Student name:_____

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

- ◎ true
- ◎ false

Question Details
Bloom's : 2. Understand
Section : 02.05
Learning Outcome : 02.05.01 Predict the change in hydrogen ion concentration represented by a differe
Topic : Acids and Bases
Gradable : automatic
Accessibility : Keyboard Navigation

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

- ◎ true
- ◎ false

Question Details
Bloom's : 1. Remember
Section : 02.04
Learning Outcome : 02.04.05 Explain why oil will not dissolve in water.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

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

- ◎ true
- ◎ false

Question Details
Bloom's : 4. Analyze
Section : 02.04
Learning Outcome : 02.04.03 Explain why sweating cools you.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

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

◎ true
◎ false

Question Details
Bloom's : 4. Analyze
Section : 02.03
Learning Outcome : 02.03.04 Predict which molecules will form hydrogen bonds with each other.
Topic : Chemical Bonds
Gradable : automatic
Accessibility : Keyboard Navigation

5) You are chemically analyzing a new compound. It does not dissolve in water. You characterize it as being hydrophilic.

◎ true
◎ false

Question Details
Bloom's : 3. Apply
Section : 02.04
Learning Outcome : 02.04.05 Explain why oil will not dissolve in water.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

6) Covalent bonds between water molecules require a high amount of energy to break which is why water heats slowly.

◎ true
◎ false

Question Details
Bloom's : 2. Understand
Section : 02.04
Learning Outcome : 02.04.01 Explain why water heats up so slowly.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

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

◎ true
◎ false

Question Details
Bloom's : 2. Understand
Section : 02.03
Learning Outcome : 02.03.02 Explain how ionic bonds promote crystal formation.
Topic : Chemical Bonds
Gradable : automatic
Accessibility : Keyboard Navigation

8) 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.

Question Details
Bloom's : 1. Remember
Section : 02.01
Learning Outcome : 02.01.01 Describe the basic structure of an atom in terms of three subatomic parti
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

9) Atoms that have a positive or negative charge are known as

A) magnetic.
B) electrically neutral.
C) ions.
D) protons.
E) stable.

Question Details
Bloom's : 1. Remember
Section : 02.02
Learning Outcome : 02.02.01 Differentiate between a cation and an anion.
Topic : Atomic Structure
Topic : Chemical Bonds
Gradable : automatic
Accessibility : Keyboard Navigation

10) The chemical behavior of an atom is determined by its

A) protons.
B) neutrons.
C) nuclei.
D) electrons.
E) mass.

Question Details
Bloom's : 1. Remember
Section : 02.01
Learning Outcome : 02.01.02 Explain why electrons determine the chemical behavior of atoms.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

11) In a neutralatom, 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.

Question Details
Bloom's : 2. Understand
Section : 02.01
Learning Outcome : 02.01.01 Describe the basic structure of an atom in terms of three subatomic parti
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

12) 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

Question Details
Bloom's : 1. Remember
Section : 02.01
Learning Outcome : 02.01.03 Explain how electrons carry energy.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

13) Electrons possess energy of position, also known as _____ energy.

A) kinetic
B) latent
C) potential
D) opposition
E) excitable

Question Details
Bloom's : 1. Remember
Section : 02.01
Learning Outcome : 02.01.03 Explain how electrons carry energy.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

14) Most elements in nature exist as mixtures of

A) unreactive atoms.
B) different isotopes.
C) gases.
D) liquids.
E) stable ions.

Question Details
Bloom's : 1. Remember
Section : 02.02
Learning Outcome : 02.02.02 Differentiate between an ion and an isotope.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

15) 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.

Question Details
Bloom's : 2. Understand
Section : 02.02
Learning Outcome : 02.02.02 Differentiate between an ion and an isotope.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

16) 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(an) _____ bond.

A) hydrogen
B) covalent
C) kinetic
D) ionic
E) static

Question Details
Bloom's : 1. Remember
Section : 02.03
Learning Outcome : 02.03.01 Define a chemical bond, and describe the three principal kinds.
Topic : Chemical Bonds
Gradable : automatic
Accessibility : Keyboard Navigation

17) What type of bond forms between two atoms sharing electrons?

