Chapter 02 Test Bank

Student: _____

1. The nucleus of an atom is composed of two subatomic particles, _____ and _____.

   A. protons; neutrons
   B. protons; electrons
   C. neutrons; electrons

2. Atoms that bear a positive or negative charge are known as

   A. magnetic.
   B. electrically neutral.
   C. ions.
   D. lacking nuclei.

3. The _____ of atoms determine how atoms will react with each other.

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

4. In a neutral atom, protons are always

   A. equal to the electrons.
   B. close to the electrons.
   C. equal to the neutrons.
   D. combined with the electrons to calculate the atomic mass.

5. The volume of space around a nucleus where an electron is most likely to be located is called the _____ of that electron.

   A. energy level
   B. spin
   C. pathway
   D. orbital

6. Electrons possess energy of position, also known as _____ energy.

   A. kinetic
   B. latent
   C. potential
   D. opposition

7. Most elements in nature exist as

A. solitary unreactive atoms.
B. mixtures of different isotopes.
C. mixtures of gases.
D. mixtures of liquids.

8. What is true about ^{14}C?

A. It is an ion.
B. It is the most common form of carbon.
C. It can be employed in the radioisotopic dating of fossils.
D. It has 6 neutrons.

9. When an electron is transferred from one atom to the next, and the two atoms are then electrically attracted to one another, the type of bond is a(n) _____ bond.

A. hydrogen
B. covalent
C. kinetic
D. ionic

10. The type of bond that forms between two atoms when electrons are shared is a(n) _____ bond.

A. hydrogen
B. covalent
C. kinetic
D. ionic

11. Strong, _____ bonds are needed for the building of complex biological molecules.

A. directional
B. nondirectional
C. stationary
D. ionic
E. covalent

12. What property of water is NOT attributable to hydrogen bonding between water molecules?

A. Heat storage
B. Ice formation
C. Polarity
D. Cohesion

13. A solution with a pH of 4 has _____ the concentration of H^+ present compared to a solution with a pH of 5.

A. 10 times
B. 100 times
C. 2 times
D. 1000 times

14. The mass number of an atom is the

A. number of neutrons only.
B. the number of electrons plus the number of protons.
C. the number of protons only.
D. the number of protons plus the number of neutrons.
E. the number of electrons, plus the number of neutrons, plus the number of protons.

15. The atomic number of an atom is the

A. number of neutrons only.
B. the number of electrons plus the number of protons.
C. the number of protons only.
D. the number of protons plus the number of neutrons.
E. the number of electrons, plus the number of neutrons, plus the number of protons.

16. The first shell in any atom contains one orbital which may contain as many as

A. 2 electrons.
B. 8 protons.
C. 8 electrons.
D. 4 neutrons.
E. 2 neutrons.

17. The second shell in an atom contains _____ orbitals and holds up to _____ electrons.

A. 4; 4
B. 3; 2
C. 4; 8
D. 3; 8
E. 8; 24

18. If an element has an atomic number of 6 and a mass number of 14, how many neutrons does it have?

A. 6
B. 14
C. 7
D. 8
E. Impossible to determine.

19. Which is *not* correct about water molecules?

A. Hydrogens have partial negative charges.
B. Water is a polar molecule.
C. Covalent bonds exist within a water molecule.
D. Hydrogen bonds exist between water molecules.
E. Hydrogen bonds are weak bonds.

