Chapter 02
Basic Chemistry of Cells

Multiple Choice Questions

1. Which of the following elements is important in smaller quantities than is true for the six major elements in living things?
A. carbon
B. iron
C. oxygen
D. nitrogen
E. hydrogen

Only six types of atoms—carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur— make up about 95% of the body weight of organisms.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.01.01 List the six types of atoms basic to cells.
Section: 02.01
Topic: Chemistry

2. Which six elements are the main components in living organisms?
A. carbon, hydrogen, nitrogen, oxygen, phosphorus, sulfur
B. copper, iron, magnesium, sodium, water, zinc
C. carbon dioxide, hydrogen, nitrogen, oxygen, phosphate, sulfate
D. calcium, hydrogen, iron, potassium, sulfur, water
E. aluminum, magnesium, nitrogen, silicon, sodium, sulfur

Only six types of atoms—carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur— make up about 95% of the body weight of organisms.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.01.01 List the six types of atoms basic to cells.
Section: 02.01
Topic: Chemistry

3. Which of the following is positively charged?
A. proton
B. electron
C. atomic mass
D. neutron
E. isotope

A proton is a subatomic particle with positive charge, located within the nucleus of an atom and has one atomic mass unit

Blooms Level: 3. Apply
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Section: 02.02
Topic: Chemistry

4. Which of the following changes would cause an atom to become a different element?
A. increase the number of neutrons
B. increase the number of electrons
C. increase the number of protons
D. decrease the number of neutrons
E. decrease the number of electrons

All atoms of an element have the same number of protons.

Blooms Level: 3. Apply
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.02
Topic: Chemistry

5. A neutral atom of phosphorus was found to have an atomic number of 15 and a mass number of 31. What is the total number of electrons in this atom?
A. 16
B. 15
C. 31
D. 8
E. 46

The atomic number not only tells you the number of protons, but it also tells you the number of electrons when the atom is electrically neutral.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Learning Outcome: 02.02.02 Determine how many electrons are in the outer shell of a neutral atom when provided only with the atomic number.
Section: 02.02
Topic: Chemistry

6. A chemist found one atom with 9 protons, 8 neutrons and 7 electrons. Another atom has 8 protons, 9 neutrons and 10 electrons. Which of the following statements is correct?
A. Both atoms have the same mass number.
B. Both atoms have -2 electrical charge.
C. Both atoms are isotopes of the same element.
D. Both atoms are chemically non-reactive and would not interact with other atoms.
E. Both atoms have fulfilled the octet rule.

All atoms of an element have the same number of protons. The mass number is the sum of the number of protons and the number of neutrons. The charge atom is determined by the number of electrons and protons. Atoms with 8 electrons filling the outer shell are following the octet rule.

Blooms Level: 5. Evaluate
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.02
Topic: Chemistry

7. The number of protons found in an atom is also known as:
A. electron number
B. isotope number
C. neutron number
D. atomic number
E. atomic mass

The atomic number is the number of protons in the nucleus of an atom

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.02
Topic: Chemistry

8. The identity of any atom can be determined by the
A. number of electrons.
B. atomic charge.
C. atomic mass.
D. number of protons.
E. number of neutrons.

The atomic number is the number of protons in the nucleus of an atom, which determines the identity of the atom.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Section: 02.02
Topic: Chemistry

9. Which of these describes the structure of an atom?
A. Positive protons and negative electrons in the nucleus are surrounded by neutral neutrons.
B. Neutral protons and negative neutrons in the nucleus are surrounded by positive electrons.
C. Positive protons and neutral neutrons in the nucleus are surrounded by negative electrons.
D. Negative protons and positive neutrons in the nucleus are surrounded by neutral electrons.
E. Positive protons and negative neutrons in the nucleus are surrounded by neutral electrons.

Positively charged protons and uncharged neutrons are located within the nucleus of an atom. Negatively charged electrons move about the nucleus.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Section: 02.02
Topic: Chemistry

10. How is the mass number of an element determined?
A. the number of neutrons plus the number of electrons
B. the number of electrons only
C. the number of protons plus the number of neutrons
D. the number of protons plus the number of electrons
E. the number of protons only

The mass number is the number of protons plus the number of neutrons in the nucleus.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.02
Topic: Chemistry

11. Which of the following would be the largest number describing an atom?
A. Electron number
B. Neutron number
C. Atomic number
D. Proton number
E. Mass number

The mass number of an atom depends on the number of protons and neutrons

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.02
Topic: Chemistry

12. What is different between two isotopes of the same element?
A. valance number
B. proton number
C. mass number
D. atomic number
E. atomic charge

The isotopes of an element have the same number of protons, but they differ in atomic mass due to different numbers of neutrons.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.02
Topic: Chemistry

13. In order to determine if a patient has a thyroid tumor, which diagnostic procedure could be performed?
A. Patient drinks low levels of radioactive Iodine-131, then has an X-ray.
B.

