***Vander's Human Physiology, 15e* (Widmaier)**

**Chapter 2 Chemical Composition of the Body and Its Relation to Physiology**

1) Which correctly describes the structure of an atom?

A) There are the same number of protons and neutrons.

B) There are the same number of protons and electrons.

C) There are the same number of neutrons and electrons.

D) The number of protons, neutrons, and electrons never changes.

E) There are never the same number of neutrons and protons.

2) Which of the following is unique to atoms of each element?

A) The number of electrons

B) The number of neutrons

C) The number of protons

D) The number of bonds it can form

E) The ratio of protons to electrons

3) Carbon-12 and carbon-14 are isotopes. How are they different from each other?

A) They have different numbers of protons.

B) They have different numbers of neutrons.

C) They have different numbers of electrons.

D) They can form different numbers of chemical bonds.

E) They have different number of energy shells

4) Which describes a covalent bond?

A) The positive side of one molecule is attracted to the negative side of another

B) A bond between water molecules

C) A bond between two oppositely charged ions

D) A bond between two free radicals

E) Two atoms share electrons with each other from their outermost shell

5) Ions are \_\_\_\_\_\_\_\_.

A) electrically neutral

B) electrically charged

C) formed by the gain or loss of protons from the nucleus

D) not soluble in water

E) nonpolar atoms

6) When magnesium loses electrons to become an ion, what does it become?

A) A covalent molecule

B) A cation

C) An anion

D) A new element

E) A free radical

7) If a sports beverage advertises that it replaces the body's electrolytes, what does the drink contain?

A) Sugars that were broken down for energy

B) Ionic forms of mineral elements

C) Lipids that form the membranes of cells

D) Oxygen and gases used by metabolism

E) Vitamins

8) Of these major ions found in the body, which one carries a negative charge?

A) Chloride

B) Sodium

C) Potassium

D) Hydrogen

E) Calcium

9) Sodium ions have a single positive charge. Table salt is formed by the ionic bond between sodium ions and ions of chloride. Which of the following must be true of chloride?

A) It is an anion.

B) It is a cation.

C) It is electrically neutral.

D) It is non-polar.

E) It is a free radical.

10) Which describes a characteristic of free radicals?

A) They rapidly oxidize other atoms by removing an electron.

B) They are inert molecules that don't interact readily with other molecules.

C) They contain two electrons in the outermost orbital.

D) They have extra neutrons in their nuclei.

E) They are found in high quantities in most sports drinks.

11) Oxygen forms covalent bonds with two atoms of hydrogen to form H2O (water). How many electrons are found in oxygen's outer shell?

A) 1

B) 2

C) 4

D) 6

E) 8

12) Muscle cell contraction is facilitated by a small electrical current. Which types of molecules are likely involved?

A) Free radicals

B) Isotopes

C) Electrolytes

D) Gasses

E) Vitamins

13) Which of the following is *not* true of a polar chemical bond?

A) It is covalent.

B) It is ionized.

C) It has opposite electrical charge at each end.

D) It has no net electrical charge.

14) Which best describes a hydrolysis reaction?

A) Molecules are broken down into smaller ones by breaking covalent bonds within water molecules and transferring hydrogen atoms and hydroxyl groups to the smaller ones.

B) Electrically charged molecules separate into ions when they dissolve in water, and then hydrogen ions and hydroxyl groups covalently attach themselves to the oppositely charged ions.

C) Large molecules are assembled from smaller ones by breaking water into hydrogen and hydroxyl ions.

D) Dissolving a large molecule in water reduces it to its individual atoms.

E) The breaking of hydrogen bonds between any two molecules.

15) Oil is spilled into the ocean. What do you expect will happen?

A) Most of the oil will quickly disperse and mix in with water and form hydrogen bonds.

B) Most of the oil molecules will clump and exclude water.

C) Most of the oil will form bonds with the water molecules to form new covalently bonded structures.

D) Water molecules will absorb the oil molecules and break them apart.

E) The hydrogen and oxygen atoms within the oil will become water.

16) Molecules that have properties of both polar and nonpolar molecules are called

A) hydrophobic.

B) hydrophilic.

C) amphipathic.

D) unipolar.

E) bipolar.

17) You're designing a new drug to treat allergies. You'd like for your therapy to be able to dissolve through the lipid bilayers of cell membranes; therefore, \_\_\_\_\_\_\_\_ molecules will make excellent drug choices.

A) polar

B) ionic

C) electrolyte

D) non-polar

E) radioactive

18) The pH of a solution

A) is a measure of the concentration of hydrogen atoms in the solution.

B) is a measure of the concentration of hydrogen ions bound to other molecules in the solution.

C) is a measure of the concentration of free hydrogen ions in the solution.

D) increases as the acidity of the solution increases.

E) increases as the free hydrogen ion concentration in the solution increases.

19) Most of the body weight of an average human is what substance?

A) Water

B) Protein

C) Minerals

D) Lipids

E) Carbohydrates

20) Which chemical group does glucose best fit into?

A) Monosaccharides

B) Disaccharides

C) Polysaccharides

D) Glycoproteins

E) Phospholipids

21) Carbohydrates are stored in animal cells in the form of

A) cellulose.

B) starch.

C) triacylglycerol.

D) glycogen.

E) protein.

22) Hydrolysis of glycogen will have what effect on blood glucose level?

A) Increase blood glucose level

B) Decrease blood glucose level

C) No effect on blood glucose level

23) What are the two main atoms in lipids, and what type of bonds connect them?

A) Carbon and oxygen, connected by polar covalent bonds.

B) Carbon and hydrogen, connected by non-polar covalent bonds

C) Carbon and hydrogen, connected by ionic bonds

D) Carbon and hydrogen, connected by hydrogen bonds

E) Oxygen and hydrogen, connected by hydrogen bonds

24) Which statement is FALSE with regard to proteins?

