

## Chapter 02

1. When can we say that atom has no vacancy, or the atom is full?

- a. An atom's outer shell is filled with electrons
- b. An atom's inner shell is filled with electrons
- c. An atom's outer shell is filled with neutrons
- d. An atom's outer shell is filled with protons
- e. An atom's inner shell is filled with protons

ANSWER: a

2. How does the energy of an electron relate with the distance from the nucleus?

- a. The closer an electron is from the nucleus, the greater its energy.
- b. The farther an electron is from the nucleus, the greater its energy.
- c. The farther a proton is from the nucleus, the greater the electron's energy.
- d. The closer a proton is from the nucleus, the greater the electron's energy.
- e. The closer a neutron is from the nucleus, the greater the electron's energy.

ANSWER: b

3. What is the smallest unit of an element that retains the properties of that element?

- a. Atom
- b. Compound
- c. Orbital
- d. Molecule
- e. Mixture

ANSWER: a

4. Which substance is *not* an element?

- a. Chlorine
- b. Oxygen
- c. Carbon
- d. Water
- e. Hydrogen

ANSWER: d

5. The atomic number of an atom refers to its \_\_\_\_\_.

- a. mass or weight
- b. number of protons
- c. number of protons and neutrons
- d. number of neutrons
- e. number of electrons

ANSWER: b

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6. Isotopes of atoms \_\_\_\_\_.

- a. have the same number of neutrons but a different number of protons
- b. behave the same chemically and biologically from other isotopes
- c. are the same physically and biologically but differ from other isotopes chemically
- d. have the same number of protons but a different number of electrons
- e. are produced when atoms lose electrons

ANSWER: b

7. An atom can get rid of vacancies by participating in a \_\_\_\_\_.

- a. cell bond
- b. physical bond
- c. chemical bond
- d. magnetic bond
- e. electric bond

ANSWER: c

8. The nucleus of an atom contains \_\_\_\_\_.

- a. neutrons and protons
- b. neutrons and electrons
- c. protons and electrons
- d. protons only
- e. neutrons only

ANSWER: a

9. The \_\_\_\_\_ of an atom have a negative charge.

- a. nuclei
- b. protons
- c. neutrons
- d. ions
- e. electrons

ANSWER: e

10. The \_\_\_\_\_ of an atom have no charge.

- a. electrons
- b. protons
- c. neutrons
- d. ions
- e. nuclei

ANSWER: c

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11. The mass number of an atom is determined by the combined masses of its \_\_\_\_.

- a. neutrons and protons
- b. neutrons and electrons
- c. protons and electrons
- d. protons, neutrons, and electrons
- e. neutrons, nucleus, and electrons

ANSWER: a

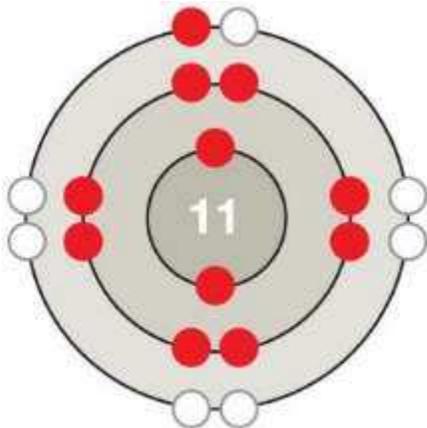


Figure 2.5 C

12. Which of the following is depicted in the accompanying figure?

- a. Hydrogen atom
- b. Sodium atom
- c. Helium ion
- d. Chlorine ion
- e. Oxygen molecule

ANSWER: b

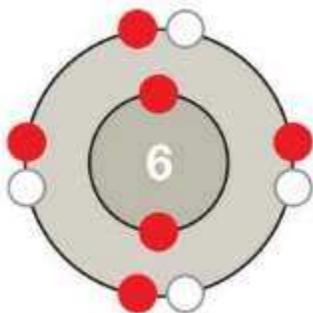


Figure 2.5B

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13. Which atom is depicted in the accompanying figure?