Patient drinks high levels of radioactive Iodine-131, then has a PET scan.

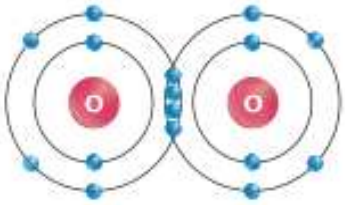
C. Injection of low levels of radioactive glucose, then patient has a PET scan.
D. Injection of low levels of radioactive Thallium-201, then patient has a PET sca.n
E. Injection of high levels of radioactive glucose, then patient has an X-ray.
A patient drinks low levels of radioactive Iodine-131, which concentrates in the thyroid gland. Then a X-ray of the thyroid glad can indicates the presence or absence of a tumor.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02A
Topic: Chemistry

14. Although high doses of radiation are harmful to cells, how can low levels of radioactive isotopes be used medicinally?
A. as tracers in imaging organs using Xrays and PET Scans
B. to reduce obesity and diabetes in teenagers
C. to create drugs that work faster than normal
D. to destroy aging and unwanted cells
E. to prevent ultraviolet damage from the sun

A radioactive isotope can act as a tracer to detect molecular changes. Specific tracers can also be used in imaging the body's organs and tissues.

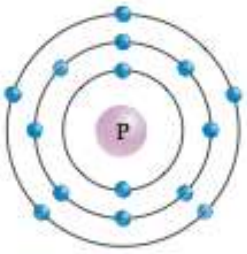
Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02A
Topic: Chemistry



15.
This diagram shows that two oxygen atoms interact
A. to form one covalent bond.
B. to form two covalent bonds.
C. to form four covalent bonds.
D. to form an ionic bond.
E. to form hydrogen bonds.

A double covalent bond occurs when two atoms share two pairs of electrons.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.03.01 Recognize and construct electron models of molecules that contain an ionic bond or covalent bonds.
Section: 02.02
Topic: Chemistry



16. This diagram shows an atom of phosphorus. How many electrons are in the valence shell?

A. 2
B. 4
C. 5
D. 6
E. 8

The number of electrons in an atom's outer shell, called the valence shell, determines its chemical reactivity.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.02
Topic: Chemistry

17. Which factor determines whether an atom will be chemically reactive?

A. the number of electrons in the outer shell
B. the ratio of protons to electrons
C. the number of electrons in the inner shell
D. the ratio of protons to neutrons
E. the number of electron shells an atom has

The number of electrons in an atom's outer shell, called the valence shell, determines its chemical reactivity.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Learning Outcome: 02.02.03 Discuss the importance of the octet rule.
Section: 02.02
Section: 02.03
Topic: Chemistry

18. A sulfur atom has 6 electrons in the outer electron shell. What will it most likely do?
A. gain two electrons from another atom
B. lose 6 neutrons to another atom
C. nothing, as this is a very stable atom
D. lose two electrons to another atom
E. stay as a single atom in nature

Most atoms obey the octet rule: They will give up, accept, or share electrons in order to have eight electrons in the outer shell.

Blooms Level: 3. Apply
Gradable: automatic
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Learning Outcome: 02.02.03 Discuss the importance of the octet rule.
Section: 02.02
Section: 02.03
Topic: Chemistry

19. When the number of protons does not equal the number of electrons, the atom is called
A. an isotope
B. an ion
C. a compound
D. an octet
E. a valance

An ion is an atom with a net charge, due to loss or gain of electron(s).