A) hydrogen
B) covalent
C) kinetic
D) ionic
E) static

Question Details
Bloom's : 1. Remember
Section : 02.03
Learning Outcome : 02.03.03 Distinguish between polar and nonpolar covalent bonds.
Topic : Chemical Bonds
Gradable : automatic
Accessibility : Keyboard Navigation

18) 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

Question Details
Bloom's : 2. Understand
Section : 02.03
Learning Outcome : 02.03.04 Predict which molecules will form hydrogen bonds with each other.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

19) 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

Question Details
Bloom's : 3. Apply
Section : 02.05
Learning Outcome : 02.05.01 Predict the change in hydrogen ion concentration represented by a differe
Topic : Acids and Bases
Gradable : automatic
Accessibility : Keyboard Navigation

20) 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.

Question Details
Bloom's : 1. Remember
Section : 02.01
Learning Outcome : 02.01.01 Describe the basic structure of an atom in terms of three subatomic parti
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

21) 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.

Question Details
Bloom's : 1. Remember
Section : 02.01
Learning Outcome : 02.01.01 Describe the basic structure of an atom in terms of three subatomic parti
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

22) 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.

Question Details
Bloom's : 1. Remember
Section : 02.01
Learning Outcome : 02.01.03 Explain how electrons carry energy.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

23) 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

Question Details
Bloom's : 2. Understand
Section : 02.01
Learning Outcome : 02.01.03 Explain how electrons carry energy.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

24) 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

Question Details
Bloom's : 2. Understand
Section : 02.01
Learning Outcome : 02.01.01 Describe the basic structure of an atom in terms of three subatomic parti
Section : 02.02
Learning Outcome : 02.02.02 Differentiate between an ion and an isotope.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

25) 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.

Question Details
Bloom's : 3. Apply
Section : 02.03
Learning Outcome : 02.03.03 Distinguish between polar and nonpolar covalent bonds.
Learning Outcome : 02.03.04 Predict which molecules will form hydrogen bonds with each other.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

26) Which type of chemical substance lowers the H^+ concentration in a solution?

A) ice
B) acid
C) base
D) buffer
E) hydrogen ion

Question Details
Bloom's : 2. Understand
Section : 02.05
Learning Outcome : 02.05.01 Predict the change in hydrogen ion concentration represented by a differe
Topic : Acids and Bases
Gradable : automatic
Accessibility : Keyboard Navigation

27) 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.

Question Details
Bloom's : 2. Understand
Section : 02.04
Learning Outcome : 02.04.04 Distinguish cohesion from adhesion.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

28) 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.

Question Details
Bloom's : 3. Apply
Section : 02.04
Learning Outcome : 02.04.04 Distinguish cohesion from adhesion.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

29) 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^+.

Question Details
Bloom's : 3. Apply
Section : 02.05
Learning Outcome : 02.05.01 Predict the change in hydrogen ion concentration represented by a differe
Topic : Acids and Bases
Gradable : automatic
Accessibility : Keyboard Navigation

30) 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

Question Details
Bloom's : 2. Understand
Section : 02.02
Learning Outcome : 02.02.01 Differentiate between a cation and an anion.
Topic : Chemical Bonds
Gradable : automatic
Accessibility : Keyboard Navigation

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

Question Details
Bloom's : 1. Remember
Section : 02.01
Learning Outcome : 02.01.01 Describe the basic structure of an atom in terms of three subatomic parti
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

32) 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 _____.

Question Details
Bloom's : 3. Apply
Section : 02.01
Learning Outcome : 02.01.01 Describe the basic structure of an atom in terms of three subatomic parti
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

33) 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 _____.

Question Details
Bloom's : 2. Understand
Section : 02.02
Learning Outcome : 02.02.02 Differentiate between an ion and an isotope.
Topic : Atomic Structure
Gradable : automatic
Accessibility : Keyboard Navigation

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

Question Details
Bloom's : 1. Remember
Section : 02.05
Learning Outcome : 02.05.01 Predict the change in hydrogen ion concentration represented by a differe
Topic : Properties of Water
Topic : Acids and Bases
Gradable : automatic
Accessibility : Keyboard Navigation

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

Question Details
Bloom's : 1. Remember
Section : 02.05
Learning Outcome : 02.05.01 Predict the change in hydrogen ion concentration represented by a differe
Topic : Acids and Bases
Gradable : automatic
Accessibility : Keyboard Navigation

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

Question Details
Bloom's : 2. Understand
Section : 02.05
Learning Outcome : 02.05.01 Predict the change in hydrogen ion concentration represented by a differe
Topic : Acids and Bases
Gradable : automatic
Accessibility : Keyboard Navigation

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

Question Details
Bloom's : 1. Remember
Section : 02.03
Learning Outcome : 02.03.03 Distinguish between polar and nonpolar covalent bonds.
Topic : Chemical Bonds
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

38) Due to _____ bonding, ice is less dense than water.

