

Student: \_\_\_\_\_

1. An atom that has gained electrons is a
  - A. reactant.
  - B. negative ion.
  - C. positive ion.
  - D. compound ion.
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.
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.
4. A negative charge is characteristic of a(n)
  - A. positive ion.
  - B. electron.
  - C. neutron.
  - D. proton.
5. Solutions are always comprised of
  - A. solvents and solute.
  - B. liquids and solids.
  - C. water and salts.
  - D. compounds and ions.
6. The greatest amount of kinetic energy is found in
  - A. gases.
  - B. liquids.
  - C. solids.
  - D. colloids.
7. All chemical reactions
  - A. involve the creation of new atoms.
  - B. involve a change in chemical bonds.
  - C. are dangerous.
  - D. create energy.
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.

9. Protons = 7, neutrons = 10, electrons = 7. The mass number of this atom is
- seven.
  - ten.
  - fourteen.
  - seventeen.
10. An acid is a substance that, in solution, releases
- oxygen ions in  $\text{H}_2\text{SO}_4$ .
  - hydrogen ions, for example,  $\text{HCl}$ .
  - $-\text{COOR}$  ions from beer.
  - chloride ions from  $\text{NaCl}$ .
11. A particle in the atom that has neither a negative nor a positive electrical charge is the
- electron.
  - element.
  - isotope.
  - neutron.
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
- $\text{C}_6\text{H}_{12}\text{O}_6$ .
  - $\text{C}_6\text{H}_{12}\text{O}_6 + \text{zymase}$ .
  - $\text{zymase} + 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$ .
  - $2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$ .
13. The correct symbol for a hydroxide ion is
- $\text{H}^-$ .
  - $\text{H}^+$ .
  - $(\text{OH})^-$ .
  - $(\text{OH})^+$ .
14. Kinetic energy is **best** defined as
- the energy of position.
  - the energy of electrical charge.
  - the energy of motion.
  - stored energy.
15. Which one of the following statements is false concerning matter?
- Matter is anything that has mass and takes up space.
  - Air is matter.
  - All matter has the same density.
  - The phases of matter are determined by the relative amounts of energy in the matter's molecules.
16. When two atoms share a pair of electrons, this type of chemical bond is
- ionic.
  - covalent.
  - hydrogen.
  - negative-positive.
17. Given that an unknown atom's mass number (AMU) is 27, its combination of particles could be
- 27 electrons, 16 neutrons, 16 protons.
  - 27 neutrons, 27 protons, 27 electrons.
  - 15 neutrons, 12 electrons, 15 protons.
  - 16 electrons, 11 neutrons, 16 protons.
18. A base can be defined as
- a hydroxide ion acceptor.
  - an attraction between a positive ion and a negative ion.
  - a substance that gives up hydrogen ions when dissolved in water.
  - a substance that gives up hydroxide groups in a solution.

19. The smallest particle of an element that still retains the properties of that element is a(n)
- atom.
  - proton.
  - electron.
  - element.
20. A chemical reactant is one that
- enters into a chemical reaction.
  - is the newly formed molecule.
  - is at a point when both sides of the equation are equal.
  - during photosynthesis, is one molecule of sugar and six molecules of oxygen.
21. An isotope is an atom of an element that varies in mass number due to variation in the number of
- atoms.
  - protons.
  - neutrons.
  - electrons.
22. A substance that is a solid
- contains a large amount of oxygen.
  - contains molecules that are packed tightly together and vibrate in place.
  - is bonded very tightly (covalent).
  - contains a large amount of hydrogen bonds.
23. An atom that has lost electrons is a
- cation.
  - neutral atom.
  - molecule.
  - anion.
24. If a particular atom has 27 electrons, 27 protons, and 31 neutrons, its mass number would be
- 52.
  - 54.
  - 56.
  - 58.
25. A solution that contains an excess of protons is(are)
- hydroxide ions.
  - an acid.
  - a base.
  - the pH.
26.  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$ . The  $\text{AgNO}_3$  in the equation is called a(n)
- reactant.
  - acid.
  - product.
  - base.
27. An isotope shows which of the following?
- A change in atomic number
  - Inability to form compounds
  - A change in mass number
  - More electrons
28. A material composed of atoms vibrating in place
- has high kinetic energy and is a gas.
  - has low kinetic energy and is a liquid.
  - has low kinetic energy and is a solid.
  - has high kinetic energy and is a solid.