- a. Hydrogen
- b. Helium
- c. Carbon
- d. Nitrogen
- e. Oxygen

ANSWER: c

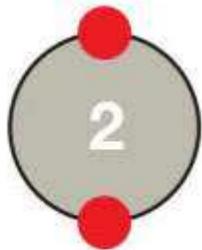


Figure 2.5A

14. Based on its outer shell, the atom in the accompanying figure would be characterized as \_\_\_\_.

- a. very stable
- b. somewhat stable
- c. somewhat unstable
- d. very unstable
- e. radioactive

ANSWER: a

15. All isotopes of an element have a different number of \_\_\_\_.

- a. electrons
- b. protons
- c. neutrons
- d. orbital shells
- e. atoms

ANSWER: c

16. In the chemical shorthand,  $^{14}\text{C}$ , the 14 represents the number of \_\_\_\_.

- a. excess neutrons
- b. protons plus neutrons
- c. electrons
- d. protons plus electrons
- e. radioactive particles

ANSWER: b

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17. Isotopes of an element are differentiated by their \_\_\_\_\_.

- a. atomic weight
- b. number of orbital shells
- c. element name
- d. mass number
- e. electron profile

ANSWER: d

18. A(n) \_\_\_\_\_ is a strong mutual attraction between ions of opposite charge.

- a. ionic bond
- b. molecular bond
- c. covalent bond
- d. polar covalent bond
- e. magnetic bond

ANSWER: a

19. Tracers are elements that \_\_\_\_\_.

- a. are used in minute amounts in plants
- b. can be monitored during biochemical reactions
- c. must be inert
- d. have an unbalanced electrical charge
- e. must have a stable nucleus

ANSWER: b

20. The radioisotope  $^{14}\text{C}$  can be used as a research tracer because it \_\_\_\_\_.

- a. decays to  $^{12}\text{C}$
- b. has a different number of protons than  $^{12}\text{C}$
- c. has fewer neutrons than  $^{12}\text{C}$
- d. behaves the same chemically as  $^{12}\text{C}$
- e. has six carbons and six neutrons

ANSWER: d

21. The slight positive charge of a hydrogen atom in one water molecule is drawn to the slight negative charge of an oxygen atom in another. This interaction is known as a(n) \_\_\_\_\_.

- a. oxygen bond
- b. water bond
- c. hydrogen bond
- d. covalent polarity bond
- e. magnetic bond

ANSWER: c

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22. Which bond can break most easily?

- a. Ionic bond
- b. Covalent bonds
- c. Polar covalent bond
- d. Hydrogen bond
- e. Magnetic bond

ANSWER: d

23. Atoms with a(n) \_\_\_\_ are more likely to form chemical bonds.

- a. filled outer orbital shell
- b. unfilled outer orbital shell
- c. filled inner orbital shell
- d. unfilled inner orbital shell
- e. large number of orbital shells

ANSWER: b

24. Atoms can form \_\_\_\_ in order to achieve a full outer orbital shell.

- a. ions
- b. covalent bonds
- c. H bonds
- d. ions and covalent bonds
- e. ions and H bonds

ANSWER: b

25. Nitrogen, with an atomic number of 7, has \_\_\_\_ electron(s) in the first energy level and \_\_\_\_ electrons in the second energy level.

- a. one; six
- b. two; five
- c. three; four
- d. four; three
- e. five; two

ANSWER: b

26. What is a buffer?

- a. A substance that releases hydrogen ions in water
- b. A substance that accepts hydrogen ions in water
- c. A substance that accepts oxygen ions in water
- d. A set of chemicals that keep the pH of a solution stable
- e. A substance that releases oxygen ions in water

ANSWER: d

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27. Which statement is *false*?

