

Student: _____

1. The electrons in an atom
 - A. have less energy the further they are away from the nucleus.
 - B. move to a higher orbital when they lose energy.
 - C. move to a higher orbital when they gain energy.
 - D. are found in the nucleus.
 - E. move freely between the orbitals.

2. When electrons in excited orbitals lose energy, that energy can
 - A. be used to drive another chemical process.
 - B. emit light.
 - C. be passed on to a neighbouring atom.
 - D. All of the answers are correct.
 - E. be used to drive photosynthesis in a leaf cell in sunlight.

3. An oxygen atom has 8 protons, 8 neutrons and 8 electrons.
 - A. Its atomic number is 16.
 - B. Its mass number is 8.
 - C. It has 4 electrons in the first energy level (electron shell).
 - D. It has 6 electrons in the outermost energy level (electron shell).
 - E. It has 8 electrons in the outermost energy level (electron shell).

4. Atoms of the same element can exist in different forms called isotopes. The most common isotope of carbon is carbon-12 but it has two less-common isotopes, carbon-13 and carbon-14. The less-common isotopes have
 - A. the same number of electrons but more protons.
 - B. the same number of protons but more neutrons.
 - C. the same number of neutrons but more protons.
 - D. the same number of protons but more electrons.
 - E. the same number of neutrons but more electrons.

5. Covalent bonds
 - A. only form between atoms of the same element.
 - B. form by the loss of an electron from the outer electron shell.
 - C. are formed by sharing electrons between two atoms.
 - D. form between positively and negatively charged ions.
 - E. form by the loss of an electron from the outer electron shell.

6. Ionic bonds are formed by the
 - A. attraction between atoms with opposite polarity.
 - B. transfer of electrons from one atom to another.
 - C. sharing of electrons between oppositely charged ions.
 - D. attraction between positively and negatively charged ions of the same element.
 - E. sharing of electrons in the outer electron orbital of an atom.

7. Hydrogen bonds can form between
 - A. carbon and hydrogen atoms.
 - B. oxygen and hydrogen atoms in the same water molecule.
 - C. oxygen and hydrogen atoms in adjacent molecules.
 - D. hydrogen atoms in adjacent molecules.
 - E. hydrogen atoms within the same molecule.

8. In living organisms, most of the strongest chemical bonds are the result of
- electrical attraction between oppositely charged ions.
 - hydrogen bonding between positively and negatively charged regions of polar molecules.
 - the transfer of electrons from one atom to another.
 - the sharing of electrons between two atoms.
 - van der Waals forces between two atoms.
9. One of the properties that make water an ideal medium for living organisms is that water
- can absorb considerable amounts of heat with little change in temperature.
 - expands and becomes more dense as it changes from solid to liquid form.
 - releases heat when it evaporates.
 - is a universal solvent.
 - has a high boiling point.
10. Hydrogen bonding between water molecules gives water a high level of structural organisation. In ice, the maximum number of hydrogen bonds formed with one water molecule is
- 2.
 - 3.
 - 4.
 - 6.
 - 1.
11. Water is a versatile solvent because water molecules are
- small.
 - polar.
 - hydrophilic.
 - loosely connected by hydrogen bonds.
 - hydrophobic.
12. Which of the following statements is CORRECT?
- The internal pH of the cells of an organism is usually the same as the pH of the external environment.
 - The internal pH of the cells of an organism may be quite different to the pH of the external environment.
 - Regardless of the internal pH of their cells, most living organisms can only survive within a narrow range of environmental pH.
 - Regardless of the pH of the environment, most living organisms will not survive if the internal pH of their cells fluctuates.
 - The internal pH of a muscle cell may become more basic during exercise.
13. The interior of a lysosome in an animal cell has a pH of 5, while the cytosol of the cell has a pH of 7.4. This indicates that in comparison to the cytosol, the interior of the lysosome has a
- lower concentration of total dissolved ions.
 - lower concentration of hydrogen ions.
 - higher concentration of bicarbonate ions.
 - higher concentration of hydrogen ions.
 - higher concentration of hydroxyl ions.
14. Buffers are substances that assist cells and organisms to resist changes in pH by
- accepting H^+ ions as pH rises and releasing H^+ ions as pH falls.
 - accepting OH^- ions as pH rises and releasing H^+ ions as pH falls.
 - accepting H^+ ions as pH falls and releasing H^+ ions as pH rises.
 - accepting OH^- ions as pH falls and releasing H^+ ions as pH rises.
 - accepting OH^- ions as pH falls and releasing OH^- ions as pH rises.

