*Most sections have correlating Bozeman Podcasts. These are extremely helpful, and I recommend you watch them first; then read through each concept/section from Chapter 2.*

**Concept 2.1 Matter consists of chemical elements in pure form and in combinations called compounds**

*Bozeman Podcast:* [*Molecules and Elements*](http://www.bozemanscience.com/ap-chem-001-molecules-elements)*.*

Define the terms in the table below. Illustrate their relationships through the use of a concept map below.

|  |  |
| --- | --- |
| **Matter** |  |
| **Element** |  |
| **Compound** |  |
| **Essential Elements** |  |
| **Trace Elements** |  |

**Concept Map:**

Explain the difference between essential elements and trace elements.

**Concept 2.2: An element's properties depend on the structure of its atoms**

*Bozeman Podcast:* [*History of the Atom*](http://www.bozemanscience.com/history-of-the-atom)*.*

Fill the below chart with the charges and other key information of each subatomic particle and then create a diagram of helium that contains all of the below subatomic particles. Refer to *Figure 2.5* for an example.

|  |  |  |
| --- | --- | --- |
| *Particle* | *Charge* | *Key Information/Definition* |
| **Neutron** |  |  |
| **Proton** |  |  |
| **Electron** |  |  |

What is the difference between the atomic number and the atomic mass of helium?

Explain how carbon can be used with radioactive isotopes. Make sure you understand what an isotope is.

Which is the only subatomic particle that is directly involved in the chemical reactions between atoms?

What is potential energy?

Explain which has more potential energy in each pair:

a. boy at the top of a slide/boy at the bottom

b. electron in the first energy shell/electron in the third energy shell

c. water/glucose

Explain the different energy levels in relation to potential energy.

**Concept 2.3: The formation and function of molecules depend on chemical bonding between atoms**

*Bozeman Podcast:* [*Chemical Bonds- Ionic vs. Covalent*](http://www.bozemanscience.com/chemical-bonds-covalent-vs-ionic)*.*

What is the difference between covalent bonds and ionic bonds?

How is a bond between two oxygen molecules drawn? What is this bond’s name?

Explain when nonpolar covalent bonds occur and when polar covalent bonds occur.

Make an electron distribution diagram of water. Which element is most electronegative? Why is water considered a polar molecule? Label the regions that are more positive or more negative. (This is a very important concept. Spend some time with this one!)

Fill in the following chart with information about ions.

|  |  |  |
| --- | --- | --- |
|  | **Definition** | **Charge of ion** |
| **Anion** |  |  |
| **Cation** |  |  |

What is a hydrogen bond? How does it work with oxygen to create water? Draw a diagram to help further your understanding.

**Concept 2.4: Chemical reactions make and break chemical bonds.**

*Video Reference:* [*Number 15 and Number 16*](http://study.com/academy/topic/campbell-biology-chapter-2-the-chemical-context-of-life.html)*.*

Write the chemical shorthand equation for photosynthesis. (It’s in your book!) Label the reactants and the products.

What is meant by dynamic equilibrium? Does this imply equal concentrations or amounts of each reactant?