Chemistry 1120 Exam 2 Study Guide

Chapter 6

6.1 Know amines are derivatives of ammonia, which is not an amine. Classify amines as primary, secondary or tertiary.

- Master Tutor Section 6.1
- Review Section 6.1 in the Concept Summary
- Review Learning Check 6.1
- For practice, do Exercise 6.4

6.2 Given an amine structure, provide the IUPAC name, or vice versa.

- Master Tutor Section 6.2
- Review Section 6.2 in the Concept Summary
- Review Learning Checks 6.2, 6.3, 6.4
- For practice, do Exercises 6.10, 6.12, 6.14

6.3 Apply hydrogen bonding characteristics of primary, secondary and tertiary amines as it relates to boiling points and water solubility. Based on hydrogen bonding characteristics, determine the relative boiling points of amines, alcohols, carboxylic acids, alkanes, etc.

- Master Tutor Section 6.3
- Review Section 6.3 in the Concept Summary
- Review Learning Check 6.5
- For practice, do Exercises 6.20, 6.22

6.4 Know amines behave as bases in water because they accept H^+ ions from water, thus raising the pH. Predict the ammonium ion formed when an amine reacts with water to produce an OH^- ion. Know a salt is formed when an amine reacts with an acid.

- Master Tutor Section 6.4
- Review Section 6.4 in the Concept Summary
- Review Example 6.1 and Learning Checks 6.6, 6.7, 6.8
- For practice, do Exercises 6.26, 6.32

6.5 Know the definition of a neurotransmitter and identify serotonin, acetylcholine, dopamine and norepinephrine as such.

- Master Tutor Section 6.5
- Review Section 6.5 in the Concept Summary
- For practice, do Exercise 6.38

6.6 Recognize the characteristics of an alkaloid. Describe the sources and/or uses of the common alkaloids: caffeine, nicotine, and quinine. Know the effects of epinephrine and that it is structurally similar to amphetamines.

- Master Tutor Section 6.6
- Review Section 6.6 in the Concept Summary
- For practice, do Exercise 6.44

6.7 Given the structure of an amide, determine its IUPAC name.

- Master Tutor Section 6.7
- Review Section 6.7 in the Concept Summary
- Review Learning Checks 6.9, 6.10
- For practice, do Exercises 6.46, 6.48

6.8 Apply hydrogen bonding characteristics of amides as it relates to boiling points and water solubility. Based on hydrogen bonding characteristics, determine the relative boiling points of amides, amines, alcohols, carboxylic acids, alkanes, etc.

- Master Tutor Section 6.8
- Review Section 6.8 in the Concept Summary
- Review Learning Check 6.11
- For practice, do Exercise 6.50

6.9 Know the hydrolysis of an amide with an acid (ie. HCl) produces a carboxylic acid and an amine salt: whereas, hydrolysis with a base (ie. NaOH) produces a carboxylic acid salt and an amine. Predict the products of an acid or base hydrolysis.

- Master Tutor Section 6.9
- Review Section 6.9 in the Concept Summary
- Review Learning Check 6.12
- For practice, do Exercise 6.52

Remember to put the Key Reactions in your exam note sheet.

Chapter 7

7.1 Recognize the aldehyde, ketone and hydroxyl (-OH) functional groups found in carbohydrates. Differentiate between mono-, di-, and polysaccharides.

- Master Tutor Section 7.1
- Review Section 7.1 in the Concept Summary
- For practice, do Exercises 7.2, 7.4

7.2 Determine the number of chiral carbons in a chemical structure. Know the definition of a stereoisomer and an enantiomer.

- Master Tutor Section 7.2
- Review Section 7.2 in the Concept Summary
- Review Examples 7.1-7.3 and Learning Checks 7.1-7.3
- For practice, do Exercises 7.6, 7.8

7.3 Given a Fischer projection, determine whether it is a D- or L-enantiomer. Know that optical activity refers to property of rotating a plane of polarized light and is determined by the presence of a chiral carbon.

- Master Tutor Section 7.3
- Review Section 7.3 in the Concept Summary
- Review Example 7.4 and Learning Checks 7.4, 7.5
- For practice, do Exercises 7.12, 7.14, 7.16

7.4 Identify a monosaccharide as a keto- or aldo- triose, tetrose, pentose or hexose.

- Master Tutor Section 7.4
- Review Section 7.4 in the Concept Summary
- Review Learning Check 7.6
- For practice, do Exercise 7.22

7.5 a) Know the definitions of Haworth structure, furanose ring, pyranose ring, anomers, anomeric carbon, and glycosidic linkage.
b) Recognize that a reducing sugar can be oxidized in the presence of a Cu^{2+} ion to form a red-orange precipitate. All monosaccharides are reducing sugars. Know cyclical monosaccharides contain hemiacetal or hemiketal groups which are changed to acetals or ketals, respectively, when a glycoside is formed.

- Master Tutor Section 7.5
- Review Section 7.5 in the Concept Summary
- Review Example 7.5 and Learning Checks 7.7, 7.8
- For practice, do Exercises 7.28, 7.34

7.6 a) Know fructose is a ketohexose, the sweetest of all sugars and is sometimes called fruit sugar or levulose. Know ribose and deoxyribose are sugars found in the nucleic acids RNA and DNA, respectively.

b) Know glucose is an aldohexose that forms a hemiacetal in cyclical formation. It is nutritionally the most important sugar and is sometimes called blood sugar or dextrose. It is found in a 1:1 ratio with fructose in hone.

