Essentials of The Living World 6th edition Johnson Test Bank

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Essentials of The Living World, 6e **(Johnson)**
Chapter 2 The Chemistry of Life

1) The nucleus of an atom is composed of
A) protons and neutrons.
B) protons and electrons.
C) only electrons.
D) only protons.
E) only neutrons.

Answer: A
Explanation: Electrons are found outside of the nucleus. Protons and neutrons are found in the nucleus. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Accessibility: Keyboard Navigation

2) Atoms that have a positive or negative charge are known as
A) magnetic.
B) electrically neutral.
C) ions.
D) protons.
E) stable.

Answer: C
Explanation: Ions have gained or lost electrons. Please see section 2.2.
Section: 02.02
Topic: Atomic Structure; Chemical Bonds
Bloom's: 1. Remember
Learning Outcome: 02.02.01 Differentiate between a cation and an anion.
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3) The chemical behavior of an atom is determined by its
A) protons.
B) neutrons.
C) nuclei.
D) electrons.
E) mass.

Answer: D
Explanation: Electrons govern interactions since they are the atomic particles which form the bonds. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.02 Explain why electrons determine the chemical behavior of atoms.
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4) In a neutral atom, the number of protons is always
A) equal to the electrons.
B) more than the electrons.
C) more than the neutrons.
D) less than the neutrons.
E) less than the electrons.

Answer: A
Explanation: Electrical neutrality means that there must be equal numbers of electrons and protons. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 2. Understand
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
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5) The volume of space around a nucleus where an electron is most likely to be located is called the _____ of that electron.
A) parameter
B) spin
C) pathway
D) orbital
E) nucleus

Answer: D
Explanation: Electron orbitals provide a path for the electrons to travel. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.03 Explain how electrons carry energy.
Accessibility: Keyboard Navigation

6) Electrons possess energy of position, also known as _____ energy.
A) kinetic
B) latent
C) potential
D) opposition
E) excitable

Answer: C
Explanation: Potential energy is stored in a thing which has a particular position. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.03 Explain how electrons carry energy.
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7) Most elements in nature exist as mixtures of
A) unreactive atoms.
B) different isotopes.
C) gases.
D) liquids.
E) stable ions.

Answer: B
Explanation: For example, carbon exists in nature as a mixture of three isotopes. Please see section 2.2.
Section: 02.02
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
Accessibility: Keyboard Navigation

8) Carbon-14 is
A) an important ion used in chemical reactions.
B) the most common form of carbon.
C) an isotope used in dating fossils.
D) widely used in hydrogen bonds.
E) All of the answer choices are correct.

Answer: C
Explanation: Carbon-14 spontaneously breaks down, releasing radiation. Please see section 2.2.
Section: 02.02
Topic: Atomic Structure
Bloom's: 2. Understand
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
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9) When an electron is transferred from one atom to another, the two atoms will then be electrically attracted to one another. This results in the formation of a(n) _____ bond.
A) hydrogen
B) covalent
C) kinetic
D) ionic
E) static

Answer: D
Explanation: Ionic bonds form between two ions that form from a loss or gain of electrons. Please see section 2.3.
Section: 02.03
Topic: Chemical Bonds
Bloom's: 1. Remember
Learning Outcome: 02.03.01 Define a chemical bond, and describe the three principal kinds.
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10) What type of bond forms between two atoms sharing electrons?
A) hydrogen
B) covalent
C) kinetic
D) ionic
E) static

Answer: B
Explanation: Covalent bonds involve shared electrons, even if not all atoms share equally. Please see section 2.3.
Section: 02.03
Topic: Chemical Bonds
Bloom's: 1. Remember
Learning Outcome: 02.03.03 Distinguish between polar and nonpolar covalent bonds.
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11) Water molecular bond to each other via hydrogen bonds. These bonds form between the slight negative charge of _____, and the slight positive charge of _____, on adjacent water molecules.
A) oxygen; hydrogen
B) hydrogen; carbon
C) hydrogen; oxygen
D) oxygen; carbon
E) hydrogen; nitrogen

Answer: A
Explanation: Hydrogen bonds form between adjacent water molecules via the slight negative charge of oxygen and the slight positive charge of hydrogen. Review section 2.3.
Section: 02.03
Topic: Properties of Water
Bloom's: 2. Understand
Learning Outcome: 02.03.04 Predict which molecules will form hydrogen bonds with each other.
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12) A solution with a pH of 4 has _____ times the concentration of H^+ present compared to a solution with a pH of 5.
A) 10
B) 100
C) 2
D) 1,000
E) 200

Answer: A
Explanation: pH units are logarithmic. A difference of one pH unit means a tenfold concentration difference. Please see section 2.5.
Section: 02.05
Topic: Acids and Bases
Bloom's: 3. Apply
Learning Outcome: 02.05.01 Predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
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13) The mass number of an atom is the number of
A) neutrons only.
B) electrons plus the number of protons.
C) protons only.
D) protons plus the number of neutrons.
E) electrons, plus the number of neutrons, plus the number of protons.

