

Chapter Two Study Guide  
Inorganic and Organic Chemistry (0723)

Part A

- 1 What was Dalton's 1803 modern atomic theory? What did he get wrong? What did it replace?
- 2 What is matter? What is matter made from? What is the difference between an atom, a compound, and an element? What is the significance of the periodic table of elements?
- 3 How is the Bohr model of the atom different than the Dalton model? What are the three subatomic particles in Bohr's model? Draw a picture and label Bohr's Model of the atom for Carbon. How is each particle described? Why is Bohr credited with the discovery of chemistry? What is chemistry?
- 4 In the electron shell model, how many electrons are in the first orbit? The second orbit and other orbits? What are the electrons called in the outer most orbit? Significance?
- 5 What determines the chemical property of the element?
- 6 What determines how atoms may bind to each other?
- 7 What are the characteristics and differences between covalent bonds, ionic bonds, and hydrogen bonds? Strongest to weakest? Give examples of each.
- 8 What does it mean if a molecule has a double bond? Example
- 9 What is the difference between a non-polar covalent bond and a polar covalent bond? Examples of each. Significance?
- 10 What is the difference between a cation and anion? What type of bond creates these species? Examples of each.
- 11 What is the difference between hydrophilic and hydrophobic molecules? What determines if a molecule is hydrophilic?
- 12 What bond does not hold atoms together and can not form compounds? What do these bonds do and how are they significant? Give examples.
- 14 When you look at a glass of water, what type of bonds do you see? What is the significance of water surface tension? The cause? How may this effect your physiology?
- 15 What is an isomer?
- 16 What is a free radical? Good or bad? Why?
- 17 What is an isotope? Radioactive isotope?
- 18 What is an electrolyte?
- 19 Why is water called a universal solvent? What happens to sodium chloride when you put it in water?

- 20 What are the three types of mixtures? Characteristics and particle size of each mixture type? Significance?
- 21 What is pH measuring? pH range? What is an acid? What is a base? Give examples of each? What is the pH of water?
- 23 What is the difference between an acid, base, and salt? Give examples.
- 24 What is a buffer?
- 25 This is one of the most important chemical reaction in your body. You must memorize this reaction and explain the significance of the law of mass action with respect to this formula. What enzyme allows this reaction to occur? You need to know the names and chemical formulas for this equation  
 $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 \rightleftharpoons \text{HCO}_3 + \text{H}^+$
- 26 What is an enzyme? What is a substrate? Are enzymes consumed in a chemical reaction?
- 27 What is metabolism? What is the difference between catabolic and anabolic metabolic pathways? What is the role of an enzyme in a metabolic pathway?
- 28 What happens to a molecule when it is reduced? Oxidized? Does this occur as isolated events or in combination with each other?

#### Part B

- 29 What atoms must a molecule have in order to be an organic compound?
- 30 What are the four organic compounds in human physiology?
- 31 How many valence electrons do carbon atoms have? Type of bond formed? Significance?
- 32 How is water used in join two atoms to make a compound? How is water used to split a compound?
- 33 What are carbohydrates? Are they hydrophilic or hydrophobic? Give example of a monosaccharide, disaccharide, and polysaccharide.
- 34 What is the difference between glycogen, starch, and cellulose? Where do you find these molecules? What is the mono-saccharides in these molecules? Where do the monosaccharide come from?
- 35 What is the carbohydrate primary function? Other uses? ?
- 36 What is the common name for a lipid? Do lipids have more energy (calories) per gram than carbohydrates? Why?
- 37 What is the structure and function of the four primary lipids (skip eicosanoids)?
- 38 Why is a fatty acid called an acid? What is the difference between a saturated and unsaturated fatty acid? What is the major source for saturated and polyunsaturated fat?

- 39 What are the components of a triglyceride? What might be the two forms of this molecule when at room temperature? What do you think will determine the state of the molecule? Primary function?
- 40 How is the structure of a phospholipid different than the structure of a triglyceride? How do these two molecules react when put in water? Are these molecules hydrophilic or hydrophobic? Why?
- 41 What two types of structures may form if you mix water and phospholipids?
- 42 What type of molecule is cholesterol? Is it hydrophobic or hydrophilic? What other types of molecules are made from cholesterol? What organ synthesizes cholesterol? Do we excrete or recycle cholesterol? Is cholesterol used to form ATP?
- 43 What type of structures are high density lipoprotein (HDL) and low density lipoprotein (LDL)? What is the "good" or "bad" lipid? Why?
- 44 What is the monomer for proteins? Are proteins hydrophilic or hydrophobic? Why? Why are the monomers called what they are called? How many different amino acids may be included in a protein molecule? What are the R groups in an amino acid?
- 45 What is the difference between protein's primary, secondary, tertiary, and quaternary structure?
- 46 Enzymes, muscle tissues, and pumps found in plasma membranes are all structures made from proteins. What three things are able to change the structure of protein and render enzymes, muscles, and other protein structures nonfunctional and may lead to death? What term describes the change made to protein? Give examples?
- 47 What are some of the functions of proteins?
- 48 What is the function of a catalyst? What is the proper name for a biological catalyst? How can you tell if the chemical name indicates it is either a sugar or a biological catalyst?
- 49 Are enzymes consumed in their function? Significance? Are they fast? Example.
- 50 What are nucleotides? Three components? What do you make with nucleotides? Function?
- 51 What is the difference between DNA and RNA?
- 52 What is ATP? Primary function? Nickname? Do we store ATP?
- 53 How do we make ATP? Give the two mechanisms used to make ATP and the location and characteristics of each pathway.