- Master Tutor Section 7.6
- Review Section 7.6 in the Concept Summary
- For practice, do Exercises 7.36, 7.38

7.7 a) Know the disaccharide maltose is formed during the digestion of starches and is composed of 2 glucose subunits. The milk sugar, lactose, is made up of glucose and galactose subunits.
b) Know sucrose is a disaccharide made from glucose and fructose. It is found in flower nectar, sugar cane and sugar beets. Hydrolysis of it makes invert sugar, which is a 1:1 ratio of glucose and fructose.

- Master Tutor Section 7.7
- Review Section 7.7 in the Concept Summary
- For practice, do Exercise 7.44

7.8 a) Recognize glucose can form the polysaccharides cellulose, amylose, amylopectin and glycogen. Cellulose is a structural material found in plant cells. Glycogen is stored in the liver and muscle cells of animals. It is similar in structure to amylopectin.
b) Know the following have these glycosidic linkages:
Cellulose: $\beta 1 \rightarrow 4$
Amylose: $\alpha 1 \rightarrow 4$
Amylopectin: $\alpha 1 \rightarrow 4$ and $\alpha 1 \rightarrow 6$
Glycogen: $\alpha 1 \rightarrow 4$ and $\alpha 1 \rightarrow 6$

- Master Tutor Section 7.8
- Review Section 7.8 in the Concept Summary
- For practice, do Exercises 7.53, 7.54

Remember to put the Key Reactions on your exam note sheet.

Chapter 8

8.1 Know the definition and characteristics of a lipid. Categorize a lipid as saponifiable simple, saponifiable complex, or nonsaponifiable.

- Master Tutor Section 8.1
- Review Section 8.1 in the Concept Summary
- For practice, do Exercise 8.4

8.2 Recognize that micelles have long chain hydrophobic tails on the interior and carboxylate hydrophilic heads on the exterior. Know fatty acids are straight chained with an even number of carbon atoms, usually between 10-20 carbons. Differentiate between saturated, monounsaturated and polyunsaturated fatty acids and how this affects their melting points.

- Master Tutor Section 8.2
- Review Section 8.2 in the Concept Summary
- For practice, do Exercises 8.6, 8.8

8.3 Identify the structural components of a triglyceride: glycerol backbone, ester linkages, long chain fatty acids. Differentiate between fats (animals) and oils (plants) based on the amount of unsaturation and melting points.

- Master Tutor Section 8.3
- Review Section 8.3 in the Concept Summary
- For practice, do Exercise 8.12

8.4 Know that hydrogenation of an unsaturated oil (ie. corn oil) makes a higher melting point product (ie. margarine). Hydrolysis of a triglyceride makes glycerol and 3 fatty acids. Saponification of a triglyceride makes glycerol and fatty acid salts (soap).

- Master Tutor Section 8.4
- Review Section 8.4 in the Concept Summary
- Review Learning Checks 8.2, 8.3, 8.4
- For practice, do Exercise 8.21

8.5 Recognize that upon hydrolysis, waxes make a long chain alcohol and a fatty acid. Recognize the structure of a wax. Know that waxes are protective coatings.

- Master Tutor Section 8.5
- Review Section 8.5 in the Concept Summary
- For practice, do Exercise 8.23

8.6 a) Know the components of phosphoglycerides (fatty acids, glycerol, phosphate and an amino alcohol) and their structure. They are found in cell membranes.
b) Differentiate between lecithin and cephalins based on their amino alcohol component. Know lecithin is an emulsifying agent and lipid transporter in the blood.

- Master Tutor Section 8.6
- Review Section 8.6 in the Concept Summary
- Review Learning Check 8.5
- For practice, do Exercises 8.28, 8.30, 8.32

8.7 Know sphingolipids have a sphingosine amino alcohol backbone, rather than glycerol. Glycolipds are a type of sphingolipids and contain a carbohydrate group. Both are found in brain and nerve tissue.

- Master Tutor Section 8.7
- Review Section 8.7 in the Concept Summary
- For practice, do Exercise 8.34

8.8 Differentiate between prokaryotic and eukaryotic cells based on the presence of organelles. Both have a cytoplasm. Know the fluid-mosaic model of a cell membrane and the structure of the lipid bilayer.

- Master Tutor Section 8.8
- Review Section 8.8 in the Concept Summary
- For practice, do Exercises 8.40, 8.42

8.9 Know cholesterol (4 fused rings) is a steroid lipid and is used to make bile salts, adrenocorticoid hormones and sex hormones. Bile salts act as emulsifying agents, similar to soap, in the digestive tract.

- Master Tutor Section 8.9
- Review Section 8.9 in the Concept Summary
- For practice, do Exercises 8.44, 8.48

8.10 Know there are 2 categories of steroid hormones: adrenocorticoid and sex hormones. Know the functions of the 2 types of adrenocorticoids: mineral corticoid (ie. aldosterone) and glucocorticoids (ie. cortisol). Identify male sex hormones as androgens.

- Master Tutor Section 8.10
- Review Section 8.10 in the Concept Summary
- For practice, do Exercise 8.50

8.11 Recognize that prostaglandins are made from arachidonic acid (an unsaturated fatty acid) and have hormone like effects in the body. Know what functions prostaglandins perform.

- Master Tutor Section 8.11
- Review Section 8.11 in the Concept Summary
- For practice, do Exercise 8.56

Remember to put the Key Reactions on your exam note sheet.