15. Living organisms are composed of elements made of small units called
- atoms.
 - protons.
 - neutrons.
 - electrons.
 - ions.
16. Which one of the following is not one of the four most abundant atoms (>99%) found in living cells?
- carbon.
 - hydrogen.
 - oxygen.
 - nitrogen.
 - phosphorus.
17. Electrons exist in orbitals around the nucleus of an atom. Any orbital may contain
- only 2 electrons.
 - 4 electrons.
 - 6 electrons.
 - 8 electrons.
 - any number of electrons depending on the orbital.
18. Atoms in which the number of protons does not equal the number of electrons in the orbital are known as
- ions.
 - molecules.
 - elements.
 - isotopes.
 - radioactive.
19. Energy levels of electrons in their orbitals are determined by
- the distance of the orbital from the nucleus.
 - the number of electrons in the orbital.
 - the number of neutrons in the nucleus.
 - the number of protons in the orbital.
 - the distance of the electrons in the orbital from each other.
20. An element is a substance made up of
- one type of atom only.
 - one type of molecule only.
 - at least two different types of atoms.
 - one atom linked to a different atom by a covalent bond.
 - an atom with one neutron and one proton in the nucleus.
21. The small, negatively charged particles in an atom are called
- electrons.
 - protons.
 - neutrons.
 - ions.
 - isotopes.
22. The atomic number of an atom is
- the number of protons in the nucleus.
 - the number of protons in the orbitals.
 - the number of electrons in the nucleus.
 - the number of neutrons in the nucleus.
 - the number of ions in the nucleus.

23. The mass number of an atom is the number of
- protons in the nucleus of an atom.
 - protons and neutrons combined in the nucleus of an atom.
 - neutrons in the nucleus of an atom.
 - electrons in an atom.
 - protons and electrons combined in an atom.
24. Elements that have atoms with the same number of protons, but different numbers of neutrons, are called
- isotopes.
 - molecules.
 - electrons.
 - ions.
 - subatomic particles.
25. Living organisms are composed predominantly of which of the following groups of elements
- Hydrogen (H); oxygen (O); carbon (C).
 - Hydrogen (H); oxygen (O); phosphorus (P).
 - Hydrogen (H); phosphorus (P); carbon (C).
 - Hydrogen (H); sodium (Na); chloride (Cl).
 - Oxygen (O); sodium (Na); chloride (Cl).
26. The chemical properties of elements are determined primarily by
- the number and arrangement of electrons in the highest energy level of the atom (the outermost electron shell).
 - the number of neutrons in the nucleus.
 - the number and arrangement of electrons in the lowest energy level of the atom (the innermost electron shell).
 - the ability of the electrons to change to a different orbital.
 - the type of bonds formed in the electron orbitals.
27. Elements in living organisms are
- similar to those found generally in the biosphere.
 - not similar to those found in the biosphere.
 - mainly carbon (C) and sodium chloride (NaCl).
 - highly reactive.
 - mostly atoms with a high atomic mass.
28. Carbon has 4 electrons in its outer shell available for covalent bonding. Which of the following statements about carbon is INCORRECT?
- Carbon is able to share the electrons with 4 atoms of hydrogen.
 - Carbon is able to share the electrons with other carbon atoms to form biomolecules.
 - Carbon is able to share electrons with oxygen to form carbon dioxide.
 - Carbon is able to form stable molecules by gaining 4 electrons in its outer electron orbital.
 - Carbon is able to form highly reactive molecules by losing 2 of the 4 electrons in its outer electron orbital.
29. Nitrogen has 5 electrons in its outer orbital which allows it to share its electrons with
- 2 hydrogen atoms.
 - 3 hydrogen atoms.
 - 4 hydrogen atoms.
 - 5 hydrogen atoms.
 - 6 hydrogen atoms.