29. Which of the following is a chemical reaction that is also known as digestion?
- phosphorylation
  - dehydration synthesis
  - acid-base
  - hydrolysis
30. Which kind of chemical reaction involves the attachment or removal of a phosphate group?
- oxidation-reduction
  - acid phosphorylation
  - phosphorylation
  - hydrolysis
31. Which of the following is an acid?
- $K_2SO_4$
  - $NaNO_3$
  - $CaCO_3$
  - $H_3PO_4$
32. An atomic particle with a weight of one, and a positive electrical charge is a(n)
- electron.
  - proton.
  - neutron.
  - isotope.
33.  $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_2 + 6O_2$ . In this reaction  $O_2$  is
- a reactant.
  - a product.
  - a reactant and a product.
  - neither a reactant nor a product.
34. One atom of sodium has a mass number of 22 units; another atom of sodium is 23 units. These two atoms are
- nonreactive.
  - unstable.
  - ions.
  - isotopes.
35. Which kind of attractive force holds two molecules together?
- ionic bond
  - hydrogen bond
  - covalent bond
  - sticky bond
36. A solution with a high concentration of hydrogen ions could have a pH of
- 2.
  - 6.
  - 9.
  - 11.
37. The attraction between a positively charged atom and a negatively charged atom within the same molecule is
- ionic bonding.
  - hydrogen bonding.
  - covalent bonding.
  - ions.

38. A scale used to indicate the strength of an acid or base is called a \_\_\_\_ scale.
- thermodynamic
  - aquatic
  - pH
  - reduction
39. The part of an atom without a charge is a(n)
- ion.
  - neutron.
  - electron.
  - molecule.
40. Which of the following indicates "reactant"?  $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + 6H_2O$
- $C_6H_{12}O_6 + O_2$
  - $H_2O$
  - $CO_2$
  - None of the choices is correct.
41. In the expression  $2H_2S + 3O_2 \rightarrow 2H_2O + SO_2$ , which is the acid?
- $H_2S$
  - $O_2$
  - $SO_2$
  - $H_2O$
42. An ion having eleven protons, twelve neutrons, and ten electrons will have a charge of
- +
  - 
  - ++
  -
43. A list of all of the elements in order of increasing atomic number is called the
- pH.
  - law of thermodynamics.
  - phase of matter.
  - periodic table.
44. The mass of a given volume of matter is expressed as
- weight.
  - energy.
  - density.
  - gravity.
45. The reaction  $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + 6H_2O$  is which type of chemical reaction?
- hydrolysis
  - transfer
  - dehydration synthesis
  - oxidation-reduction
46. Which rule states that atoms attempt to acquire an outermost energy level with eight electrons through chemical reactions?
- octet
  - atomic stability
  - hybridization
  - full energy level

47. A person jogging displays what kind of energy?  
 A. potential  
 B. kinetic  
 C. nuclear  
 D. sweat
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.
49. The atomic number for carbon is 6. The isotope  $^{14}\text{C}$  has \_\_\_\_ neutrons.  
 A. 6  
 B. 8  
 C. 14  
 D. 20
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.
51. One molecule of sodium nitrate ( $\text{NaNO}_3$ ) contains \_\_\_\_ atoms.  
 A. 6  
 B. 5  
 C. 4  
 D. 3
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.
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
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.
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.