20. Which type of chemical substance lowers the H^+ concentration in a solution?

A. Ice
B. Acid
C. Base
D. Buffer
E. Hydrogen ion

21. Water moving up into a paper towel is attributable to

A. heat storage.
B. high heat of vaporization.
C. electronegativity.
D. cohesion.
E. adhesion.

22. The high surface tension of water that allows some insects to literally walk on water is due to

A. high heat of vaporization.
B. cohesion.
C. adhesion.
D. polar covalent bonds.
E. heat storage.

23. Buffers always release H^+ ions into solution to stabilize pH.

True False

24. Nonpolar molecules are water soluble.

True False

25. The number of protons in the nucleus of an atom is called the _____.

True False

26. The number of protons in the nucleus of an atom is called the _____.

_____

27. Atomic mass refers to the numbers of _____ and _____ of an atom.

_____

28. Atoms that have the same number of protons but differ in their number of neutrons are _____.

_____

29. Nonpolar molecules are said to be _____ because they shrink away from water.

_____

30. When water ionizes, the negatively charged OH fragment is the _____ ion.

_____

31. We use the _____ scale to measure concentrations of hydrogen ions in a solution.

_____

32. A solution with a pH of 3 is said to be highly _____.

_____

33. Cells contain chemical substances called _____ that minimize changes in concentrations of H^+ and OH^-.

_____

34. The chemical bond within a water molecule is a _____ bond.

_____

35. Due to hydrogen bonding, ice is _____ dense than water.

_____

36. A substance that increases the concentration of H^+ is called a(n) _____.

_____

37. What are two of the characteristics of water that make it so important in living organisms?

38. What are some of the uses of radioactive isotopes?

39. Discuss the difference between covalent, ionic, and hydrogen bonds.

40. Describe van der Waals forces and how they play a role in biological molecules.

41. Describe the structure of an atom and include how the number of electrons in the outer shell will affect an atom's tendency to interact with other atoms.

Chapter 02 Test Bank Key

1. The nucleus of an atom is composed of two subatomic particles, _____ and _____.

A. protons; neutrons
B. protons; electrons
C. neutrons; electrons

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Section: 02.01
Topic: Chemistry

2. Atoms that bear a positive or negative charge are known as

A. magnetic.
B. electrically neutral.
C. ions.
D. lacking nuclei.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Differentiate between a cation and an anion.
Section: 02.02
Topic: Chemistry

3. The _____ of atoms determine how atoms will react with each other.

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

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Explain why electrons determine the chemical behavior of atoms.
Section: 02.01
Topic: Chemistry

4. In a neutral atom, protons are always

A. equal to the electrons.
B. close to the electrons.
C. equal to the neutrons.
D. combined with the electrons to calculate the atomic mass.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
Section: 02.01
Section: 02.02
Topic: Chemistry

5. The volume of space around a nucleus where an electron is most likely to be located is called the _____ of that electron.

A. energy level
B. spin
C. pathway
D. orbital

Bloom's Level: 1. Remember
Learning Outcome: 02.01.03 Explain how electrons carry energy.
Section: 02.01
Topic: Chemistry

6. Electrons possess energy of position, also known as _____ energy.

A. kinetic
B. latent
C. potential
D. opposition

Bloom's Level: 1. Remember
Learning Outcome: 02.01.03 Explain how electrons carry energy.
Section: 02.01
Topic: Chemistry

7. Most elements in nature exist as

A. solitary unreactive atoms.
B. mixtures of different isotopes.
C. mixtures of gases.
D. mixtures of liquids.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
Section: 02.02
Topic: Chemistry

8. What is true about ^{14}C?

A. It is an ion.
B. It is the most common form of carbon.
C. It can be employed in the radioisotopic dating of fossils.
D. It has 6 neutrons.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
Section: 02.02
Topic: Chemistry

9. When an electron is transferred from one atom to the next, and the two atoms are then electrically attracted to one another, the type of bond is a(n) _____ bond.

A. hydrogen
B. covalent
C. kinetic
D. ionic

Bloom's Level: 1. Remember
Learning Outcome: 02.03.02 Explain how ionic bonds promote crystal formation.
Section: 02.03
Topic: Chemistry

10. The type of bond that forms between two atoms when electrons are shared is a(n) _____ bond.

A. hydrogen
B. covalent
C. kinetic
D. ionic

Bloom's Level: 1. Remember
Learning Outcome: 02.03.03 Explain why most chemical bonds in organisms are covalent bonds, and distinguish between polar and nonpolar covalent bonds.
Section: 02.03
Topic: Chemistry

