MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Matter
   A) has mass.
   B) All of the choices are correct.
   C) occupies space.
   D) is what life is composed of.
   E) is composed of elements.

2) A compound
   A) contains two or more elements in a fixed ratio.
   B) is exemplified by sodium.
   C) is a solution.
   D) is less common than a pure element.
   E) is a pure element.

3) The four most common elements in living organisms are
   B) C, H, O, Fe.
   C) C, H, O, N.
   D) Fe, N, O, Ca.

4) The nucleus of an atom contains
   A) protons and neutrons.
   B) only electrons.
   C) only protons.
   D) protons and electrons.
   E) only neutrons.

5) Typically, nitrogen atoms are composed of seven electrons, seven protons, and seven neutrons. An isotope of nitrogen could
   A) be negatively charged.
   B) have more than seven electrons and more than seven protons.
   C) have more than seven protons.
   D) have more than seven neutrons.
   E) be positively charged.
6) In the equation $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$,
   A) only $\text{H}_2$ and $\text{O}_2$ are compounds.
   B) $\text{H}_2$, $\text{O}_2$, and $\text{H}_2\text{O}$ are all trace elements.
   C) $\text{H}_2$, $\text{O}_2$, and $\text{H}_2\text{O}$ are all compounds.
   D) only $\text{H}_2\text{O}$ is a compound.
   E) $\text{H}_2$, $\text{O}_2$, and $\text{H}_2\text{O}$ are all elements.

7) What is the fundamental difference between covalent and ionic bonding?
   A) Covalent bonding involves only the outer electron shell; ionic bonding also involves the next inner electron shell.
   B) In a covalent bond, the partners have identical electronegativity; in an ionic bond, one of them is more electronegative.
   C) Covalent bonds form between atoms of the same element; ionic bonds, between atoms of different elements.
   D) In a covalent bond, the partners share a pair of electrons; in an ionic bond, one partner captures an electron from the other.
   E) In covalent bonding, both partners end up with filled outer electron shells; in ionic bonding, one partner does and the other does not.

8) Many fabrics are coated with a "water-repellent" chemical that causes water to bead on the fabric instead of soaking in. This probably occurs because
   A) the coating is neutral, and therefore repels water, which is also neutral.
   B) the coating has positive charges that repel the positively charged ends of the water molecules and also has negative charges that repel the negatively charged ends of the water molecules.
   C) the coating has negative charges that repel the negatively charged ends of the water molecules.
   D) the coating has positive charges that repel the positively charged ends of the water molecules.
   E) the coating is neutral and repels the positive and negative ends of the water molecules.

9) The oxygen atom of a water molecule
   A) is electrically neutral.
   B) attracts electrons less strongly than the hydrogen atoms.
   C) is attracted to the negatively charged atoms of other molecules.
   D) is more positively charged than the hydrogen atoms.
   E) is more electronegative than the hydrogen atoms.
10) A *solute* is

A) the dissolving agent of a solution.
B) usually water in living cells.
C) the liquid portion of a solution.
D) the dissolving agent of a solution which is usually oxygen in living cells.
E) the substance that is dissolved in solution.

11) Water molecules stick to other water molecules because

A) water molecules are neutral, and neutral molecules are attracted to each other.
B) hydrogen bonds form between the hydrogen atoms of one water molecule and the oxygen atoms of other water molecules.
C) the hydrogen atoms of adjacent water molecules are attracted to one another.
D) the oxygen atoms of adjacent water molecules are attracted to one another.
E) covalent bonds form between the hydrogen atoms of one water molecule and the oxygen atoms of other water molecules.

12) The ability of water molecules to form hydrogen bonds with other water molecules is critical to

A) the milder temperatures of coastal regions compared to inland areas.
B) the movement of water from the roots of a tree to its leaves.
C) the ability of certain insects to walk on the surface of water.
D) evaporative cooling of skin surfaces.
E) all of these factors.

13) A solution with a pH of 7 is

A) neutral.
B) weakly basic.
C) strongly basic.
D) strongly acidic.
E) weakly acidic.