56. The formulation  $\text{Ca}^{++}\text{Cl}^{-}_2$ , indicates
- covalent bonding between one calcium atom and two chlorine atoms.
  - one calcium ion that has gained two electrons and formed ionic bonds with two chloride ions that have each lost one electron.
  - one calcium atom with two protons and two chlorine atoms that share one electron.
  - one calcium ion that has lost two electrons and formed ionic bonds with two chloride ions that have each gained one electron.
57. One atomic mass unit (AMU) approximately equals the mass of one
- proton.
  - electron.
  - nucleus.
  - proton plus the mass of one neutron.
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)
- covalent bond.
  - ionic bond.
  - electron bond.
  - hydrogen bond.
59. When a pencil falls from a tabletop to the floor
- kinetic energy is converted to potential energy.
  - potential energy is converted to kinetic energy.
  - energy is created.
  - energy is destroyed.
60. The pH of a strong base is closest to
- 2.
  - 6.
  - 9.
  - 12.
61. A neutral atom with an atomic number of 15 will have \_\_\_\_\_ electrons in its outermost energy level.
- 3
  - 5
  - 8
  - 15

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	-

- Row 1
  - Row 2
  - Row 3
  - Row 4
63. The higher the pH,
- the greater the hydroxide ion concentration.
  - the more acidic the solution.
  - the greater the hydrogen ion concentration.
  - the lower the pH number.

64. A difference between an acid and a base is that
- acids are harmful and bases are not.
  - acids release hydroxide ions and bases release hydrogen ions.
  - acids have a high pH value and bases have a low pH value.
  - acids have a low pH value and bases have a high pH value.
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
- MgCl.
  - Mg<sub>2</sub>Cl.
  - MgCl<sub>2</sub>.
  - Mg<sub>2</sub>Cl<sub>2</sub>.
66. Which reaction below produces a salt?
- $\text{KOH} + \text{H}_2\text{O} \rightarrow \text{K}^+ + \text{OH}^- + \text{H}_2\text{O}$
  - $\text{HC}_2\text{H}_3\text{O}_2 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_3\text{O}_2^- + \text{H}^+ + \text{H}_2\text{O}$
  - $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
  - $\text{C}_6\text{H}_{12}\text{O}_6 + \text{C}_6\text{H}_{12}\text{O}_6 \rightarrow \text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O}$
67. Fluorine has the atomic number 9. The correct notation for a fluoride ion is
- F<sup>-</sup>.
  - F<sup>-</sup>.
  - F<sup>+</sup>.
  - F<sup>++</sup>.
68. The energy level listed below with the most energetic electrons is
- 1.
  - 2.
  - 3.
  - None of these. All energy levels contain electrons of equal energy.
69. An atom that contains 8 electrons in its outermost energy level is said to be
- inert.
  - reactive.
  - a cation.
  - a molecule.
70. Which of the following is monatomic?
- He
  - H<sub>2</sub>
  - O<sub>2</sub>
  - N<sub>2</sub>
71. List and define two types of chemical bonds.
72. In which one of the following situations do the molecules have the greatest amount of energy?
- Ice in a Coke
  - Cold tap water
  - Water vapor
  - Water condensed on your windshield

73. If an atom has the atomic number 4 and the atomic mass 9.012 it will
- have 5 electrons.
  - have 5 neutrons.
  - have 9 electrons.
  - weigh 13.012 atomic mass units.
74. A measure of the average kinetic energy of the molecules making up a substance is known as
- temperature.
  - heat.
  - potential.
  - phase of matter.
75. Which of the following would have the smallest number of hydrogen ions ( $H^+$ )?
- A solution with the pH 2
  - A solution with the pH 6
  - A container of acetic acid (vinegar)
  - A container of a strong base
76. In which one of the following situations do the molecules have the greatest attraction for one another?
- An ice cube
  - Cold tap water
  - Water vapor
  - Water condensed on your windshield
77. If an atom has the atomic number 4 and the atomic mass 9.012 it will have \_\_\_\_\_ electrons in the **first** energy level.
- 1
  - 2
  - 3
  - 4
78. If an atom has the atomic number 11 and the atomic mass 22.99, it will have
- 1 electron in the third energy level.
  - 1 electron in the second energy level.
  - 3 electrons in the fourth energy level.
  - 1 electron in the first energy level.
79. Which of the following would have the largest number of hydrogen ions ( $H^+$ )?
- A solution with the pH 11
  - A solution with the pH 8
  - A container of acetic acid (vinegar)
  - A container of a strong base
80. Which combination of elements is most likely to undergo a chemical reaction based on their positions in the Periodic Table of the Elements?
- Na and Cl
  - Na and Mg
  - F and Ne
  - All would react.
81. The lower the \_\_\_\_\_, the slower the molecules are moving.
- density
  - temperature
  - potential energy
  - gravity