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.02.01 Use the periodic table of the elements to construct electrically neutral atoms.
Learning Outcome: 02.02.03 Discuss the importance of the octet rule.
Section: 02.02
Section: 02.04
Topic: Chemistry

20. If a neutral oxygen atom gains two electrons from another atom, then the overall charge of this oxygen atom will become
A. +2
B. 0
C. -2
D. unknown, as you need to know how many protons are present
E. 2 more than its original mass number

The oxygen atom now has two more electrons than it has protons; therefore, it has a net charge of –2.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.02.01 Use the periodic table of the elements to construct electrically neutral atoms.
Section: 02.02
Section: 02.03
Topic: Chemistry

21. Which ions found specifically in bones and teeth are important in muscle contractions and nerve conduction?
A. sodium
B. chloride
C. bicarbonate
D. potassium
E. calcium

Calcium is found in bones and teeth; important in muscle contraction and nerve conduction

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.03.01 Recognize and construct electron models of molecules that contain an ionic bond or covalent bonds.
Section: 02.03
Topic: Chemistry

22. Which bond results from the sharing of electrons?
A. isotope
B. metallic
C. covalent
D. ionic
E. octet

A covalent bond occurs when two atoms share electrons.

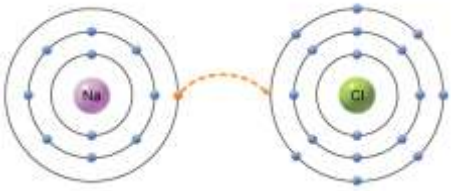
Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.02.02 Determine how many electrons are in the outer shell of a neutral atom when provided only with the atomic number.
Learning Outcome: 02.03.01 Recognize and construct electron models of molecules that contain an ionic bond or covalent bonds.
Section: 02.04
Topic: Chemistry

23. Which kind of bond occurs between positively and negatively charged atoms?
A. covalent bond
B. adhesive interaction
C. hydrogen bond
D. ionic bond
E. hydrophobic interaction

Ionic compounds are held together by an ionic bond, which is an attraction between negatively and positively charged ions.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.03.01 Recognize and construct electron models of molecules that contain an ionic bond or covalent bonds.
Section: 02.03
Topic: Chemistry

24. What kind of interaction is shown between sodium and chlorine?



A. The sodium atom gives up one proton.
B. The sodium atom gives up one neutron.
C. The chlorine atom gives up one neutron.
D. The chlorine atom gives up one electron.
E. The sodium atom gives up one electron.

After the sodium atom donates one electron to the chlorine atom, each atom would have eight electrons in the outer shell. The sodium atom would then have a net charge of +1 and the chlorine atom has a net charge of –1.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.02.03 Discuss the importance of the octet rule.
Learning Outcome: 02.03.01 Recognize and construct electron models of molecules that contain an ionic bond or covalent bonds.
Section: 02.03
Topic: Chemistry

25. Which chemical bond results from the equal sharing of electrons between two atoms?
A. polar
B. hydrogen
C. ionic
D. nonpolar
E. adhesive

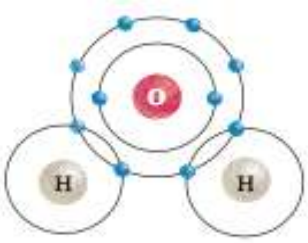
A nonpolar covalent bond occurs when the sharing of electrons between atoms is fairly equal

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.04.01 Differentiate between a nonpolar and a polar covalent bond.
Section: 02.04
Topic: Chemistry

26. When there in an unequal sharing of electrons between two atoms, what will be the result?
A. a nonpolar molecule, such as methane.
B. an ionic compound, such as salt.
C. an electronegative molecule, such as calcium ion.
D. a hydrophobic molecule, such as fat.
E. a polar molecule, such as water.

A polar covalent bond occurs when the sharing of electrons between atoms is unequal, and results in a polar molecule.

Blooms Level: 3. Apply
Gradable: automatic
Learning Outcome: 02.04.01 Differentiate between a nonpolar and a polar covalent bond.
Section: 02.04
Topic: Chemistry



27. What type of chemical bond occurs specifically between one hydrogen atom and one oxygen atom in a water molecule?
A. a polar covalent bond
B. an ionic bond
C. hydrogen bond
D. a nonpolar covalent bond
E. a hydrophobic interaction

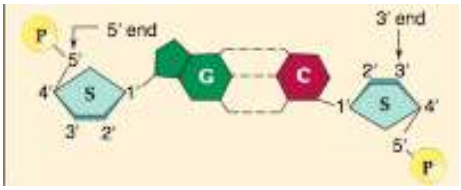
In a water molecule, the sharing of electrons between oxygen and each hydrogen is not completely equal. The unequal sharing of electrons in a covalent bond creates a polar covalent bond.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.02.03 Discuss the importance of the octet rule.
Learning Outcome: 02.03.01 Recognize and construct electron models of molecules that contain an ionic bond or covalent bonds.
Learning Outcome: 02.04.01 Differentiate between a nonpolar and a polar covalent bond.
Section: 02.04
Topic: Chemistry

