2 - The Periodic Table

From Hydrogen to Oganneson: A Journey Through the Periodic Table

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Video 2 - Transcript

Hi everyone. Welcome to video number two where we're going to be discussing the periodic table. This image shown here is a very familiar one to many of us. The periodic table of elements is an icon in chemistry and it's also widely used in physics and other sciences as well, in terms of naturally occurring elements. The periodic table begins with hydrogen, which is the simplest atom and also happens to be the most abundant element in the universe. In this table, all of the atoms which exist on Earth, whether they are naturally occurring, or they are new elements synthesized in the lab are shown. The elements are arranged in increasing order of atomic number. Now the atomic number is the number of protons within the nucleus of an atom. We will explore atomic number in more detail in the next video. Now the table is seen to be arranged in periods which are going to be my horizontal rows, as well as in groups, which are going to be my vertical columns. Now the periodic table is a depiction of periodic law which says that when an element, or when elements are arranged in order of their atomic number, an approximate recurrence of their properties is evident. Now in terms of naturally occurring elements, as I mentioned before, the periodic table begins with hydrogen. Hydrogen has an atomic number of 1. Now, this means that hydrogen has one proton in its nucleus. The highest atomic number that's a naturally occurring element is depicted at position 94. And this happens to be plutonium, which is represented by the symbol Pu. Plutonium happens to be radioactive. Element 118, known as Oganesson. The symbol Og. This is a synthetic element that is expected to be a gas at room temperature. This is the highest atomic number in the periodic table. Now, in addition to the groups and periods that I mentioned before, the periodic table is arranged in blocks as well. We have the s block, we have the p block, we have the d block, and we have the f block. Additionally, we have many other aspects of the periodic table, but we're not going to be too concerned with everything at this point. They're going to be some key things that you need to know about the periodic table. Firstly, you should be able to recall the first 20 elements of this table. We're going to list them here. We have hydrogen, helium, lithium, beryllium, boron, carbon, nitrogen, oxygen, fluorine, neon, sodium, magnesium, aluminum, silicon, phosphorus, sulfur, chlorine, argon, potassium and calcium. It is going to be very important for you to remember these first 20 elements and these of course - atomic number 1 to 20. Now, of special interest to biologists is specifically CHNOPS. We touched upon this in the previous video. Carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. These are going to be the six atoms that make up the majority of all biomolecules. Additionally,

what's also going to be important to biologists are sodium, chlorine, potassium, calcium, and magnesium. These function as important electrolytes in living organisms. They exist as ions in living organisms. Na+, Cl-, K+, Ca2+ and Mg2+. Now, magnesium is also a very important component of the light capturing complex of chloroplasts in plants. Hence, magnesium is very vital to the process of photosynthesis. Now, outside of the first 20 elements that we've identified here, we're going to see. We're going to meet. A couple other elements outside of these 20 as you progress through your study of biology. For example, you might meet iron, Fe in the form of Fe2+. Iron - atomic number 26 is a very important component of the pigment in our red blood cells, known as hemoglobin, which is responsible for the transport of oxygen to all of our tissues. You may also meet other ions such as Cu2+, Zn2+ and Mn2+ These ions are needed for some enzymes in our bodies to work properly. Finally, it is going to be useful for us to identify groups one to eight of the periodic table. Knowing the group number of an element gives us some very important information about the chemical properties and the physical properties of those elements. Specifically, groups 1, 2 & 3 are metals. Metals are going to have 1, 2 or 3 electrons in their outermost shells, and we're going to look at electronic configuration in a subsequent video. These elements in groups 1, 2 & 3 will exhibit metallic properties. They are malleable and ductile, which means that they can bend and stretch easily without breaking. Metals tend to form positively charged ions. Positively charged ions, and they tend to bond ionically with other non metals. Now group 4 is said to be the semi -metals, otherwise known as metalloids or semi-conductors. Carbon, for instance, is in group 4. Carbon will bond covalently to other non metals such as nitrogen and oxygen. Carbon is of course, super important to biologists because life on Earth is carbon based. Groups 5, 6 & 7 - these are my non metals. These have 5, 6 & 7 - so we can write that - groups 5, 6 & 7 - these are non metals. They have 5, 6 & 7 electrons in their outermost shells. These elements tend to form negatively charged ions and they can also form covalent bonds with each other. Finally, group 8 - these are known as my noble gases because their outermost shells are filled with electrons and they are very unreactive. That's about all that we're going to talk about regarding the periodic table today. I hope that this was useful and I'll see you guys in the next video.