

Bi 102 Exam 1, Chapters 1 through 5: Active Study Guide

We'll do as much of this section as we can **in class**. Do the rest at home or with your study group. (Osmosis and diffusion will be on the next exam.)

Atoms, molecules, and bonds

Test your knowledge. Match the statements with the best answers below. Answers can be used more than once.

- | | |
|-----------------------------|------------------|
| A. Ionic bond | D. hydrogen bond |
| B. Covalent bond (nonpolar) | E. atom |
| C. Polar covalent bond | F. ion |

- ___ 1. Formed by the sharing of a pair of electrons.
- ___ 2. Formed when atoms share a pair of electrons from their outer shells, but the pairs are not shared equally.
- ___ 3. Has an equal number of electrons and protons.
- ___ 4. Type of bond found in a molecule that is insoluble in water.
- ___ 5. Formed when two atoms share pairs of electrons from their outer shells, and the electrons are shared equally.
- ___ 6. Has a different number of electrons than protons.
- ___ 7. Bond that produces a polar molecule.
- ___ 8. Bond between two polar molecules.
- ___ 9. Type of bond found in a water molecule.
- ___ 10. Bond formed when one atom donates an electron to another atom.
- ___ 11. Type of bond found in water soluble molecules.
- ___ 12. Two or more of these make up a molecule.

Draw a carbon atom and label its parts. Indicate which particles are involved in bonding:

Draw a water molecule. What kind of bond is formed between oxygen and hydrogen?

Draw a methane molecule (CH₄). What kind of bonds is formed between carbon and hydrogen?

The biomolecules

Complete this table without looking at your notes:

Polymers	monomers	enzyme that breaks the polymer into its monomers
Complex carbohydrates		
Proteins		
Lipids		

For each of these substances, name the reagent that you used to test for it in lab:

Starch: _____

Proteins: _____

Glucose: _____

Amino acids: _____

Lipids: _____

Listed below are specific macromolecules that have been mentioned in class. Identify each of these as a complex carbohydrate, protein, lipid, or nucleic acid

keratin _____

testosterone _____

ATP _____

cellulose _____

starch _____

hemoglobin _____

amylase _____

DNA _____

pectin _____

triglyceride _____

Enzymes

Cellulose is a carbohydrate. Keratin is the protein that hair, bird feathers, and reptile scales are made of. Mineral oil is a lipid. All of these are energy-rich carbon compounds, but we humans can't extract the energy out of any of them. Why?

Which of the following statements about enzymes are true and which are false?

- | | | |
|---|---|---|
| 1. Enzymes are proteins | T | F |
| 2. An enzyme can work under a wide range of conditions | T | F |
| 3. Each enzyme carries out a specific reaction | T | F |
| 4. Enzymes are used up in a reaction | T | F |
| 5. Enzymes change shape during a reaction, but return to their original shape | T | F |
| 6. Enzymes lower the activation energy of a reaction | T | F |

Suppose you were handed some small beakers and told that they had been filled with either starch or protein. They may or may not have been treated with an enzyme that breaks down the polymer. You perform the same tests on them as you did in lab and get the following results. Given these results, what originally went into your beakers?

results	original beaker contents	results	original beaker contents
Ninhydrin: strong positive Biuret: weak positive Benedicts: negative Lugols: negative		Ninhydrin: negative Biuret: weak positive Benedicts: negative Lugols: strong positive	
Ninhydrin: negative Biuret: weak positive Benedicts: strong positive Lugols: negative		Ninhydrin: negative Biuret: negative Benedicts: negative Lugols: positive	

Cell structures

Fill in the following table, which compares viruses, prokaryotic organisms (such as bacteria) and eukaryotic organisms, with "yes" or "no" to indicate which are true for each:

	Viruses	Prokaryotes	Eukaryotes
Has a membrane-bound nucleus			
Has genetic material			
Has a cell membrane			
Reproduces independently			
Has membrane-bound organelles			
Has a metabolism			
Is a living organism			
Can be killed with antibiotics			
Reproduce using mitosis (preview of next exam!)			

Complete the following table without using your notes

Organelle	Function	In plants?	In animals?
Nucleus			
Rough E.R.			
Smooth E.R.			
Golgi apparatus			
Vesicles			
Lysosomes			
Mitochondria			
Chloroplasts			
Cell membrane			
Cell wall			
Central vacuole			

In a classroom experiment, a student grinds up some spinach in distilled water and filters the liquid onto a piece of filter paper. Organelles isolated from the filter paper absorb carbon dioxide and release oxygen. Which organelle did the student isolate? Explain.

If the student does the same experiment with mushrooms, would the same organelle be present? Why or why not?

Sketch the arrangement of phospholipids and proteins in the cell membrane. Mark where the hydrophobic and hydrophilic regions are.