30. The pH of blood is 7.4. The pH of a vinegar is 1.4. The blood sample has
- 6 times lower $[H^+]$ than the vinegar.
 - 6,000 times higher $[H^+]$ than the vinegar.
 - 6,000 times lower $[H^+]$ than the vinegar.
 - 5.3 times lower $[H^+]$ than the vinegar.
 - a million times lower $[H^+]$ than the vinegar.
31. When two atoms share a pair of electrons, the type of bonding is termed
- ionic.
 - hydrogen.
 - covalent.
 - non-covalent.
 - unstable.
32. When atoms gain or lose electrons from their orbital and so become charged, they are called
- unstable.
 - non-covalent.
 - isotopes.
 - radioactive.
 - ions.
33. In a molecule of water, the electrons are not equally shared between the atoms. This makes the molecule polar and interaction with other polar molecules allows the formation of
- covalent bonds.
 - van der Waals interactions.
 - hydrogen bonds.
 - ionic bonds.
 - stable bonds.
34. Which of the following statements about chemical bonds is CORRECT?
- Van der Waals forces allow temporary associations between molecules but the bonds are 100 times weaker than covalent bonds.
 - Covalent bonds involve the attraction between two ions of opposite charge.
 - Hydrogen bonds formed between hydrogen and oxygen atoms are strong, stable bonds.
 - In a molecule of water, the electrons are shared equally between the hydrogen and the oxygen molecule. This is the reason for the stability of water.
 - Ionic compounds result from the attraction between anions (positively charged ions) and cations (negatively charged ions).
35. Water molecules tend to stick to other water molecules. This is known as
- cohesion.
 - adhesion.
 - ionic bonding.
 - covalent bonding.
 - van der Waals forces.
36. Which of the following statements about water is INCORRECT?
- Water molecules tend to stick to one another (cohesion) and to other molecules that have charged surface groups to which water can hydrogen bond (adhesion).
 - The cohesive forces between water molecules are stronger between water molecules than between water and air molecules. This results in surface tension.
 - Both cohesive and adhesive forces are together responsible for the capillary action of water.
 - Only adhesive forces are responsible for the capillary action that causes water to rise through plant stems.
 - Heat is liberated when liquid water is turned to ice. This property of water is called the heat of fusion.

37. Water is extremely important in all living things because of its properties. Which of the following is not a property of water?
- A. Water is a polar molecule because of the unequal sharing of the electrons between hydrogen and oxygen.
 - B. Water molecules form hydrogen bonds with each other and with other polar molecules.
 - C. Hydrogen bonding makes water molecules cohesive. This cohesiveness results in surface tension.
 - D. Water repels non-polar molecules.
 - E. Water is an excellent buffer and maintains the intracellular pH in a cell.
38. Compared with a pH of 7, a solution with a pH of 9 has
- A. 2 times higher $[H^+]$ concentration.
 - B. 2 times lower $[H^+]$ concentration.
 - C. 1/100 the $[H^+]$ concentration.
 - D. 100 times the $[H^+]$ concentration.
 - E. 20 times lower $[H^+]$ concentration.
39. Substances that release hydrogen ions (H^+) into solution are
- A. acids.
 - B. bases.
 - C. buffers.
 - D. hydrophobic.
 - E. carbon containing molecules.
40. Which of the following statements is INCORRECT?
- A. A buffer solution maintains a relatively constant pH either by removing hydrogen ions or by releasing them.
 - B. Water molecules ionise and dissociate forming both hydrogen (H^+) and hydroxyl ions (OH^-).
 - C. The pH is the concentration of hydrogen ions in the solution.
 - D. The pH is the concentration of hydroxyl ions in the solution.
 - E. The pH scale is logarithmic.

1 Key

1. The electrons in an atom
- A. have less energy the further they are away from the nucleus.
 - B. move to a higher orbital when they lose energy.
 - C.** move to a higher orbital when they gain energy.
 - D. are found in the nucleus.
 - E. move freely between the orbitals.

*Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #1
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements*

2. When electrons in excited orbitals lose energy, that energy can
- A. be used to drive another chemical process.
 - B. emit light.
 - C. be passed on to a neighbouring atom.
 - D.** All of the answers are correct.
 - E. be used to drive photosynthesis in a leaf cell in sunlight.

*Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #2
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements*

3. An oxygen atom has 8 protons, 8 neutrons and 8 electrons.
- A. Its atomic number is 16.
 - B. Its mass number is 8.
 - C. It has 4 electrons in the first energy level (electron shell).
 - D.** It has 6 electrons in the outermost energy level (electron shell).
 - E. It has 8 electrons in the outermost energy level (electron shell).

*Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #3
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements*

4. Atoms of the same element can exist in different forms called isotopes. The most common isotope of carbon is carbon-12 but it has two less-common isotopes, carbon-13 and carbon-14. The less-common isotopes have
- A. the same number of electrons but more protons.
 - B.** the same number of protons but more neutrons.
 - C. the same number of neutrons but more protons.
 - D. the same number of protons but more electrons.
 - E. the same number of neutrons but more electrons.

*Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #4
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements*

5. Covalent bonds
- A. only form between atoms of the same element.
 - B. form by the loss of an electron from the outer electron shell.
 - C.** are formed by sharing electrons between two atoms.
 - D. form between positively and negatively charged ions.
 - E. form by the loss of an electron from the outer electron shell.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #5
Knox - Chapter 1
Knox - Part 1
Learning Objective: 3
Section: Chemical bonding of atoms makes molecules

6. Ionic bonds are formed by the
- A. attraction between atoms with opposite polarity.
 - B.** transfer of electrons from one atom to another.
 - C. sharing of electrons between oppositely charged ions.
 - D. attraction between positively and negatively charged ions of the same element.
 - E. sharing of electrons in the outer electron orbital of an atom.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #6
Knox - Chapter 1
Knox - Part 1
Learning Objective: 3
Section: Chemical bonding of atoms makes molecules

7. Hydrogen bonds can form between
- A. carbon and hydrogen atoms.
 - B. oxygen and hydrogen atoms in the same water molecule.
 - C.** oxygen and hydrogen atoms in adjacent molecules.
 - D. hydrogen atoms in adjacent molecules.
 - E. hydrogen atoms within the same molecule.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #7
Knox - Chapter 1
Knox - Part 1
Learning Objective: 3
Section: Chemical bonding of atoms makes molecules

8. In living organisms, most of the strongest chemical bonds are the result of
- A. electrical attraction between oppositely charged ions.
 - B. hydrogen bonding between positively and negatively charged regions of polar molecules.
 - C. the transfer of electrons from one atom to another.
 - D.** the sharing of electrons between two atoms.
 - E. van der Waals forces between two atoms.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #8
Knox - Chapter 1
Knox - Part 1
Learning Objective: 3
Section: Chemical bonding of atoms makes molecules

9. One of the properties that make water an ideal medium for living organisms is that water **A.** can absorb considerable amounts of heat with little change in temperature.
B. expands and becomes more dense as it changes from solid to liquid form.
C. releases heat when it evaporates.
D. is a universal solvent.
E. has a high boiling point.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #9
Knox - Chapter 1
Knox - Part 1
Learning Objective: 4
Section: Water is the medium of life

10. Hydrogen bonding between water molecules gives water a high level of structural organisation. In ice, the maximum number of hydrogen bonds formed with one water molecule is
A. 2.
B. 3.
C. 4.
D. 6.
E. 1.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #10
Knox - Chapter 1
Knox - Part 1
Learning Objective: 4
Section: Water is the medium of life

11. Water is a versatile solvent because water molecules are
A. small.
B. polar.
C. hydrophilic.
D. loosely connected by hydrogen bonds.
E. hydrophobic.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #11
Knox - Chapter 1
Knox - Part 1
Learning Objective: 4
Section: Water is the medium of life

12. Which of the following statements is CORRECT?
A. The internal pH of the cells of an organism is usually the same as the pH of the external environment.
B. The internal pH of the cells of an organism may be quite different to the pH of the external environment.
C. Regardless of the internal pH of their cells, most living organisms can only survive within a narrow range of environmental pH.
D. Regardless of the pH of the environment, most living organisms will not survive if the internal pH of their cells fluctuates.
E. The internal pH of a muscle cell may become more basic during exercise.

