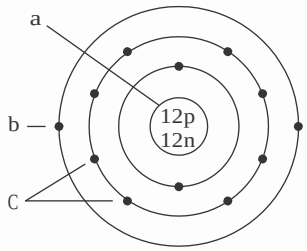
STUDY GUIDE 2

1. Atoms and Elements

a. Write the terms that match the phrases in the spaces at the right.

1) Smallest unit of an element. **Atom**
2) Positively charged subatomic particle. **Proton**
3) Negatively charged subatomic particle. **Electron**
4) Subatomic particle with no charge. **Neutron**
5) Substance that cannot be broken down into any simpler substance. **Element**
6) Atoms of the same element, with different numbers of neutrons. **Isotopes**
7) Most abundant element in the body. **Oxygen**

b. Label the atom shown by placing the number of the component in the space by the label, then, provide the responses to the phrases below.

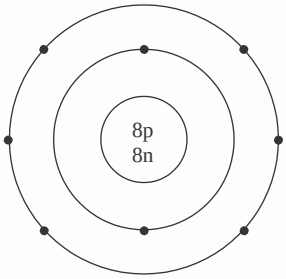


c 1) Nonvalence electrons
a 2) Nucleus
b 3) Valence electron(s)

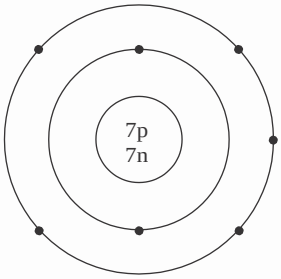
4) Atomic number of this atom. **12**
5) Atomic weight of this atom. **24**
6) Number of electrons needed to complete its outer shell. **6**
7) Type of chemical bond that is likely to join this atom to another atom. **Ionic**
8) Symbol of this atom. **Mg**

c. Diagram an atom of these elements.

Oxygen



Nitrogen



2. Molecules and Compounds

a. Write the terms that match the phrases in the spaces at the right.

1) Composed of two elements combined in a fixed ratio. **Compound**
2) Smallest unit of a compound. **Molecule**
3) Number of chlorine atoms in $CaCl_2$. **2**
4) Chemical bond resulting from the donation of electron(s) from one atom to another. **Ionic**
5) Chemical bond resulting from the sharing of valence electrons by two atoms. **Covalent**
6) An atom with a net electrical charge. **Ion**
7) The attractive force between a slightly positive H atom and a slightly negative O or N atom. **Hydrogen bond**
8) Chemical bonds forming organic molecules. **Covalent**
9) Electrons in the outer shell. **Valence electrons**

b. Indicate the kinds and numbers of atoms in a glucose molecule ($C_6H_{12}O_6$).

Kinds of Atoms	Numbers of Atoms
Carbon	**6**
Hydrogen	**12**
0xygen	**6**

c. Identify the pH values as acid (A) or base (B). Circle the pH with the highest concentration of H^+.

A pH 2.8 **A** pH 6.8 **B** pH 7.4 **B** pH 9.5 **A** pH 3.7

3. Compounds Composing the Human Body

a. Identify the following compounds as either organic (0) or inorganic (I).

I NaCl	**0** Lipids	**I** $CaP0_4$
0 Nucleic acids	**I** Salts	**0** $C_6H_{12}O_6$
0 Proteins	**I** Most acids	**0** CH_4
I Most bases	**0** Carbohydrates	**I** $C0_2$
0 Amino acids	**0** Steroids	**0** Monosaccharides
0 Fatty acids	**0** Glycerol	**0** Nucleotides

b. Write the terms that match the phrases in the spaces at the right.

1) Most abundant compound in the body. **Water**
2) Substances dissolved in a liquid. **Solute**
3) A compound that releases H^+. **Acid**
4) Splitting of ionic compounds into ions. **Ionization (dissociation)**
5) A measure of the H^+ concentration in a solution. **pH**
6) Chemicals that keep the pH of a solution relatively constant. **Buffers**
7) Class of compounds formed of many simple sugars joined together. **Carbohydrates**

8) Type of reaction that joins two glucose molecules to form maltose. **Synthesis**

9) Storage form of carbohydrates in the body. **Glycogen**

10) Composed of three fatty acids and one glycerol. **Triglycerides (fat)**

11) Composed of two fatty acids and a phosphate group joined to one glycerol. **Phospholipids**

12) Type of fat whose fatty acids contain no carbon–carbon double bonds. **Saturated fat**