- a. A molecule must be made of at least two atoms.
- b. Compounds are made of elements.
- c. Two atoms of oxygen make a molecule of oxygen.
- d. Chemical bonds form between molecules of solute and solvent.
- e. Elements are found in compounds and molecules.

ANSWER: d

28. A molecule consists of \_\_\_\_.

- a. radioactive compounds
- b. two or more atoms of the same element
- c. electrically charged elements
- d. elements with one or more extra neutrons
- e. atoms held together by chemical bonds

ANSWER: e

29. The bond in table salt (NaCl) is \_\_\_\_.

- a. polar
- b. ionic
- c. covalent
- d. double
- e. nonpolar

ANSWER: b

30. In \_\_\_\_ bonds, both atoms exert the same pull on shared electrons.

- a. triple covalent
- b. polar covalent
- c. double covalent
- d. nonpolar covalent
- e. coordinate covalent

ANSWER: d

31. In covalent bonds, \_\_\_\_.

- a. atoms share electrons
- b. atoms give up electrons
- c. atoms accept electrons
- d. electrons cannot be shared equally
- e. electrons are always shared equally

ANSWER: a

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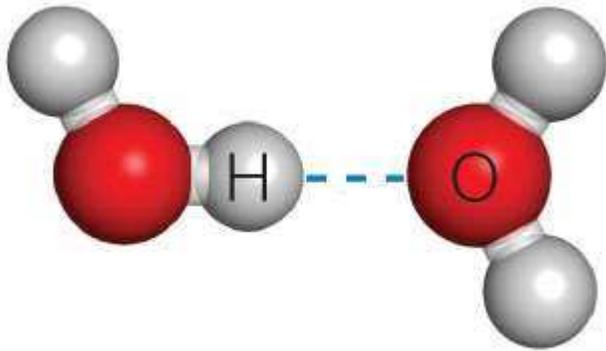


Figure 2.11B

32. The dashed line in the accompanying figure represents a(n) \_\_\_\_.
- a. covalent bond
  - b. ionic bond
  - c. hydrogen bond
  - d. polar covalent bond
  - e. hydrophobic interaction

ANSWER: c

33. A hydrogen bond is an attraction between a(n) \_\_\_\_ hydrogen atom and another atom taking part in \_\_\_\_.
- a. covalently bonded; the same polar covalent bond
  - b. ionically bonded; the same polar covalent bond
  - c. covalently bonded; a separate polar covalent bond
  - d. ionically bonded; a separate nonpolar covalent bond
  - e. nonpolar covalently bonded; a separate nonpolar covalent bond

ANSWER: c

34. Water is important to the interactions of biological molecules because it \_\_\_\_.
- a. is a good buffer
  - b. destabilizes temperature
  - c. is a poor solvent for polar and ionic substances
  - d. has weak cohesive properties
  - e. promotes hydrophilic interactions

ANSWER: e

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35. The most likely reason that glucose dissolves in water is that it is \_\_\_\_\_.  
a. an ionic compound  
b. a polysaccharide  
c. polar and forms many hydrogen bonds with the water molecules  
d. an extremely unstable molecule  
e. highly nonpolar

ANSWER: c

36. The solvent, cohesive, and temperature stabilization properties of water are primarily due to its \_\_\_\_\_.  
a. ability to promote hydrophilic interactions  
b. ionic bonds  
c. hydrogen bonds  
d. ability to promote hydrophobic interactions  
e. nonpolar nature

ANSWER: c

37. The column of water extending in tubes from plant roots to leaves is maintained by \_\_\_\_\_.  
a. hydrophilic interactions  
b. ionic bonds  
c. covalent bonds  
d. hydrophobic interactions  
e. cohesion between water molecules

ANSWER: e

38. When exposed to water, sodium chloride (NaCl) \_\_\_\_\_.  
a. dissolves into  $\text{Na}^+$  and  $\text{Cl}^-$  ions  
b. crystallizes into a solid  
c. dissolves into  $\text{Na}^-$  and  $\text{Cl}^+$  ions  
d. crystallizes into a liquid  
e. forms a hydrophobic compound

ANSWER: a

39. A salt will dissolve in water to form \_\_\_\_\_.  
a. acids  
b. only hydrogen and oxygen bonds  
c. ions other than  $\text{H}^+$  and  $\text{OH}^-$   
d. bases  
e. buffers

ANSWER: c

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40. "Acidic" is an appropriate description for four of the following. Which one is the exception?