Blooms: Comprehension
Difficulty: Hard
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #12
Knox - Chapter 1
Knox - Part 1
Learning Objective: 6
Section: Acids, bases and buffers

13. The interior of a lysosome in an animal cell has a pH of 5, while the cytosol of the cell has a pH of 7.4. This indicates that in comparison to the cytosol, the interior of the lysosome has a
- A. lower concentration of total dissolved ions.
 - B. lower concentration of hydrogen ions.
 - C. higher concentration of bicarbonate ions.
 - D.** higher concentration of hydrogen ions.
 - E. higher concentration of hydroxyl ions.

Blooms: Application
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #13
Knox - Chapter 1
Knox - Part 1
Learning Objective: 6
Section: Acids, bases and buffers

14. Buffers are substances that assist cells and organisms to resist changes in pH by
- A. accepting H^+ ions as pH rises and releasing H^+ ions as pH falls.
 - B. accepting OH^- ions as pH rises and releasing H^+ ions as pH falls.
 - C.** accepting H^+ ions as pH falls and releasing H^+ ions as pH rises.
 - D. accepting OH^- ions as pH falls and releasing H^+ ions as pH rises.
 - E. accepting OH^- ions as pH falls and releasing OH^- ions as pH rises.

Blooms: Knowledge
Difficulty: Hard
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #14
Knox - Chapter 1
Knox - Part 1
Learning Objective: 5
Section: Acids, bases and buffers

15. Living organisms are composed of elements made of small units called
- A.** atoms.
 - B. protons.
 - C. neutrons.
 - D. electrons.
 - E. ions.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #15
Knox - Chapter 1
Knox - Part 1
Learning Objective: 1
Section: All life is composed of the same few elements

16. Which one of the following is not one of the four most abundant atoms (>99%) found in living cells?
- A. carbon.
 - B. hydrogen.
 - C. oxygen.
 - D. nitrogen.
 - E.** phosphorus.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #16
Knox - Chapter 1
Knox - Part 1
Learning Objective: 1
Section: All life is composed of the same few elements

17. Electrons exist in orbitals around the nucleus of an atom. Any orbital may contain
A. only 2 electrons.
B. 4 electrons.
C. 6 electrons.
D. 8 electrons.
E. any number of electrons depending on the orbital.

Blooms: Knowledge
Difficulty: Hard
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #17
Knox - Chapter 1
Knox - Part 1
Learning Objective: 1
Section: All life is composed of the same few elements

18. Atoms in which the number of protons does not equal the number of electrons in the orbital are known as
A. ions.
B. molecules.
C. elements.
D. isotopes.
E. radioactive.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #18
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements

19. Energy levels of electrons in their orbitals are determined by
A. the distance of the orbital from the nucleus.
B. the number of electrons in the orbital.
C. the number of neutrons in the nucleus.
D. the number of protons in the orbital.
E. the distance of the electrons in the orbital from each other.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #19
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements

20. An element is a substance made up of
A. one type of atom only.
B. one type of molecule only.
C. at least two different types of atoms.
D. one atom linked to a different atom by a covalent bond.
E. an atom with one neutron and one proton in the nucleus.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #20
Knox - Chapter 1
Knox - Part 1
Learning Objective: 1

21. The small, negatively charged particles in an atom are called
A. electrons.
B. protons.
C. neutrons.
D. ions.
E. isotopes.

*Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #21
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements*

22. The atomic number of an atom is
A. the number of protons in the nucleus.
B. the number of protons in the orbitals.
C. the number of electrons in the nucleus.
D. the number of neutrons in the nucleus.
E. the number of ions in the nucleus.

*Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #22
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements*

23. The mass number of an atom is the number of
A. protons in the nucleus of an atom.
B. protons and neutrons combined in the nucleus of an atom.
C. neutrons in the nucleus of an atom.
D. electrons in an atom.
E. protons and electrons combined in an atom.

*Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #23
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements*

24. Elements that have atoms with the same number of protons, but different numbers of neutrons, are called
A. isotopes.
B. molecules.
C. electrons.
D. ions.
E. subatomic particles.