14) Kinetic energy differs from chemical energy in that

A) chemical energy is a particular form of kinetic energy.
B) kinetic energy is stored energy that has the potential to do work, and chemical energy is the energy of movement.
C) kinetic energy is the energy of a moving object, whereas chemical energy is the potential energy of molecules.
D) kinetic energy can be converted into various forms of energy, whereas chemical energy can only be converted into heat.
E) kinetic energy depends on the movement of atoms, whereas chemical energy depends on the movement of molecules.
15) Glucose molecules provide energy to power the swimming motion of sperm. In this example, the sperm are changing
   A) kinetic energy into potential energy.
   B) chemical energy into potential energy.
   C) chemical energy into kinetic energy.
   D) kinetic energy into chemical energy.
   E) None of the choices are correct.

16) What is the basic difference between exergonic and endergonic reactions?
   A) Exergonic reactions release energy; endergonic reactions absorb it.
   B) Exergonic reactions involve ionic bonds; endergonic reactions involve covalent bonds.
   C) Exergonic reactions involve the breaking of bonds; endergonic reactions involve the formation of bonds.
   D) Exergonic reactions involve the formation of bonds; endergonic reactions involve the breaking of bonds.
   E) In exergonic reactions, the reactants have less chemical energy than the products; in endergonic reactions, the opposite is true.

17) Most of a cell’s enzymes are
   A) nucleic acids.
   B) proteins.
   C) lipids.
   D) amino acids.
   E) carbohydrates.

18) The active site of an enzyme is
   A) the region of a substrate that is changed by an enzyme.
   B) the region of a product that detaches from the enzyme.
   C) the highly changeable portion of an enzyme that adapts to fit the substrates of various reactions.
   D) the region of an enzyme that attaches to a substrate.
   E) None of the choices are correct.

19) Which list below consists of only polymers?
   A) proteins, lipids, nucleic acids, amino acids
   B) proteins, lipids, nucleic acids, polysaccharides
   C) polysaccharides, lipids, amino acids, nucleic acids
   D) sugars, amino acids, nucleic acids, lipids
   E) proteins, lipids, nucleotides, sugars
20) One way to convert an oil into a substance that is solid at room temperature is to
   A) remove water, causing a dehydration synthesis reaction to occur.
   B) put it in the refrigerator: when unsaturated fats cool, double bonds form and the fats solidify.
   C) add water and shake vigorously.
   D) add hydrogens, decreasing the number of double bonds in the molecules.
   E) remove hydrogens, increasing the number of double bonds.

21) A protein containing more than one polypeptide chain exhibits the ________ level of protein structure.
   A) primary
   B) tertiary
   C) secondary
   D) infinite
   E) quaternary

22) Peptide bonds
   A) are used to form amino acids.
   B) link amino acids.
   C) form between fatty acids.
   D) are formed by a hydrolysis reaction.
   E) None of the choices are correct.

23) The tertiary structure of a polypeptide refers to
   A) the presence of pleated sheets.
   B) its size.
   C) the number of R groups it contains.
   D) the overall three-dimensional structure.
   E) the amino acids of which it is made.

24) Which one of the following is an example of secondary structure in a protein?
   A) an alpha helix
   B) a particular amino acid sequence
   C) a globular shape
   D) the joining of two polypeptide chains
   E) a fibrous shape
25) Because water and oil don't mix, water is not very effective at washing away oily dirt. The ability of soap to mix with both water and oily dirt allows dirt to be washed away. Which statement provides the most logical chemical explanation for this phenomenon?

A) Soap molecules carry no charge. As a result, soap can form an effective bridge between charged water molecules and neutral oil molecules.

B) Soap molecules have charged regions and neutral regions. The neutral regions are attracted to water molecules; the charged regions are attracted to oils.

C) Soap molecules have both positively and negatively charged regions. The negatively charged regions are attracted to water; the positively charged regions are attracted to oil.

D) Soap molecules have charged regions and neutral regions; the charged regions are attracted to water molecules; the neutral regions are attracted to oils.

E) Soap molecules have both positively and negatively charged regions. The positively charged regions are attracted to water; the negatively charged regions are attracted to oil.