Notes - Physical Science in Action: Atoms and Molecules Video

1. What is the smallest particle of an element called? **The smallest particle of an element is called an atom. (The smallest particle of a compound is called a molecule.)**

2. What are the three types of sub-atomic particles, and where are they located in an atom? **Protons and neutrons are found in the nucleus in the center of an atom. Electrons are found in the outer shell of the atom, called the electron cloud.**

3. What force keeps electrons orbiting around the nucleus of an atom? **The <u>electromagnetic force</u> causes sub-atomic particles with unlike charges (positive or negative) to attract one another. Because electrons are negative and protons in the nucleus are positive, the electrons orbit around the nucleas, held in orbit by the electromagnetic force.**

4. What electrical charge does each of the three sub-atomic particles have? **Protons have a positive charge. Neutrons have no charge (also called a neutral charge). Electrons have a negative charge.**

5. What force holds the nucleus together? **Because the nucleus for most atoms has more than one proton, each with a positive charge, the electromagnetic force should cause all the like-charged protons to repel one another. This repulsion is overcome by the much stronger <u>nuclear force</u>, which holds all of the protons and neutrons in the nucleus together.**

6. What makes atoms of different elements unique? **All atoms for a particular element have a unique number of protons. For example, all iron atoms have 26 protons, and all sodium atoms have 11 protons.**

7. Where are all of the different elements listed? In what order are they listed? **All of the known elements are listed in the Periodic Table of the Elements. Each element is listed in a separate box, and the element boxes are listed in order of their atomic number, starting at the upper left corner and reading left to right, from top to bottom.**

8. What does the "atomic number" tell about an atom of that element? **The atomic number for an element is equal to the number of protons in all atoms of that element. In the periodic table of the elements, the smaller whole number is the atomic number.**

9. What does the "atomic mass" tell about an atom of that element? **The term "atomic mass" refers to the sum of the number of protons and neutrons in one atom. For any one atom, it is always a whole number, because each proton and neutron has an "atomic mass" of one. On the periodic table of the elements, the larger non-whole number given for each element is commonly called the "atomic mass." In fact, this number is the <u>average</u> atomic mass of all atoms for that element, including different "isotopes" of that element with different numbers of neutrons.**

10. How do atoms join together to form molecules? **All substances made of more than one atom have chemical bonds that hold the atoms together. These bonds can be created or broken in chemical reactions. To break or create a chemical bond, energy is needed to start the reaction. Some reactions take energy out of the environment and store it in the bonds, while other reactions release more energy than is stored.**

11. What are the two main kinds of chemical bonds? **When atoms share electrons, a covalent bond is formed. When one atom takes an electron from another atom, leaving each atom with an electrical charge (ions), an ionic bond is formed.**

12. What are the three phases of matter? What are the properties of each phase? **The three commonly occurring phases of matter are solids, liquids and gases. (There is a fourth phase of matter called plasma, where atoms are split into sub-atomic particles, which occurs at very high temperatures.) Solids have the slowest moving particles, which only vibrate in place and do not change position in relation to one another. Thus, solids hold their shape and do not flow. Liquids have particles that are moving fast enough to change position and slide past one another, but no so fast as to leave the container that the liquid is in. Thus, a liquid takes the shape of its container, and can flow out of the container if poured Gas particles are moving so fast that they fill whatever space they are in; they will not stay in an open container.**