82. The fact that the atomic weight of carbon is 12.0112 probably indicates that carbon atoms vary in the number of \_\_\_\_\_ they contain.
- electrons
  - protons
  - neutrons
  - nuclei
83. Human blood has a pH of about 7.4. If the pH should change to 7.0, this would indicate
- a decrease in pH.
  - an increase in acidity.
  - a change in electrolytes.
  - All the choices are correct.
84. When you sprinkle table salt on your food, the salt
- ionizes.
  - dissociates.
  - forms covalent bonds with the food.
  - undergoes an acid-base reaction.
85. The type of chemical bond that holds  $\text{OH}^-$  and  $\text{H}^+$  together is
- ionic.
  - covalent.
  - hydrogen.
  - All the choices are correct.
86. Which of the following is a base or alkaline material?
- $\text{NaOH}$
  - $\text{HCl}$
  - $\text{H}_2\text{SO}_4$
  - $\text{NaCl}$
87. Which of the following is an acid?
- $\text{NaOH}$
  - $\text{HOH}$
  - $\text{H}_2\text{SO}_4$
  - $\text{NaCl}$
88. Which of the following is a salt?
- $\text{NaOH}$
  - $\text{HOH}$
  - $\text{H}_2\text{SO}_4$
  - $\text{MgCl}_2$
89. What is happening here?  $\text{Water} + \text{NaCl} \rightarrow \text{Na}^+ + \text{Cl}^-$
- A solution of ions is prepared.
  - The dissociation of ions.
  - Movement of an electron from the outermost energy level of Na to the outermost energy level of Cl.
  - All the choices are true.
90. Why is the following reaction considered to be dehydration synthesis?  $\text{H-NH}_3\text{C}_2\text{O-OH} + \text{H-NH}_3\text{C}_2\text{O-OH} \rightarrow \text{H-NH}_3\text{C}_2\text{O-NH}_3\text{C}_2\text{O-OH} + \text{H-OH}$
- Water molecules are hidden in the products  $\text{H-NH}_3\text{C}_2\text{O-NH}_3\text{C}_2\text{O-OH}$ .
  - This is the same reaction that occurs during digestion and water is required.
  - Water molecules are formed as a result of the breakdown of  $\text{H-NH}_3\text{C}_2\text{O-NH}_3\text{C}_2\text{O-OH}$ .
  - Water molecules are formed as a new, more complex end product is formed.

91. Comparing reactants to end products in the following chemical reaction, which end product will *gain* energy? Adenosine-tri-phosphate + sugar  $\rightarrow$  adenosine-di-phosphate + sugar-mono-phosphate
- sugar-mono-phosphate
  - adenosine-di-phosphate
  - adenosine-tri-phosphate
  - None of these choices is correct.
92. Why is  $\text{NaHCO}_3$  considered a base in the following reaction?  $\text{NaHCO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$
- It contains hydrogen ions.
  - It is a hydrogen ion acceptor.
  - It donates hydroxide ions in this reaction.
  - It results in the formation of  $\text{CO}_2$ .
93. When electrons in a covalent bond are not equally shared, the molecule is said to be
- polar.
  - nonpolar.
  - lopsided.
  - unable to form hydrogen bonds.
94. Because this is happening  $\text{Water} + \text{NaCl} \rightarrow \text{Na}^+ + \text{Cl}^-$  the solution formed is called
- ionic.
  - an electrolyte.
  - salty.
  - All of the choices are true.
95. These are mixtures of weak acids and the salts of weak acids that tend to maintain constant pH.
- buffers
  - oxidants
  - electrolytes
  - soft drinks
96. When electrons in a covalent bond are shared equally, the molecule is said to be
- polar.
  - nonpolar.
  - lopsided.
  - unable to form hydrogen bonds.
97. When this energy is reradiated as infrared radiation (heat), it is absorbed by these gases in the atmosphere.
- greenhouse.
  - refrigerants.
  - isotopes of oxygen.
  - isotopes of hydrogen.