*Difficulty: Easy
Knox - Chapter 01 #24
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements*

25. Living organisms are composed predominantly of which of the following groups of elements
- A.** Hydrogen (H); oxygen (O); carbon (C).
 - B. Hydrogen (H); oxygen (O); phosphorus (P).
 - C. Hydrogen (H); phosphorus (P); carbon (C).
 - D. Hydrogen (H); sodium (Na); chloride (Cl).
 - E. Oxygen (O); sodium (Na); chloride (Cl).

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #25
Knox - Chapter 1
Knox - Part 1
Learning Objective: 1
Section: All life is composed of the same few elements

26. The chemical properties of elements are determined primarily by
- A.** the number and arrangement of electrons in the highest energy level of the atom (the outermost electron shell).
 - B. the number of neutrons in the nucleus.
 - C. the number and arrangement of electrons in the lowest energy level of the atom (the innermost electron shell).
 - D. the ability of the electrons to change to a different orbital.
 - E. the type of bonds formed in the electron orbitals.

Blooms: Knowledge
Difficulty: Hard
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #26
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements

27. Elements in living organisms are
- A. similar to those found generally in the biosphere.
 - B.** not similar to those found in the biosphere.
 - C. mainly carbon (C) and sodium chloride (NaCl).
 - D. highly reactive.
 - E. mostly atoms with a high atomic mass.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #27
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements

28. Carbon has 4 electrons in its outer shell available for covalent bonding. Which of the following statements about carbon is INCORRECT?
- A. Carbon is able to share the electrons with 4 atoms of hydrogen.
 - B. Carbon is able to share the electrons with other carbon atoms to form biomolecules.
 - C. Carbon is able to share electrons with oxygen to form carbon dioxide.
 - D. Carbon is able to form stable molecules by gaining 4 electrons in its outer electron orbital.
 - E.** Carbon is able to form highly reactive molecules by losing 2 of the 4 electrons in its outer electron orbital.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #28
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements

29. Nitrogen has 5 electrons in its outer orbital which allows it to share its electrons with
- A. 2 hydrogen atoms.
 - B.** 3 hydrogen atoms.
 - C. 4 hydrogen atoms.
 - D. 5 hydrogen atoms.
 - E. 6 hydrogen atoms.

Blooms: Knowledge
Difficulty: Medium
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #29
Knox - Chapter 1
Knox - Part 1
Learning Objective: 2
Section: All life is composed of the same few elements

30. The pH of blood is 7.4. The pH of a vinegar is 1.4. The blood sample has
- A. 6 times lower $[H^+]$ than the vinegar.
 - B. 6,000 times higher $[H^+]$ than the vinegar.
 - C. 6,000 times lower $[H^+]$ than the vinegar.
 - D. 5.3 times lower $[H^+]$ than the vinegar.
 - E.** a million times lower $[H^+]$ than the vinegar.

Blooms: Knowledge
Difficulty: Hard
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #30
Knox - Chapter 1
Knox - Part 1
Learning Objective: 6
Section: Acids, bases and buffers

31. When two atoms share a pair of electrons, the type of bonding is termed
- A. ionic.
 - B. hydrogen.
 - C.** covalent.
 - D. non-covalent.
 - E. unstable.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #31
Knox - Chapter 1
Knox - Part 1
Learning Objective: 3
Section: Chemical bonding of atoms makes molecules

32. When atoms gain or lose electrons from their orbital and so become charged, they are called
- A. unstable.
 - B. non-covalent.
 - C. isotopes.
 - D. radioactive.
 - E.** ions.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #32
Knox - Chapter 1
Knox - Part 1
Learning Objective: 3
Section: Chemical bonding of atoms makes molecules

33. In a molecule of water, the electrons are not equally shared between the atoms. This makes the molecule polar and interaction with other polar molecules allows the formation of
- A. covalent bonds.
 - B. van der Waals interactions.
 - C.** hydrogen bonds.
 - D. ionic bonds.
 - E. stable bonds.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #33
Knox - Chapter 1
Knox - Part 1
Learning Objective: 3
Section: Chemical bonding of atoms makes molecules

34. Which of the following statements about chemical bonds is CORRECT?
- A.** Van der Waals forces allow temporary associations between molecules but the bonds are 100 times weaker than covalent bonds.
 - B. Covalent bonds involve the attraction between two ions of opposite charge.
 - C. Hydrogen bonds formed between hydrogen and oxygen atoms are strong, stable bonds.
 - D. In a molecule of water, the electrons are shared equally between the hydrogen and the oxygen molecule. This is the reason for the stability of water.
 - E. Ionic compounds result from the attraction between anions (positively charged ions) and cations (negatively charged ions).

