water plays in maintaining life.

Section: 02.07

Topic: Chemistry

90. Why is the following reaction considered to be dehydration synthesis? $\text{H-NH}_3\text{C}_2\text{O-OH} + \text{H-NH}_3\text{C}_2\text{O-OH} \rightarrow \text{H-NH}_3\text{C}_2\text{O-NH}_3\text{C}_2\text{O-OH} + \text{H-OH}$
- A. Water molecules are hidden in the products $\text{H-NH}_3\text{C}_2\text{O-NH}_3\text{C}_2\text{O-OH}$.
 - B. This is the same reaction that occurs during digestion and water is required.
 - C. Water molecules are formed as a result of the breakdown of $\text{H-NH}_3\text{C}_2\text{O-NH}_3\text{C}_2\text{O-OH}$.
 - D.** Water molecules are formed as a new, more complex end product is formed.

Bloom's Level: 2. Understand

Learning Outcome: List the five types of chemical reactions associated with all living things.

Section: 02.08

Topic: Chemistry

91. Comparing reactants to end products in the following chemical reaction, which end product will *gain* energy? $\text{Adenosine-tri-phosphate} + \text{sugar} \rightarrow \text{adenosine-di-phosphate} + \text{sugar-mono-phosphate}$
- A.** sugar-mono-phosphate
 - B. adenosine-di-phosphate
 - C. adenosine-tri-phosphate
 - D. None of these choices is correct.

Bloom's Level: 3. Apply

Learning Outcome: Explain the difference between reactants and products.

Learning Outcome: List the five types of chemical reactions associated with all living things.

Section: 02.08

Topic: Chemistry

92. Why is NaHCO_3 considered a base in the following reaction? $\text{NaHCO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$
- A. It contains hydrogen ions.
 - B.** It is a hydrogen ion acceptor.
 - C. It donates hydroxide ions in this reaction.
 - D. It results in the formation of CO_2 .

Bloom's Level: 2. Understand

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

93. When electrons in a covalent bond are not equally shared, the molecule is said to be
- A.** polar.
 - B. nonpolar.
 - C. lopsided.
 - D. unable to form hydrogen bonds.

Bloom's Level: 2. Understand

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.06

Topic: Chemistry

94. Because this is happening $\text{Water} + \text{NaCl} \rightarrow \text{Na}^+ + \text{Cl}^-$ the solution formed is called
- A. ionic.
 - B. an electrolyte.
 - C. salty.
 - D.** All of the choices are true.

Bloom's Level: 3. Apply

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

95. These are mixtures of weak acids and the salts of weak acids that tend to maintain constant pH.
- A.** buffers
 - B. oxidants
 - C. electrolytes
 - D. soft drinks

Bloom's Level: 2. Understand

Learning Outcome: Identify compounds that are acids, bases, or salts.

Section: 02.09

Topic: Chemistry

96. When electrons in a covalent bond are shared equally, the molecule is said to be

- A. polar.
- B. nonpolar.**
- C. lopsided.
- D. unable to form hydrogen bonds.

Bloom's Level: 2. Understand

Learning Outcome: Contrast chemical bonds and hydrogen bonds.

Section: 02.06

Topic: Chemistry

97. When this energy is reradiated as infrared radiation (heat), it is absorbed by these gases in the atmosphere.

- A. greenhouse.**
- B. refrigerants.
- C. isotopes of oxygen.
- D. isotopes of hydrogen.

Bloom's Level: 2. Understand

Learning Outcome: Contrast matter and energy.

Section: 02.01

Section: 02.02

Topic: Chemistry