28. Which interaction bonds water molecules to other water molecules?
A. hydrophobic interaction
B. hydrogen bond
C. ionic bond
D. covalent bond
E. adhesive interaction

The polarity of water molecules causes the hydrogen atoms in one molecule to be attracted to the oxygen atoms in other water molecules.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.04.02 Predict when hydrogen bonding will occur and the effects of these bonds on the molecule.
Section: 02.04
Topic: Chemistry

29. 

In a DNA molecule, the polar "G" nucleotide on one strand always bonds with the polar "C" nucleotide on the other strand. What kind of bonds are these?
A. hydrophobic interactions
B. hydrogen bonds
C. adhesive interactions
D. covalent bonds
E. ionic bonds

Hydrogen bonds hold the two strands of DNA together. When DNA makes a copy of itself, each hydrogen bond breaks easily, allowing the DNA to unzip. On the other hand, the hydrogen bonds, acting together, add stability to the DNA molecule.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.04.02 Predict when hydrogen bonding will occur and the effects of these bonds on the molecule.
Section: 02.05
Topic: Chemistry

30. Which term describes the tendency of water molecules to cling to other water molecules?
A. adhesion
B. electronegativity
C. polar
D. ccohesion
E. nonpolar

Water molecules exhibit cohesion when they stick together.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.04.02 Predict when hydrogen bonding will occur and the effects of these bonds on the molecule.
Learning Outcome: 02.05.02 Explain why water's hydrogen bonding is essential to the ability of water to serve as a transport medium.
Section: 02.04
Section: 02.05
Topic: Chemistry

31. When salt crystals dissolve in water, which chemical interactions in the salt crystals are being dissociated by the water molecules?
A. nonpolar covalent bonds
B. hydrogen bonds
C. polar covalent bonds
D. ionic bonds
E. hydrophobic interactions

When ionic salts are put into water, the negative ends of the water molecules are attracted to the sodium ions, and the positive ends of the water molecules are attracted to the chloride ions. This causes the sodium ions and the chloride ions to dissociate (separate) as it dissolves in water.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.07.01 Identify water as a hydrophilic solvent for polar molecules.
Section: 02.07
Topic: Chemistry

32. What term describes the tendency of water molecules to cling to the wall of a blood vessel?
A. hydrophobicity
B. buffering
C. cohesion
D. adhesion
E. electronegativity

Cohesion keeps the water column from breaking apart, and adhesion of water molecules to vessel walls prevents the water column from falling backward.

Blooms Level: 3. Apply
Gradable: automatic
Learning Outcome: 02.04.02 Predict when hydrogen bonding will occur and the effects of these bonds on the molecule.
Section: 02.04
Topic: Chemistry

33. Certain insects, such as a water strider, can walk across the surface of a pond. Which property of water allows this?
A. Frozen water is less dense than liquid water.
B. Water molecules are able to stick to other water molecules.
C. Water can dissolve polar and ionic compounds.
D. Water molecules are able to stick to other non-water molecules.
E. Water repels hydrophobic materials.

Hydrogen bonding is responsible for cohesion of water molecules, and causes water to have a high surface tension.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.05.01 Recognize that hydrogen bonding between water molecules ensures its liquid nature at temperatures suitable to life.
Learning Outcome: 02.05.02 Explain why water's hydrogen bonding is essential to the ability of water to serve as a transport medium.
Section: 02.05
Topic: Chemistry

34. Which of the following is not a use of water by living organisms?
A. external transportation for chemicals
B. help exchange heat
C. aids in homeostasis
D. provides nutrients for metabolism
E. provides a medium for movement

A watery environment supports and protects cells while providing an external transport system for chemicals. Homeostasis is also assisted by the ability of water to absorb and give off heat in a way that prevents rapid temperature changes.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.05.01 Recognize that hydrogen bonding between water molecules ensures its liquid nature at temperatures suitable to life.
Learning Outcome: 02.05.02 Explain why water's hydrogen bonding is essential to the ability of water to serve as a transport medium.
Section: 02.05
Topic: Chemistry

35. An unknown solution is poured into a beaker containing water and is stirred vigorously. After a few minutes, the scientist observes that the two liquids are not mixing. Based on this observation, what conclusion can the scientist make?
A. The unknown solution is adhesive.
B. The unknown solution is covalent.
C. The unknown solution is ionic.
D. The unknown solution is hydrophilic.
E. The unknown solution is hydrophobic.