Blooms: Knowledge
Difficulty: Hard
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #34
Knox - Chapter 1
Knox - Part 1
Learning Objective: 3
Section: Chemical bonding of atoms makes molecules

35. Water molecules tend to stick to other water molecules. This is known as
- A.** cohesion.
 - B. adhesion.
 - C. ionic bonding.
 - D. covalent bonding.
 - E. van der Waals forces.

Blooms: Knowledge
Difficulty: Easy
Graduate Attribute: In-depth knowledge of subject material
Knox - Chapter 01 #35
Knox - Chapter 1
Knox - Part 1
Learning Objective: 4
Section: Water is the medium of life

36. Which of the following statements about water is INCORRECT?
- A. Water molecules tend to stick to one another (cohesion) and to other molecules that have charged surface groups to which water can hydrogen bond (adhesion).
 - B. The cohesive forces between water molecules are stronger between water molecules than between water and air molecules. This results in surface tension.
 - C. Both cohesive and adhesive forces are together responsible for the capillary action of water.
 - D.** Only adhesive forces are responsible for the capillary action that causes water to rise through plant stems.
 - E. Heat is liberated when liquid water is turned to ice. This property of water is called the heat of fusion.

Blooms: Knowledge
Difficulty: Hard
Knox - Chapter 01 #36
Knox - Chapter 1
Knox - Part 1
Learning Objective: 4
Section: Water is the medium of life

37. Water is extremely important in all living things because of its properties. Which of the following is not a property of water?
- A. Water is a polar molecule because of the unequal sharing of the electrons between hydrogen and oxygen.
 - B. Water molecules form hydrogen bonds with each other and with other polar molecules.
 - C. Hydrogen bonding makes water molecules cohesive. This cohesiveness results in surface tension.
 - D. Water repels non-polar molecules.
 - E.** Water is an excellent buffer and maintains the intracellular pH in a cell.

Blooms: Knowledge

Difficulty: Hard

Graduate Attribute: In-depth knowledge of subject material

Knox - Chapter 01 #37

Knox - Chapter 1

Knox - Part 1

Learning Objective: 4

Section: Water is the medium of life

38. Compared with a pH of 7, a solution with a pH of 9 has
- A. 2 times higher $[H^+]$ concentration.
 - B. 2 times lower $[H^+]$ concentration.
 - C.** 1/100 the $[H^+]$ concentration.
 - D. 100 times the $[H^+]$ concentration.
 - E. 20 times lower $[H^+]$ concentration.

Blooms: Knowledge

Difficulty: Hard

Graduate Attribute: In-depth knowledge of subject material

Knox - Chapter 01 #38

Knox - Chapter 1

Knox - Part 1

Learning Objective: 6

Section: Acids, bases and buffers

39. Substances that release hydrogen ions (H^+) into solution are
- A.** acids.
 - B. bases.
 - C. buffers.
 - D. hydrophobic.
 - E. carbon containing molecules.

Blooms: Knowledge

Difficulty: Medium

Graduate Attribute: In-depth knowledge of subject material

Knox - Chapter 01 #39

Knox - Chapter 1

Knox - Part 1

Learning Objective: 5

Section: Acids, bases and buffers

40. Which of the following statements is INCORRECT?
- A. A buffer solution maintains a relatively constant pH either by removing hydrogen ions or by releasing them.
 - B. Water molecules ionise and dissociate forming both hydrogen (H^+) and hydroxyl ions (OH^-).
 - C. The pH is the concentration of hydrogen ions in the solution.
 - D.** The pH is the concentration of hydroxyl ions in the solution.
 - E. The pH scale is logarithmic.

Blooms: Knowledge

Difficulty: Medium

Graduate Attribute: In-depth knowledge of subject material

Knox - Chapter 01 #40

Knox - Chapter 1

Knox - Part 1

Learning Objective: 6

Section: Acids, bases and buffers

1 Summary

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