11. Strong, _____ bonds are needed for the building of complex biological molecules.

A. directional
B. nondirectional
C. stationary
D. ionic
E. covalent

Bloom's Level: 2. Understand
Learning Outcome: 02.03.03 Explain why most chemical bonds in organisms are covalent bonds, and distinguish between polar and nonpolar covalent bonds.
Section: 02.03
Topic: Chemistry

12. What property of water is NOT attributable to hydrogen bonding between water molecules?

A. Heat storage
B. Ice formation
C. Polarity
D. Cohesion

Bloom's Level: 2. Understand
Learning Outcome: 02.04.05 Explain why oil will not dissolve in water.
Section: 02.04
Topic: Chemistry

13. A solution with a pH of 4 has _____ the concentration of H^+ present compared to a solution with a pH of 5.

A. 10 times
B. 100 times
C. 2 times
D. 1000 times

Bloom's Level: 3. Apply
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

14. The mass number of an atom is the

A. number of neutrons only.
B. the number of electrons plus the number of protons.
C. the number of protons only.
D. the number of protons plus the number of neutrons.
E. the number of electrons, plus the number of neutrons, plus the number of protons.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Section: 02.01
Topic: Chemistry

15. The atomic number of an atom is the

A. number of neutrons only.
B. the number of electrons plus the number of protons.
C. the number of protons only.
D. the number of protons plus the number of neutrons.
E. the number of electrons, plus the number of neutrons, plus the number of protons.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Section: 02.01
Topic: Chemistry

16. The first shell in any atom contains one orbital which may contain as many as

A. 2 electrons.
B. 8 protons.
C. 8 electrons.
D. 4 neutrons.
E. 2 neutrons.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.03 Explain how electrons carry energy.
Section: 02.01
Topic: Chemistry

17. The second shell in an atom contains _____ orbitals and holds up to _____ electrons.

A. 4; 4
B. 3; 2
C. 4; 8
D. 3; 8
E. 8; 24

Bloom's Level: 1. Remember
Learning Outcome: 02.01.03 Explain how electrons carry energy.
Section: 02.01
Topic: Chemistry

18. If an element has an atomic number of 6 and a mass number of 14, how many neutrons does it have?

A. 6
B. 14
C. 7
D. 8
E. Impossible to determine.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
Section: 02.01
Section: 02.02
Topic: Chemistry

19. Which is *not* correct about water molecules?

A. Hydrogens have partial negative charges.
B. Water is a polar molecule.
C. Covalent bonds exist within a water molecule.
D. Hydrogen bonds exist between water molecules.
E. Hydrogen bonds are weak bonds.

Bloom's Level: 2. Understand
Learning Outcome: 02.03.04 Predict which molecules will form hydrogen bonds with each other.
Section: 02.03
Topic: Chemistry

20. Which type of chemical substance lowers the H^+ concentration in a solution?

A. Ice
B. Acid
C. Base
D. Buffer
E. Hydrogen ion

Bloom's Level: 2. Understand
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

21. Water moving up into a paper towel is attributable to

A. heat storage.
B. high heat of vaporization.
C. electronegativity.
D. cohesion.
E. adhesion.

Bloom's Level: 2. Understand
Learning Outcome: 02.04.04 Distinguish cohesion from adhesion.
Section: 02.04
Topic: Chemistry

22. The high surface tension of water that allows some insects to literally walk on water is due to

A. high heat of vaporization.
B. cohesion.
C. adhesion.
D. polar covalent bonds.
E. heat storage.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.04 Distinguish cohesion from adhesion.
Section: 02.04
Topic: Chemistry

23. Buffers always release H^+ ions into solution to stabilize pH.

FALSE

Bloom's Level: 2. Understand
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

24. Nonpolar molecules are water soluble.

FALSE

Bloom's Level: 1. Remember
Learning Outcome: 02.04.05 Explain why oil will not dissolve in water.
Section: 02.04
Topic: Chemistry

25. The number of protons in the nucleus of an atom is called the _____.

TRUE

Bloom's Level: 2. Understand
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