Hydrophilic molecules (ionized and/or polar, such as salts) attract water. Hydrophobic molecules (nonionized and nonpolar, such as gasoline) do not attract water.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.04.02 Predict when hydrogen bonding will occur and the effects of these bonds on the molecule.
Learning Outcome: 02.05.02 Explain why water's hydrogen bonding is essential to the ability of water to serve as a transport medium.
Learning Outcome: 02.07.01 Identify water as a hydrophilic solvent for polar molecules.
Section: 02.04
Section: 02.05
Section: 02.07
Topic: Chemistry

36. When you mix sugar into your coffee, the sugar dissolves in the liquid. This shows that sugar molecules are
A. hydrophilic.
B. cohesive.
C. covalent.
D. neither hydrophobic nor hydrophilic.
E. hydrophobic.

Hydrophilic molecules (ionized salts or polar sugars) attract water molecules, can be dissolved in water and carried through organisms in blood vessels/plant tubes.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.04.01 Differentiate between a nonpolar and a polar covalent bond.
Learning Outcome: 02.05.02 Explain why water's hydrogen bonding is essential to the ability of water to serve as a transport medium.
Learning Outcome: 02.07.01 Identify water as a hydrophilic solvent for polar molecules.
Section: 02.04
Section: 02.05
Section: 02.07
Topic: Chemistry

37. When water is mixed with a salt in a beaker, the salt would be considered
A. the solvent.
B. the solute.
C. the solution.
D. the buffer.
E. the ion.

A solution contains both a solute, usually a solid, and a solvent, usually a liquid.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.05.02 Explain why water's hydrogen bonding is essential to the ability of water to serve as a transport medium.
Learning Outcome: 02.07.01 Identify water as a hydrophilic solvent for polar molecules.
Section: 02.05
Section: 02.07
Topic: Chemistry

38. Which of the following statements is not true about most other solvents, rather than about water ice?
A. It is less dense than liquid water
B. It insulates and slows down the freezing of water below
C. It freezes from top to bottom
D. It floats in water
E. It is denser than liquid water

Water is more dense at 4°C than it is at 0°C. Water expands when it freezes.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.05.02 Explain why water's hydrogen bonding is essential to the ability of water to serve as a transport medium.
Learning Outcome: 02.06.01 Describe why water expands when it freezes and why it warms up and cools down slowly.
Section: 02.05
Section: 02.06
Topic: Chemistry

39. In a solution, if the hydroxide ion concentration exceeds the hydrogen ion concentration the solution is considered to be
A. a buffer.
B. an acid.
C. a neutral solution.
D. a base.
E. a solute.

A pH above 7 is basic because [OH–], hydroxide concentration, is greater than [H+], the hydrogen concentration.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.08.01 Distinguish between acids and bases.
Section: 02.08
Topic: Chemistry

40. Hydrochloric acid is classified as an acid because
A. it absorbs excess hydroxide ions from the solution.
B. it dissociates to release hydroxide ions.
C. it dissociates to release hydrogen ions and absorbs excess hydroxide ions from the solution.
D. it absorbs excess hydrogen ions from the solution.
E. it dissociates to release hydrogen ions.

Hydrochloric acid (HCl) is an important inorganic acid that dissociates to release hydrogen ions and chlorine ions and will also absorb excess hydroxide ions.

Blooms Level: 3. Apply
Gradable: automatic
Learning Outcome: 02.08.01 Distinguish between acids and bases.
Section: 02.08
Topic: Chemistry

41. What type of solution has a pH of 8.2?
A. neutral
B. acid
C. ionic
D. buffer
E. base

A pH below 7 is an acidic solution. A pH above 7 is a basic solution.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.08.01 Distinguish between acids and bases.
Section: 02.08
Topic: Chemistry

42. Lemon Juice has a pH of 2.3 and should be classified as a
A. strong acid.
B. buffering solution.
C. weak acid.

A pH below 7 is an acidic solution. A pH above 7 is a basic solution.