A) Their roles in the body include acting as enzymes, providing structural support, and signaling between cells.

B) They make up a greater percentage of body mass than carbohydrates do.

C) They are composed of nucleic acids.

D) They are macromolecules with subunits linked by polypeptide bonds.

E) They are polymers made up of amino acids.

25) What best describes the main determinant of the secondary structure of a protein?

A) The sequence of the various amino acids that make up a polypeptide chain

B) The total number of amino acids that make up a polypeptide chain, and its overall resulting length

C) The total number of polypeptide chains that combine to determine the overall size of the protein

D) Molecular interactions between widely separated regions of a polypeptide, such as disulfide bonds, that stabilize the folded conformation

E) Molecular interactions along a polypeptide chain that fold various regions into alpha helices or beta sheets

26) Within a single protein, which of the following are you likely to find?

A) Ionic bonds

B) Hydrogen bonds

C) Disulfide bridges

D) Hydrophobic interactions

E) You are likely to find all of these within a single protein.

27) Which of the following is NOT a type of molecular interaction that determines the tertiary structure of a protein?

A) Covalent bonds between purine and pyrimidine bases

B) Ionic bonds

C) Van der Waals forces

D) Covalent bonds between two cysteine amino acids

E) Hydrogen bonds

28) What is the term describing the covalent bond formed between two amino acids?

A) Glycosidic bond

B) Peptide bond

C) Phosphodiester bond

D) Ester bond

E) Hydrolytic bond

29) A single genetic mutation will change a protein at what level of structure?

A) Primary

B) Secondary

C) Tertiary

D) Quaternary

E) A single genetic mutation could change all of these

30) Which is a correct description of nucleic acids?

A) They are polymers of subunits containing glucose and amino acids.

B) They are polymers of subunits containing glucose, a phosphate group, and an amino acid.

C) They are polymers of subunits containing a phosphate group, a sugar, and a purine or pyrimidine base.

D) They are polymers of subunits containing a phosphate group, a sugar, and an amino acid.

E) They are long polymers of amino acids, folded into an alpha helix.

31) The atomic number of an element is given by the number of electrons in the atom.

32) The atomic number of an element refers to the number of particles in its atomic nucleus.

33) Trace elements such as zinc and manganese are found in minute quantities in the body but do not serve any known function.

34) The number of covalent bonds that can be formed by a given atom depends upon the number of electrons present in the outermost orbit.

35) Nitrogen atoms can form a maximum of four covalent bonds with other atoms.

36) The shape of a molecule may change as atoms rotate about their covalent bonds.

37) All of the physiologically important atoms of the body readily form ions.

38) Water molecules can form covalent bonds with other water molecules.

39) The carboxyl ion is an anion.

40) NaCl is a molecule formed by the covalent bonding of a sodium atom to a chlorine atom.

41) All covalent bonds are polar.

42) During hydrolysis, hydrogen ions and hydroxyl groups are formed.

43) In general, polar molecules will dissolve in polar solvents, while nonpolar molecules cannot.

44) Solutes that do not dissolve in water are called hydrophilic.

45) Phospholipids are examples of amphipathic molecules.

46) Comparing two cups of coffee, one with no sugar added and the other has had a packet of sugar dissolved in it, we can say that the coffee with sugar is more concentrated.

47) A solution with a pH of 8 is more acidic than one with a pH of 3.

48) A solution with a pH of 8 contains more H+ ions than a solution with a pH of 3.

49) Fatty acids are examples of organic molecules.

50) When multiple repeating simple sugar molecules combine to form a larger molecule, it is called a polysaccharide.

51) The term "blood sugar level" refers to the concentration of disaccharides in the blood.

52) Saturated fats contain carbon atoms linked by double bonds.

53) Cholesterol is a phospholipid.

54) Glycoproteins are protein molecules with molecules of glycogen attached to the amino acid side chains.

55) A molecule composed of two atoms of the same element, such as fluorine (Fl2), can be formed by a polar covalent bond.

56) The majority of the molecules in the human body are polar.

57) The sequence of amino acids in a protein is known as the secondary structure.

58) A protein may consist of more than one polypeptide chain.

59) If a protein's conformation changes it is likely that its function will change as well.

60) Substitution of one amino acid for a different one in a given protein always significantly alters the conformation of that protein.

61) In DNA, thymine binds with adenine and cytosine binds with uracil.

62) Water is only lost from the body in urine formation.

63) Dehydration reactions among glucose monomers will produce polysaccharides such as glycogen.

64) Dehydration reactions between carboxyl groups and phosphate groups result in peptide bond formation.

65) A 1 molar solution of glucose and 1 molar solution of NaCl have the same number of glucose and NaCl molecules.

66) A person experiencing liver failure is likely to have lower levels of triglycerides in their body than a person with a healthy liver.

67) Simple macromolecules with fewer numbers of bonds yield more energy to fuel cell processes than large macromolecules.

68) Estrogen is a steroid hormone, therefore it will readily dissolve through a lipid bilayer.

69) Which of the following words can be used to describe water?

A) Ion

B) Polar

C) Molecule

D) Atom

E) Lipophilic

70) Hydrogen bonds can break in high temperature conditions. Which of the following molecules is likely to break apart or change shape at high temperatures?

A) DNA

B) RNA

C) Triglycerides

D) Proteins

E) Polysaccharides

71) Which of the following contain phosphate groups?

A) Amino acids

B) Monosaccharides

C) Nucleotides

D) Phospholipids

E) Cholesterol

72) Dehydration reactions are involved in the production of \_\_\_\_\_\_\_\_.

A) polysaccharides

B) monosaccharides

C) triglycerides

D) polypeptides

E) nitrogenous Bases