Answer: D
Explanation: Atomic number is the number of large particles in the nucleus of an atom of an element. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Accessibility: Keyboard Navigation

14) The atomic number of an atom is the number of
A) neutrons only.
B) electrons plus the number of protons.
C) protons only.
D) protons plus the number of neutrons.
E) electrons, plus the number of neutrons, plus the number of protons.

Answer: C
Explanation: Atomic number is never more than mass number. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
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15) 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.

Answer: A
Explanation: The possible number of electrons per atom is determined by the number of protons, and the number per shell is determined by how far it is from the nucleus. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.03 Explain how electrons carry energy.
Accessibility: Keyboard Navigation

16) 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

Answer: C
Explanation: The second shell has four orbitals that hold two electrons each. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 2. Understand
Learning Outcome: 02.01.03 Explain how electrons carry energy.
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17) 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) 28

Answer: D
Explanation: The difference between mass number and atomic number is the number of neutrons. Please see sections 2.1 and 2.2.
Section: 02.01; 02.02
Topic: Atomic Structure
Bloom's: 2. Understand
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.; 02.02.02 Differentiate between an ion and an isotope.
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18) If you were grading an exam about water, which statement would lose points?
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 relatively weak bonds.

Answer: A
Explanation: Hydrogen atoms in water molecules have partial positive charges. Please see section 2.3.
Section: 02.03
Topic: Properties of Water
Bloom's: 3. Apply
Learning Outcome: 02.03.03 Distinguish between polar and nonpolar covalent bonds.; 02.03.04 Predict which molecules will form hydrogen bonds with each other.
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19) Which type of chemical substance lowers the H^+ concentration in a solution?
A) ice
B) acid
C) base
D) buffer
E) hydrogen ion

Answer: C
Explanation: A base will accept free H^+ in a solution and thereby raising the pH. Please see section 2.5.
Section: 02.05
Topic: Acids and Bases
Bloom's: 2. Understand
Learning Outcome: 02.05.01 Predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Accessibility: Keyboard Navigation

20) Water moving up into a paper towel, a polar substance, is attributable to
A) heat storage.
B) high heat of vaporization.
C) electronegativity.
D) cohesion.
E) adhesion.

Answer: E
Explanation: Adhesion is the property of water sticking to other polar substances. Please see section 2.4.
Section: 02.04
Topic: Properties of Water
Bloom's: 2. Understand
Learning Outcome: 02.04.04 Distinguish cohesion from adhesion.
Accessibility: Keyboard Navigation

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21) If you wanted to stop an insect from walking on water, you would need to add something to the water to stop
A) high heat of vaporization.
B) cohesion.
C) adhesion.
D) polar covalent bonds.
E) heat storage.

Answer: B
Explanation: Cohesion is due to water molecules sticking together as a result of hydrogen bonding. Please see section 2.4.
Section: 02.04
Topic: Properties of Water
Bloom's: 3. Apply
Learning Outcome: 02.04.04 Distinguish cohesion from adhesion.
Accessibility: Keyboard Navigation

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

Answer: FALSE
Explanation: Buffers act to minimize changes in pH, which sometimes involves releasing hydrogen ions into solution but other times involves taking up hydrogen ions from the solution. Please see section 2.5.
Section: 02.05
Topic: Acids and Bases
Bloom's: 2. Understand
Learning Outcome: 02.05.01 Predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Accessibility: Keyboard Navigation

23) Nonpolar molecules, such as fats, are water-soluble.

Answer: FALSE
Explanation: Nonpolar molecules are hydrophobic, or "water fearing." Please see section 2.4.
Section: 02.04
Topic: Properties of Water
Bloom's: 1. Remember
Learning Outcome: 02.04.05 Explain why oil will not dissolve in water.
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24) The number of protons in the nucleus of an atom is called the _____ _____.

Answer: atomic number
Explanation: Atomic number is always the same as or less than atomic mass. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Accessibility: Keyboard Navigation

25) If you wanted to change the mass number of an atom, you would have to alter either the number of protons or the number of _____.

Answer: neutrons
Explanation: Mass number is the sum of the numbers of protons and neutrons in an atomic nucleus. Please see section 2.1.
Section: 02.01
Topic: Atomic Structure
Bloom's: 3. Apply
Learning Outcome: 02.01.01 Describe the basic structure of an atom in terms of three subatomic particles.
Accessibility: Keyboard Navigation

26) If you were helping a professor with an experiment in which different forms of carbon were to be used, you would go to the chemical cabinet to find different _____.

Answer: isotopes
Explanation: Carbon occurs in nature in three isotopes, which are forms of carbon differing in weight but not in how they form bonds. Please see section 2.2.
Section: 02.02
Topic: Atomic Structure
Bloom's: 2. Understand
Learning Outcome: 02.02.02 Differentiate between an ion and an isotope.
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27) When water ionizes, the negatively charged OH fragment is the _____ ion.

