There are many effective ways to take notes; you need to figure out the system that works best for you. Whatever system you come up with, one key thing is to make sure it's organized in a way that will let you easily find information. Many students miss questions because they couldn't find the information they DID write down. This becomes extremely true later on in the year when you are trying to find information for a review question and you've 30+ chapters worth of notes. One way that takes some investment of effort but is extremely effective is to organize your notes in a particular way.

1. In/near the beginning of your notes, copy down the detailed Table of Contents from the textbook. This will function as a reference since it breaks down each chapter into its subheadings. This can be something you do when you're bored, waiting for a commercial to end, a friend to text you back, etc.
2. At the beginning of each chapter's notes, copy the list of Key Concepts for that chapter to help you have an idea where to find information w/in your notes. You can also add tabs to make finding the chapters easier.
3. Leave a page or so blank for putting vocabulary definitions. You'll fill this in after you've taken your notes, it helps review the knowledge, plus many questions on the reading quizzes are essentially "what's the definition of…" Glance at the chapter to get a sense of how many words are in bold, this will help you guesstimate how much space to leave blank in the case of longer chapters.
4. Read the chapter summary at the end of the chapter before taking notes. This will help you preview the information and give you a "big picture" understanding of the details you'll be reading about.
5. Take your notes. In the margin on each page, put the big keywords/topics to be found on that page (again, it makes it easier to find later). Come up with a logical (to you) system to organize things and make them easier to find (in the example notes below, the standard outline format is used to organize concepts in a hierarchy of concepts (Chemical Bonds is a big idea that includes Covalent and Ionic Bonds, so they would be subheadings under Chemical Bonds).
6. Go back through your notes and copy the vocabulary and definitions again into the blank section you left in the beginning of the chapter notes. Also as you're skimming your notes, think of what sorts of questions might possibly be asked about each couple of paragraphs' worth of text and make sure your notes could be used to answer those questions.

Example of reading notes with comments *in italics*

Concept 2.3 **The formation and function of molecules depend on chemical bonding between atoms** Now that we have looked at the structure of atoms, we can move up the hierarchy of organization and see how atoms combine to form molecules and ionic compounds. Atoms with incomplete valence shells can interact with certain other atoms in such a way that each partner completes its valence shell: The atoms either share or transfer valence electrons. These interactions usually result in atoms staying close together, held by attractions called **chemical bonds**. The strongest kinds of chemical bonds are covalent and ionic bonds. **Covalent Bonds** A **covalent bond** is the sharing of a pair of valence electrons by two atoms. For example, let's consider what happens when two hydrogen atoms approach each other. Recall that hydrogen has 1 valence electron in the first shell, but the shell's capacity is 2	I. Formation & function of molecules depend on chem bonding between atoms *(concept statements often make for good topic headings. Also, use abbreviations like the & symbol or "chem" for commonly used words)* A. Atoms with incomplete valence shells interact w/other atoms so each partner completes its valence shell by sharing/transferring valence electrons *(summarize concept statements, but be sure to leave in important adjectives/qualifiers like "valence" instead of generic electrons)* B. Chemical bonds-attractions between atoms that keep them close together (due to electrons) *(Always define words in bold, they make for obvious reading questions)* 1. Strongest chem bonds= covalent & ionic 2. Covalent bond- sharing of pair of valence electrons by two atoms a. Ex- Hydrogen has 1 valence electron, needs 2, so 2 H atoms will share. *(good idea to include examples given by the textbook)* 3. Molecule- two or more atoms held together by covalent bonds 4. Molecular formula- H_2= the 2 means there's 2 Hydrogens in the molecule *(you can skip this kind of*

electrons. When the two hydrogen atoms come close enough for their 1*s* orbitals to overlap, they can share their electrons. Each hydrogen atom is now associated with 2 electrons in what amounts to a completed valence shell. Two or more atoms held together by covalent bonds constitute a **molecule**, in this case a hydrogen molecule. Figure 2.12a shows several ways of representing a hydrogen molecule. Its *molecular formula*, H_2, simply indicates that the molecule consists of two atoms of hydrogen. Electron sharing can be depicted by an electron distribution diagram or by a *Lewis dot structure*, in which element symbols are surrounded by dots that represent the valence electrons (H:H). We can also use a *structural formula,* H—H, where the line represents a **single bond**, a pair of shared electrons. A space-filling model comes closest to representing the actual shape of the molecule.	*info if you've already mastered it in prior classes)* 5. Several ways to represent electron sharing a. <u>Lewis dot structure</u>- element symbols are surrounded by dots (the valence electrons). Ex- H:H b. Structural formula- use lines to represent bonds/shared electrons. Ex- H—H c. Space-filling model is closest to representing actual shape of molecules *(the figure referred to (2.12a) might be a good one to look at and sketch at least part of to help make clear these distinctions)* 6. <u>Single Bond-</u> a pair of shared electrons

Example reading questions that could come from this:

1. Atoms form chemical bonds by completing their _____ electron shells. **(*valence)***
2. A _____ bond is the sharing of a pair of electrons by two atoms. **(*covalent*)**
3. The molecular formula C_2H_4 means that the molecule has _____ Hydrogen atoms in it. **(*4*)**
4. A Lewis dot structure is the most accurate for representing the actual shape of the molecule (***False***).

The following is an example of the book's description of an important experiment and what sorts of notes to write about it. Pay attention to how concepts are grouped into bigger/smaller hierarchies.

Evidence That DNA Can Transform Bacteria The discovery of the genetic role of DNA dates back to 1928. While attempting to develop a vaccine against pneumonia, a British medical officer named Frederick Griffith was studying *Streptococcus pneumoniae*, a bacterium that causes pneumonia in mammals. Griffith had two strains (varieties) of the bacterium, one pathogenic (disease-causing) and one non-pathogenic (harmless). He was surprised to find that when he killed the pathogenic bacteria with heat and then mixed the cell remains with living bacteria of the nonpathogenic strain, some of the living cells became pathogenic (Figure 16.2). Furthermore, this newly acquired trait of pathogenicity was inherited by all the descendents of the transformed bacteria. Clearly, some chemical component of the dead pathogenic cells caused this heritable change, although the identity was not known. Griffith called the phenomenon **transformation**, now defined as a change in genotype and phenotype due to the assimilation of external DNA by a cell.	I. Evidence that DNA Can Transform Bacteria A. 1928-Fred Griffith, British medical officer *(be sure to note the person and date, they're obvious reading questions)* 1. Studying Streptococcus pneumoniae- bacteria that causes pneumonia in mammals 2. 2 strains of bacteria a. Pathogenic –caused disease, killed mice *(Fig 16.2, shows he was using mice, could even hand copy the figure instead of writing out these notes. Be sure you define key terms for the experiment)* b. Non-pathogenic- harmless 3. When heat-killed deadly bacterial remains were mixed with living harmless bacteria, some of the harmless bacteria changed into pathogenic bacteria and passed this on to future generations *(basic process of experiment and results)* a. knew it was a chemical, but not sure which one *(experimental conclusion, note the limits on what he knew, this could be a easy "true/false" question)* 4. called it <u>Transformation</u>- a change in genotype and phenotype due to the assimilation of external DNA by a cell *(if you don't know 'assimilation' means taking in, add that to the definition)*