Blooms Level: 3. Apply
Gradable: automatic
Learning Outcome: 02.08.01 Distinguish between acids and bases.
Section: 02.08
Topic: Chemistry

43. A solution which resists pH changes is
A. a hydrophilic solution.
B. a base.
C. a buffer.
D. a hydrophobic solution.
E. an acid.

A buffer resists changes in pH.

Blooms Level: 3. Apply
Gradable: automatic
Learning Outcome: 02.09.02 Describe a buffer and identify how buffers assist organisms.
Section: 02.09
Topic: Chemistry

44. Alkalosis, cramping, and irritability can occur when our blood pH rises above 7.45. Acidosis, seizures, coma and death can occur when our blood pH falls below pH 7.35. To prevent these conditions, our blood usually has chemicals which
A. can take up both excess hydrogen ions and excess hydroxide ions.
B. can produce more water molecules.
C. can take up excess hydroxide ions.
D. can take up excess hydrogen ions.
E. keep pH at neutral state.

Normally, buffers take up excess hydrogen ions (H+) or hydroxide ions (OH–), thus preventing alkalosis and acidosis.

Blooms Level: 2. Understand
Gradable: automatic
Learning Outcome: 02.09.02 Describe a buffer and identify how buffers assist organisms.
Section: 02.09
Topic: Chemistry

45. A chemistry student measures the pH of a solution as 7.1. The student adds five milliliters of an acid to the solution and finds that the pH of the solution is still 7.1. What conclusion could be made from these observations?
A. The original solution was weakly basic.
B. The original solution was weakly acidic.
C. The original solution was strongly basic.
D. The original solution was buffered.
E. The original solution was strongly acidic.

A buffer resists changes in pH. A buffer can take up excess hydrogen ions (H+) or excess hydroxide ions (OH–) in the solution.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.09.02 Describe a buffer and identify how buffers assist organisms.
Section: 02.09
Topic: Chemistry

46. Which of the following is not an impact of acid on the environment?
A. hurts human health
B. damages buildings and other human made structures
C. pollution of surface water
D. destroys forests
E. pollution of ground water

Excessice acidity degrades various parts of human and natural habitats.

Blooms Level: 4. Analyze
Gradable: automatic
Learning Outcome: 02.09.02 Describe a buffer and identify how buffers assist organisms.
Section: 02B
Topic: Chemistry

True / False Questions

47. Neutrons have a negative charge.
FALSE

The subatomic particles are positively charged protons, uncharged neutrons, and negatively charged electrons.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Section: 02.01
Topic: Chemistry

48. Radioactive isotopes can be used as tracers to detect molecular changes.
TRUE

A radioactive isotope can act as a tracer to detect molecular changes.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.01
Section: 02.02
Section: 02A
Topic: Chemistry

49. The bond which results from a transfer of electrons from one atom to another is called an ionic bond.
TRUE

An ionic bond occurs when electrons are transferred from one atom to another.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.02.03 Discuss the importance of the octet rule.
Learning Outcome: 02.03.01 Recognize and construct electron models of molecules that contain an ionic bond or covalent bonds.
Section: 02.02
Section: 02.03
Topic: Chemistry

50. When the concentration of hydrogen ions is greater than the concentration of hydroxide ions the solution is considered an acid.
TRUE

Acids have Excess Hydrogen Ions.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.08.01 Distinguish between acids and bases.
Section: 02.08
Topic: Chemistry

51. Out of covalent, ionic, and hydrogen, the hydrogen bond is the strongest.
FALSE

A hydrogen bond is weaker than an ionic or covalent bond.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.03.01 Recognize and construct electron models of molecules that contain an ionic bond or covalent bonds.
Section: 02.03
Topic: Chemistry

52. Two or more different elements bonded together is called an isotope.
FALSE

When atoms of two or more elements bond together in fixed proportions, the product is called a compound. A molecule is the smallest part of a compound that still has the properties of that compound.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.01.02 Describe the locations and charges of the subatomic particles..
Learning Outcome: 02.01.03 Distinguish between the atomic symbol, number, mass, and isotopes.
Section: 02.01
Topic: Chemistry

53. The attraction of an atom for the electrons in a covalent bond is called electronegativity.
TRUE

The ability of an atom to attract electrons in a covalent bond is called its electronegativity.

Blooms Level: 1. Remember
Gradable: automatic
Learning Outcome: 02.02.03 Discuss the importance of the octet rule.
Section: 02.02
Topic: Chemistry