## 2 Key

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

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #1*  
*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #2*  
*Learning Outcome: Discriminate between atoms and elements; molecules and compounds.*  
*Section: 02.02*  
*Topic: 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.

*Blooms Level: 1. Remember*  
*Enger - Chapter 02 #3*  
*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.

*Blooms Level: 1. Remember*  
*Enger - Chapter 02 #4*  
*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #5*  
*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #6*  
*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #7*  
*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.

*Blooms Level: 1. Remember*  
*Enger - Chapter 02 #8*  
*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.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #9*  
*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  $\text{H}_2\text{SO}_4$ .  
**B.** hydrogen ions, for example, HCl.  
C.  $\text{—COOR}$  ions from beer.  
D. chloride ions from NaCl.

*Blooms Level: 1. Remember*  
*Enger - Chapter 02 #10*  
*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.

*Blooms Level: 1. Remember*  
*Enger - Chapter 02 #11*  
*Learning Outcome: Discriminate between atoms and elements; molecules and compounds.*  
*Section: 02.02*  
*Topic: Chemistry*

12. In the expression  $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ , the products are
- A.  $C_6H_{12}O_6$ .
  - B.  $C_6H_{12}O_6 + \text{zymase}$ .
  - C.  $\text{zymase} + 2C_2H_5OH + 2CO_2$ .
  - D.**  $2C_2H_5OH + 2CO_2$ .

Blooms Level: 3. Apply  
Enger - Chapter 02 #12

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.**  $(OH)^-$ .
  - D.  $(OH)^+$ .

Blooms Level: 1. Remember  
Enger - Chapter 02 #13

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.

Blooms Level: 2. Understand  
Enger - Chapter 02 #14

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.

Blooms Level: 2. Understand  
Enger - Chapter 02 #15

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.

Blooms Level: 2. Understand  
Enger - Chapter 02 #16

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.

Blooms Level: 3. Apply  
Enger - Chapter 02 #17

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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #18  
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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #19  
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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #20  
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.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #21  
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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #22  
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.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #23  
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.**

*Blooms Level: 3. Apply*

*Enger - Chapter 02 #24*

*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.

*Blooms Level: 1. Remember*

*Enger - Chapter 02 #25*

*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  $\text{AgNO}_3$  in the equation is called a(n)  
**A. reactant.**  
B. acid.  
C. product.  
D. base.

*Blooms Level: 2. Understand*

*Enger - Chapter 02 #26*

*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

*Blooms Level: 2. Understand*

*Enger - Chapter 02 #27*

*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.

*Blooms Level: 2. Understand*

*Enger - Chapter 02 #28*

*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**

*Blooms Level: 1. Remember*

*Enger - Chapter 02 #29*

*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

*Blooms Level: 2. Understand  
Enger - Chapter 02 #30*

*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.**  $H_3PO_4$

*Blooms Level: 1. Remember  
Enger - Chapter 02 #31*

*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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #32*

*Learning Outcome: Discriminate between atoms and elements; molecules and compounds.  
Section: 02.02  
Topic: Chemistry*

33.  $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_2 + 6O_2$ . 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.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #33*

*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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #34*

*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

*Blooms Level: 1. Remember  
Enger - Chapter 02 #35*

*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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #36  
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.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #37  
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

*Blooms Level: 1. Remember  
Enger - Chapter 02 #38  
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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #39  
Learning Outcome: Discriminate between atoms and elements; molecules and compounds.  
Section: 02.02  
Topic: Chemistry*

40. Which of the following indicates "reactant"?  $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + 6H_2O$   
**A.**  $C_6H_{12}O_6 + O_2$   
B.  $H_2O$   
C.  $CO_2$   
D. None of the choices is correct.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #40  
Learning Outcome: Explain the difference between reactants and products.  
Section: 02.08  
Topic: Chemistry*

41. In the expression  $2H_2S + 3O_2 \rightarrow 2H_2O + SO_2$ , which is the acid?  
**A.**  $H_2S$   
B.  $O_2$   
C.  $SO_2$   
D.  $H_2O$