Question Details
Bloom's : 2. Understand
Section : 02.04
Learning Outcome : 02.04.02 Explain why ice floats.
Topic : Properties of Water
Gradable : automatic
Accessibility : Keyboard Navigation

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

Question Details
Bloom's : 2. Understand
Section : 02.05
Learning Outcome : 02.05.01 Predict the change in hydrogen ion concentration represented by a differe
Topic : Properties of Water
Topic : Acids and Bases
Gradable : automatic
Accessibility : Keyboard Navigation

Answer Key

Test name: chapter 02

1) FALSE
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.
2) FALSE
Nonpolar molecules are hydrophobic, or "water fearing." Please see section 2.4.
3) TRUE
The hydrogen bonds in water are what makes it effective in cooling organisms as they sweat. Please see section 2.4.
4) FALSE
Hydrophobic molecules cannot form hydrogen bonds since they lack polar atoms. Please see section 2.3.
5) FALSE
Chemicals that do not dissolve in water are hydrophobic. Please see section 2.4.

6) FALSE
Hydrogen bonds are found between water molecules. Please see section 2.4.

7) FALSE
Sodium loses electrons and chlorine gains electrons. This exchange results in ionic bond formation. Please see section 2.3.

8) A

Electrons are found outside of the nucleus. Protons and neutrons are found in the nucleus. Please see section 2.1.

9) C

Ions have gained or lost electrons. Please see section 2.2.

10) D

Electrons govern interactions since they are the atomic particles which form the bonds. Please see section 2.1.

11) A

Electrical neutrality means that there must be equal numbers of electrons and protons. Please see section 2.1.

12) D

Electron orbitals provide a path for the electrons to travel. Please see section 2.1.

13) C

Potential energy is stored in a thing which has a particular position. Please see section 2.1.

14) B

For example, carbon exists in nature as a mixture of three isotopes. Please see section 2.2.

15) C

Carbon-14 spontaneously breaks down, releasing radiation. Please see section 2.2.

16) D

Ionic bonds form between two ions that form from a loss or gain of electrons.Please see section 2.3.

17) B

Covalent bonds involve shared electrons, even if not all atoms share equally. Please see section 2.3.

18) A

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.

19) A

pH units are logarithmic. A difference of one pH unit means a tenfold concentration difference. Please see section 2.5.

20) D

Atomic number is the number of large particles in the nucleus of an atom of an element. Please see section 2.1.

21) C

Atomic number is never more than mass number. Please see section 2.1.

22) A

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.

23) C

The second shell has four orbitals that hold two electrons each. Please see section 2.1.

24) D

The difference between mass number and atomic number is the number of neutrons. Please see sections 2.1 and 2.2.

25) A

Hydrogen atoms in water molecules have partial positive charges. Please see section 2.3.

26) C

A base will accept free H^+ in a solution and thereby raising the pH. Please see section 2.5.

27) E

Adhesion is the property of water sticking to other polar substances. Please see section 2.4.

28) B
Cohesion is due to water molecules sticking together as a result of hydrogen bonding. Please see section 2.4.
29) A
Antacids work by accepting excess hydrogen ions to raise the pH. Please see section 2.5.

30) A
Cations have lost electrons to anions. Please see section 2.2.

31) atomic number
Atomic number is always the same as or less than atomic mass. Please see section 2.1.
32) neutrons
Mass number is the sum of the numbers of protons and neutrons in an atomic nucleus. Please see section 2.1.
33) isotopes
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.
34) hydroxide
Besides hydroxide, water produces a proton for the other ion when it ionizes. Please see section 2.5.
35) pH
pH ranges from strongly acidic to strongly basic. Please see section 2.5.
36) acidic
Examples of acids include lemon juice and stomach acid. Please see section 2.5.
37) covalent
Atoms within a water molecule share electrons, so the bonds formed are covalent. Please see section 2.3.

38) hydrogen
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.
39) acid
Acids release protons, lowering pH. Please see section 2.5.