Answer: hydroxide
Explanation: Besides hydroxide, water produces a proton for the other ion when it ionizes. Please see section 2.5.
Section: 02.05
Topic: Properties of Water; Acids and Bases
Bloom's: 1. Remember
Learning Outcome: 02.05.01 Predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Accessibility: Keyboard Navigation

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

Answer: pH
Explanation: pH ranges from strongly acidic to strongly basic. Please see section 2.5.
Section: 02.05
Topic: Acids and Bases
Bloom's: 1. Remember
Learning Outcome: 02.05.01 Predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Accessibility: Keyboard Navigation

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

Answer: acidic
Explanation: Examples of acids include lemon juice and stomach acid. Please see section 2.5.
Section: 02.05
Topic: Acids and Bases
Bloom's: 2. Understand
Learning Outcome: 02.05.01 Predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Accessibility: Keyboard Navigation

30) The chemical bond within a water molecule is a _____ bond.

Answer: covalent
Explanation: Atoms within a water molecule share electrons, so the bonds formed are covalent. Please see section 2.3.
Section: 02.03
Topic: Chemical Bonds; Properties of Water
Bloom's: 1. Remember
Learning Outcome: 02.03.03 Distinguish between polar and nonpolar covalent bonds.
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31) Due to _____ bonding, ice is less dense than water.

Answer: hydrogen
Explanation: Fish in cold lakes are saved in the winter by the lower density of water ice since water ice then floats, rather than sinking and crushing the fish. Please see section 2.4.
Section: 02.04
Topic: Properties of Water
Bloom's: 2. Understand
Learning Outcome: 02.04.02 Explain why ice floats.
Accessibility: Keyboard Navigation

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

Answer: acid
Explanation: Acids release protons, lowering pH. Please see section 2.5.
Section: 02.05
Topic: Properties of Water; Acids and Bases
Bloom's: 2. Understand
Learning Outcome: 02.05.01 Predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Accessibility: Keyboard Navigation

33) While exercising you begin to sweat. Sweating is cooling your body because it takes energy with it in the form of heat.

Answer: TRUE
Explanation: The hydrogen bonds in water are what makes it effective in cooling organisms as they sweat. Please see section 2.4.
Section: 02.04
Topic: Properties of Water
Bloom's: 4. Analyze
Learning Outcome: 02.04.03 Explain why sweating cools you.
Accessibility: Keyboard Navigation

34) Two hydrophobic molecules in a cell membrane would form a hydrogen bond.

Answer: FALSE
Explanation: Hydrophobic molecules cannot form hydrogen bonds since they lack polar atoms. Please see section 2.3.
Section: 02.03
Topic: Chemical Bonds
Bloom's: 4. Analyze
Learning Outcome: 02.03.04 Predict which molecules will form hydrogen bonds with each other.
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35) You are chemically analyzing a new compound. It does not dissolve in water. You characterize it as being hydrophilic.

Answer: FALSE
Explanation: Chemicals that do not dissolve in water are hydrophobic. Please see section 2.4.
Section: 02.04
Topic: Properties of Water
Bloom's: 3. Apply
Learning Outcome: 02.04.05 Explain why oil will not dissolve in water.
Accessibility: Keyboard Navigation

36) Doctors prescribe medicines to help the symptoms of acid reflux which cause burning in the esophagus from excess acid in the stomach. To help neutralize the acid, medicines are used to
A) accept excess H^+.
B) accept excess OH^-.
C) donate excess H^+.
D) donate excess OH^-.
E) donate either OH^- or H^+.

Answer: A
Explanation: Antacids work by accepting excess hydrogen ions to raise the pH. Please see section 2.5.
Section: 02.05
Topic: Acids and Bases
Bloom's: 3. Apply
Learning Outcome: 02.05.01 Predict the change in hydrogen ion concentration represented by a difference of 1 on the pH scale.
Accessibility: Keyboard Navigation

37) In an ionic bond, a cation is an atom that has _____ and is now positively charged.
A) lost an electron
B) gained an electron
C) lost a neutron
D) gained a neutron
E) gained a proton

Answer: A
Explanation: Cations have lost electrons to anions. Please see section 2.2.
Section: 02.02
Topic: Chemical Bonds
Bloom's: 2. Understand
Learning Outcome: 02.02.01 Differentiate between a cation and an anion.
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38) Covalent bonds between water molecules require a high amount of energy to break which is why water heats slowly.

Answer: FALSE
Explanation: Hydrogen bonds are found between water molecules. Please see section 2.4.
Section: 02.04
Topic: Properties of Water
Bloom's: 2. Understand
Learning Outcome: 02.04.01 Explain why water heats up so slowly.
Accessibility: Keyboard Navigation

39) Ionic bond of salt molecules form between negative sodium molecules and positive chlorine atoms resulting in a crystal formation.

Answer: FALSE
Explanation: Sodium loses electrons and chlorine gains electrons. This exchange results in ionic bond formation. Please see section 2.3.
Section: 02.03
Topic: Chemical Bonds
Bloom's: 2. Understand
Learning Outcome: 02.03.02 Explain how ionic bonds promote crystal formation.
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