13) Compound used to store excess energy reserves. **Triglycerides (fat)**

14) Class of lipids that includes sex hormones. **Steroids**

15) Class of compounds formed of 50 to thousands of amino acids. **Proteins**

16) Chemical bonds that determine the three-dimensional shape of proteins. **Hydrogen bonds**

17) Bonds joining amino acids together in proteins. **Peptide bonds**

18) A single-stranded nucleic acid that is involved in protein synthesis. **RNA**

19) Building units of nucleic acids. **Nucleotides**

20) Steroid that tends to plug arteries when in excess. **Cholesterol**

21) Sugar in DNA molecules. **Deoxyribose**

22) Primary carbohydrate fuel for cells. **Glucose**

23) Building units of proteins. **Amino acids**

24) Water compartment containing 65% of water in the body. **Intracellular fluid**

25) Molecule releasing energy to power chemical reactions within cells. **ATP**

26) Double-stranded nucleic acid. **DNA**

27) Molecules catalyzing chemical reactions in cells. **Enzymes**

28) Type of reaction breaking a large molecule into smaller molecules. **Decomposition**

29) Molecule controlling protein synthesis in cells. **DNA**

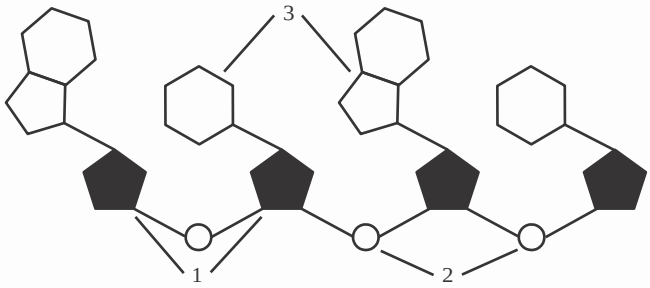
30) Element whose atoms form the backbone of organic molecules. **Carbon**

c. Match the four classes of organic compounds with the listed substances.

1) Carbohydrates	2) Lipids	3) Proteins	4) Nucleic acids
3 Amino acids	**4** Nucleotides	**3** Enzymes	
2 Steroids	**1** Monosaccharides	**4** RNA	
1 Glycogen	**2** Triglycerides	**4** DNA	
2 Cholesterol	**1** Starch	**2** Fatty acids	

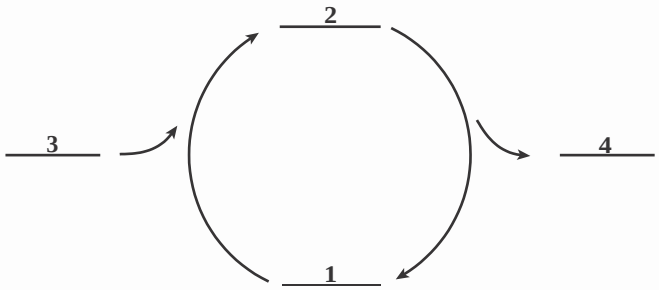
d. Label the parts of the small portion of an RNA molecule shown and draw a line around one nucleotide.

__3__ Nitrogen bases __1__ Ribose sugars __2__ Phosphate groups



e. Show the interaction of ADP, ATP, P, and energy in the formation and breakdown of ATP by placing the numbers of the responses in the correct spaces provided.

1) ADP
2) ATP
3) Energy from cellular respiration + P
4) Energy released for cellular work + P



f. Explain the importance of the shape of an enzyme. **The enzyme's active site must fit onto the substrate in order for the enzyme to catalyze a reaction.**

g. How does a change in pH change the shape of and inactivate an enzyme? **A pH change disrupts the hydrogen bonding between amino acids composing an enzyme, changing the shape of the enzyme.**

4. Clinical Applications

a. Why does a diet high in saturated fats increase the risk of coronary heart disease? **Saturated fats are more likely to be converted into cholesterol than unsaturated fats. Excess cholesterol forms plaques in coronary arteries reducing the blood supply to the heart.**

b. A patient in a coma is brought to the emergency room. A blood test shows that he has severe hypoglycemia (abnormally low blood glucose) and acidosis. Treatment is begun immediately to increase both blood sugar and pH.

1) Why is a normal level of blood glucose important? **Glucose is the primary energy supply used by cells in cellular respiration.**
2) Why is severe acidosis a problem? **A change in pH may inactivate vital enzymes.**