*Blooms Level: 3. Apply  
Enger - Chapter 02 #41  
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. --.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #42*

*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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #43*

*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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #44*

*Learning Outcome: Describe the differences among liquids, solids, and gases.  
Section: 02.01  
Section: 02.05  
Topic: Chemistry*

45. The reaction  $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + 6H_2O$  is which type of chemical reaction?  
A. hydrolysis  
B. transfer  
C. dehydration synthesis  
**D.** oxidation-reduction

*Blooms Level: 1. Remember  
Enger - Chapter 02 #45*

*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

*Blooms Level: 2. Understand  
Enger - Chapter 02 #46*

*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

*Blooms Level: 5. Evaluate  
Enger - Chapter 02 #47*

*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.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #48*

*Learning Outcome: Explain the difference between reactants and products.  
Section: 02.08*

*Topic: Chemistry*

49. The atomic number for carbon is 6. The isotope  $^{14}\text{C}$  has \_\_\_\_ neutrons.  
A. 6  
**B.** 8  
C. 14  
D. 20

*Blooms Level: 1. Remember  
Enger - Chapter 02 #49*

*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.

*Blooms Level: 3. Apply  
Enger - Chapter 02 #50*

*Learning Outcome: Discriminate between atoms and elements; molecules and compounds.  
Section: 02.02*

*Topic: Chemistry*

51. One molecule of sodium nitrate ( $\text{NaNO}_3$ ) contains \_\_\_\_ atoms.  
A. 6  
**B.** 5  
C. 4  
D. 3

*Blooms Level: 4. Analyze  
Enger - Chapter 02 #51*

*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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #52*

*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

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

compound?

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

*Blooms Level: 5. Evaluate*

*Enger - Chapter 02 #53*

*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.

*Blooms Level: 1. Remember*

*Enger - Chapter 02 #54*

*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.

*Blooms Level: 2. Understand*

*Enger - Chapter 02 #55*

*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.**

*Blooms Level: 3. Apply*

*Enger - Chapter 02 #56*

*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.

*Blooms Level: 1. Remember*

*Enger - Chapter 02 #57*

*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #58*  
*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.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #59*  
*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.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #60*  
*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

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #61*  
*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

*Blooms Level: 5. Evaluate*  
*Enger - Chapter 02 #62*  
*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #63*  
*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #64*  
*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. Mg<sub>2</sub>Cl.  
**C.** MgCl<sub>2</sub>.  
D. Mg<sub>2</sub>Cl<sub>2</sub>.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #65*  
*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?  
A.  $\text{KOH} + \text{H}_2\text{O} \rightarrow \text{K}^+ + \text{OH}^- + \text{H}_2\text{O}$   
B.  $\text{HC}_2\text{H}_3\text{O}_2 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_3\text{O}_2^- + \text{H}^+ + \text{H}_2\text{O}$   
**C.**  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$   
D.  $\text{C}_6\text{H}_{12}\text{O}_6 + \text{C}_6\text{H}_{12}\text{O}_6 \rightarrow \text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O}$

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #66*  
*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  
**A.** F<sup>-</sup>.  
B. F<sup>-</sup>.  
C. F<sup>+</sup>.  
D. F<sup>++</sup>.

*Blooms Level: 1. Remember*  
*Enger - Chapter 02 #67*  
*Learning Outcome: Discriminate between atoms and elements; molecules and compounds.*  
*Section: 02.09*  
*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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #68  
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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #69  
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.** H<sub>2</sub>  
C. O<sub>2</sub>  
D. N<sub>2</sub>

*Blooms Level: 2. Understand  
Enger - Chapter 02 #70  
Learning Outcome: Discriminate between atoms and elements; molecules and compounds.  
Section: 02.02  
Topic: Chemistry*

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

*Blooms Level: 1. Remember  
Enger - Chapter 02 #71  
Learning Outcome: Contrast chemical bonds and hydrogen bonds.  
Section: 02.06  
Topic: Chemistry*

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

*Blooms Level: 3. Apply  
Enger - Chapter 02 #72  
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.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #73  
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.