- a. Excess hydrogen ions
- b. The contents of the stomach
- c. Magnesium hydroxide
- d. HCl
- e. A pH less than 7

ANSWER: c

41. A solution with a pH of 9 has \_\_\_\_\_ times fewer hydrogen ions than a solution with a pH of 6.

- a. two
- b. four
- c. 10
- d. 100
- e. 1,000

ANSWER: e

42. Blood pH is kept near a value of 7.3–7.5 because of \_\_\_\_\_.

- a. salts
- b. buffers
- c. acids
- d. bases
- e. water

ANSWER: b

43. Tracers allow scientists to track a molecule through a biochemical process by replacing an atom in that molecule with its \_\_\_\_\_.

ANSWER: radioisotope

44. The sharing of two pairs of electrons between two atoms is called a(n) \_\_\_\_\_.

ANSWER: double bond

45.  $^{14}\text{C}$  is a radioactive isotope, and it turns into \_\_\_\_\_ when it decays.

ANSWER: nitrogen

46. The predictable rate of \_\_\_\_\_ allows scientists to estimate the age of a rock or fossil by examining its isotope content.

ANSWER: decay  
radioactive decay

47. The ability of a solution to resist changes in pH depends on its \_\_\_\_\_ capacity.

ANSWER: buffering

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Classification. The various energy levels in an atom of magnesium ( $^{24}\text{Mg}$ ) have different numbers of electrons. Use the numbers below to answer the following questions.

- a. 1
- b. 2
- c. 3
- d. 6
- e. 8

48. The number of electrons in the first energy level

ANSWER: b

49. The number of electrons in the third energy level

ANSWER: b

50. The number of electrons in the second energy level

ANSWER: e

Classification. The following are types of chemical bonds. Answer the questions below by matching the descriptions with the most appropriate bond type.

- a. hydrogen
- b. ionic
- c. covalent
- d. polar covalent
- e. double bond

51. The bond between the atoms of table salt (NaCl)

ANSWER: b

52. The bond type holding several molecules of water together

ANSWER: a

53. The bond between the oxygen atoms of oxygen gas (O<sub>2</sub>)

ANSWER: e

54. The bond that breaks when salts dissolve in water

ANSWER: b

55. A bond in which connected atoms share electrons

ANSWER: c

56. A bond in which connected atoms unequally share electrons

ANSWER: d

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Classification. The following are important terms relating to water's special properties. Answer the questions below by matching the descriptions with the most appropriate word.

- a. hydrophobic
- b. hydrophilic
- c. salt
- d. solute
- e. solvent

57. NaCl becomes this in solution

ANSWER: d

58. Property of NaCl that enables it to dissolve in water

ANSWER: b

59. A liquid that dissolves other substances

ANSWER: e

60. A compound that releases ions when dissolved in water

ANSWER: c

61. Property of nonpolar compounds

ANSWER: a

Classification. The following are important terms relating to acids and bases. Answer the questions below by matching the descriptions with the most appropriate word.

- a. pH
- b. acid
- c. base
- d. buffer

62. Substance that accepts, but does not release,  $H^+$

ANSWER: c

63. Lemon juice

ANSWER: b

64. Substance that releases, but does not accept,  $H^+$

ANSWER: b

65. Set of chemicals that stabilize pH

ANSWER: d

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

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66. Measure of  $H^+$  in a fluid

*ANSWER:* a

67. Toothpaste

*ANSWER:* c