26. The number of protons in the nucleus of an atom is called the _____.

atomic number

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Section: 02.01

Topic: Chemistry

27. Atomic mass refers to the numbers of _____ and _____ of an atom.

protons, neutrons

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Section: 02.01
Topic: Chemistry

28. Atoms that have the same number of protons but differ in their number of neutrons are _____.

isotopes

Bloom's Level: 1. Remember
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
Section: 02.02
Topic: Chemistry

29. Nonpolar molecules are said to be _____ because they shrink away from water.

hydrophobic

Bloom's Level: 1. Remember
Learning Outcome: 02.04.05 Explain why oil will not dissolve in water.
Section: 02.04
Topic: Chemistry

30. When water ionizes, the negatively charged OH fragment is the _____ ion.

hydroxide

Bloom's Level: 1. Remember
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

31. We use the _____ scale to measure concentrations of hydrogen ions in a solution.

pH

Bloom's Level: 1. Remember
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

32. A solution with a pH of 3 is said to be highly _____.

acidic

Bloom's Level: 2. Understand
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

33. Cells contain chemical substances called _____ that minimize changes in concentrations of H^+ and OH^-.

buffers

Bloom's Level: 1. Remember
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

34. The chemical bond within a water molecule is a _____ bond.

covalent

Bloom's Level: 1. Remember
Learning Outcome: 02.03.03 Explain why most chemical bonds in organisms are covalent bonds, and distinguish between polar and nonpolar covalent bonds.
Section: 02.03
Topic: Chemistry

35. Due to hydrogen bonding, ice is _____ dense than water.

less

Bloom's Level: 2. Understand
Learning Outcome: 02.04.02 Explain why ice floats.
Section: 02.04
Topic: Chemistry

36. A substance that increases the concentration of H^+ is called a(n) _____.

acid

Bloom's Level: 2. Understand
Learning Outcome: 02.05.01 Define pH and predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Section: 02.05
Topic: Chemistry

37. What are two of the characteristics of water that make it so important in living organisms?

Bloom's Level: 2. Understand
Learning Outcome: 02.04.01 Explain why water heats up so slowly.
Section: 02.04
Topic: Chemistry

38. What are some of the uses of radioactive isotopes?

Bloom's Level: 2. Understand
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
Section: 02.02
Topic: Chemistry

39. Discuss the difference between covalent, ionic, and hydrogen bonds.

Bloom's Level: 2. Understand
Learning Outcome: 02.03.01 Define a chemical bond and describe the three principal kinds.
Section: 02.03
Topic: Chemistry

40. Describe van der Waals forces and how they play a role in biological molecules.

Bloom's Level: 2. Understand
Learning Outcome: 02.03.05 Distinguish between a chemical bond and van der Waals interactions.
Section: 02.03
Topic: Chemistry

41. Describe the structure of an atom and include how the number of electrons in the outer shell will affect an atom's tendency to interact with other atoms.

Bloom's Level: 2. Understand
Learning Outcome: 02.01.03 Explain how electrons carry energy.
Section: 02.01
Topic: Chemistry

Chapter 02 Test Bank Summary

Category	*# of Questions*
Bloom's Level: 1. Remember	22
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Learning Outcome: 02.01.03 Explain how electrons carry energy.	5
Learning Outcome: 02.02.01 Differentiate between a cation and an anion.	1
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.	6
Learning Outcome: 02.03.01 Define a chemical bond and describe the three principal kinds.	1
Learning Outcome: 02.03.02 Explain how ionic bonds promote crystal formation.	1
Learning Outcome: 02.03.03 Explain why most chemical bonds in organisms are covalent bonds, and distinguish between polar and nonpolar covalent bonds.	3
Learning Outcome: 02.03.04 Predict which molecules will form hydrogen bonds with each other.	1
Learning Outcome: 02.03.05 Distinguish between a chemical bond and van der Waals interactions.	1
Learning Outcome: 02.04.01 Explain why water heats up so slowly.	1
Learning Outcome: 02.04.02 Explain why ice floats.	1
Learning Outcome: 02.04.04 Distinguish cohesion from adhesion.	2
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