*Blooms Level: 1. Remember  
Enger - Chapter 02 #74  
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

*Blooms Level: 2. Understand  
Enger - Chapter 02 #75  
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

*Blooms Level: 2. Understand  
Enger - Chapter 02 #76  
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

*Blooms Level: 2. Understand  
Enger - Chapter 02 #77  
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.

*Blooms Level: 3. Apply  
Enger - Chapter 02 #78  
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

*Blooms Level: 1. Remember  
Enger - Chapter 02 #79  
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.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #80*  
*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

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #81*  
*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

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #82*  
*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.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #83*  
*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.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #84*  
*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  $\text{OH}^-$  and  $\text{H}^+$  together is  
**A.** ionic.  
B. covalent.  
C. hydrogen.  
D. All the choices are correct.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #85*  
*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<sub>2</sub>SO<sub>4</sub>
- D. NaCl

*Blooms Level: 1. Remember  
Enger - Chapter 02 #86*

*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<sub>2</sub>SO<sub>4</sub>
- D. NaCl

*Blooms Level: 1. Remember  
Enger - Chapter 02 #87*

*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<sub>2</sub>SO<sub>4</sub>
- D.** MgCl<sub>2</sub>

*Blooms Level: 1. Remember  
Enger - Chapter 02 #88*

*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.

*Blooms Level: 3. Apply  
Enger - Chapter 02 #89*

*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 H-NH<sub>3</sub>C<sub>2</sub>O-NH<sub>3</sub>C<sub>2</sub>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 H-NH<sub>3</sub>C<sub>2</sub>O-NH<sub>3</sub>C<sub>2</sub>O-OH.
- D.** Water molecules are formed as a new, more complex end product is formed.

*Blooms Level: 2. Understand  
Enger - Chapter 02 #90*

*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? Adenosine-tri-phosphate + sugar → adenosine-di-phosphate + sugar-mono-phosphate
- A.** sugar-mono-phosphate
  - B. adenosine-di-phosphate
  - C. adenosine-tri-phosphate
  - D. None of these choices is correct.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #91*

*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  $\text{NaHCO}_3$  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  $\text{CO}_2$ .

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #92*

*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #93*

*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.

*Blooms Level: 3. Apply*  
*Enger - Chapter 02 #94*

*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

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #95*

*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #96*  
*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.

*Blooms Level: 2. Understand*  
*Enger - Chapter 02 #97*  
*Learning Outcome: Contrast matter and energy.*  
*Section: 02.01*  
*Section: 02.02*  
*Topic: Chemistry*

## 2 Summary

<u>Category</u>	<u># of Questions</u>
Blooms Level: 1. Remember	35
Blooms Level: 2. Understand	40
Blooms Level: 3. Apply	18
Blooms Level: 4. Analyze	1
Blooms Level: 5. Evaluate	3
Enger - Chapter 02	97
Learning Outcome: Contrast chemical bonds and hydrogen bonds.	10
Learning Outcome: Contrast matter and energy.	3
Learning Outcome: Describe how isotopes differ from one another.	1
Learning Outcome: Describe the differences among liquids, solids, and gases.	4
Learning Outcome: Describe the information found in the periodic table of the elements.	6
Learning Outcome: Differentiate among atomic weight, atomic number, atomic mass, and mass number.	1
Learning Outcome: Differentiate among solution, solvent, and solute.	1
Learning Outcome: Discriminate between atoms and elements; molecules and compounds.	27
Learning Outcome: Explain how atoms stick together to form compounds.	2
Learning Outcome: Explain the difference between reactants and products.	11
Learning Outcome: Identify compounds that are acids, bases, or salts.	13
Learning Outcome: List the five types of chemical reactions associated with all living things.	5
Learning Outcome: Summarize the difference between potential and kinetic energy.	7
Learning Outcome: Understand the roles water plays in maintaining life.	1
Learning Outcome: Work with the pH scale.	8
Section: 02.01	6
Section: 02.02	37
Section: 02.03	5
Section: 02.04	5
Section: 02.05	4
Section: 02.06	14
Section: 02.07	2
Section: 02.08	14
Section: 02.09	20
Topic: Chemistry	97