

Section 2.1

Study Guide

1. An element is a certain type of atom.
2. Sketch should resemble one of the illustrations in Figure 2.2 on page 37. Nucleus should be in the center with protons and neutrons. Electrons should be labeled in a ring surrounding the nucleus.
3. A compound is composed of atoms of different elements.
4. an atom that has gained or lost one or more electrons
5. the number of protons no longer equals the number of electrons
6. Sketch should resemble the first illustration in Figure 2.3, with one atom losing an electron (becoming a positive ion) and the other accepting that electron (becoming a negative ion).
7. A bond that forms between two atoms that share a pair of electrons.
8. the number of electron pairs that it needs to share to fill its outer energy level
9. molecule
10. compound
11. element
12. ion
13. Ionic bonds form between oppositely-charged ions; covalent bonds form when atoms share a pair of electrons.

Section 2.2

Study Guide

1. a molecule with a slightly positively charged region and a slightly negatively charged region
2. The oxygen nucleus pulls the electrons in the molecule more strongly than the hydrogen atoms. The hydrogen atoms have a slight positive charge and the oxygen atom has a slight negative charge.
3. an attraction between a slightly positive hydrogen and a slightly negative atom
4. between the slightly positive hydrogen atom of one water molecule and the slightly negative oxygen atom of another water molecule
5. A large amount of energy is needed to produce an increase in water temperature; water resists changes in temperature.
6. Water molecules "stick" to each other.
7. Water molecules "stick" to other substances.
8. A solvent is present in greater concentration and dissolves the solute.
9. ions and polar molecules
10. nonpolar molecules, such as fats and oils
11. **Effect on H^+ concentration:** acids increase H^+ concentration; bases decrease H^+ concentration
Effect on pH: acids lower pH.; bases raise pH.
12. Sketch should resemble Visual Vocab on page 42 of the text. **Solution:** homogeneous mixture of substances; **solvent:** substance present in greater amount in which other substances dissolve; **solute:** substance that dissolves in a solvent.

Section 2.3

Study Guide

1. Carbon atoms are the basis of the molecules that make up most living things.
2. Carbon atoms can form covalent bonds with up to four other atoms, including other carbon atoms.
3. Sketches should resemble Figure 2.10 on page 44.
4. broken down as a source of chemical energy; part of cell structure
5. sugars, starches, cellulose
6. broken down as a source of chemical energy; part of cell structure
7. fats, oils, phospholipids
8. many functions, including movement, transport, chemical catalysts
9. enzymes, hemoglobin
10. store genetic information, build proteins
11. DNA, RNA
12. the order of amino acids and interactions between amino acids (hydrogen bonds and sulfur-sulfur bonds)
13. nucleotides, which are composed of a sugar, a phosphate group, and a nitrogen-containing base
14. A monomer is a single subunit; a polymer is a molecule made of many monomers.

Section 2.5

Study Guide

1. the amount of energy required to start a chemical reaction
2. Catalysts decrease activation energy for a chemical reaction; catalysts increase the rate of a chemical reaction; catalysts are neither reactants nor products because they are not changed or used up.
3. less
4. **Why enzymes are necessary:** because reactions in organisms have to occur at a low temperature (body temperature), with low concentrations of reactants, and at a high rate; **Important factors in enzyme structure:** order of amino acids and hydrogen bonding between the amino acids; **How structure affects function:** if structure changes, substrates will not be able to bind to an enzyme's active sites; **Lock-and-key model:** only certain substrates bind to an enzyme's active sites; when bound to the enzyme the chemical reaction can occur.
5. The enzyme's shape changes slightly, which strains the bonds inside the substrate. The strain on the bonds weakens them.
6. A catalyst "dissolves" or "gets rid of" some of the activation energy needed to start a reaction.
7. Specific substrates fit exactly into the active sites for specific enzymes, in a similar way that only a certain key will open any given lock.