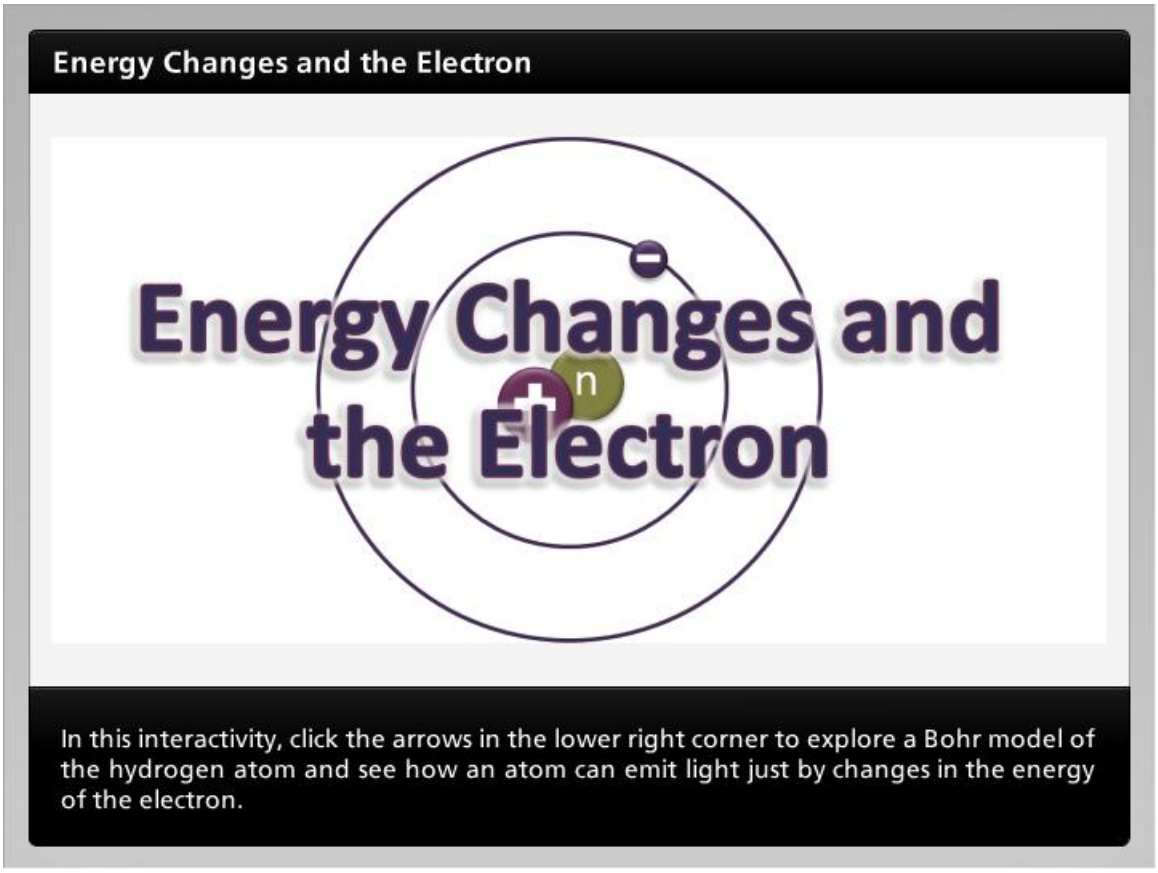
Module 4: Radiation and the Electromagnetic Spectrum
Topic 1 Content: Energy Changes and the Electron Notes



In this interactivity, click the arrows in the lower right corner to explore a Bohr model of the hydrogen atom and see how an atom can emit light just by changes in the energy of the electron.

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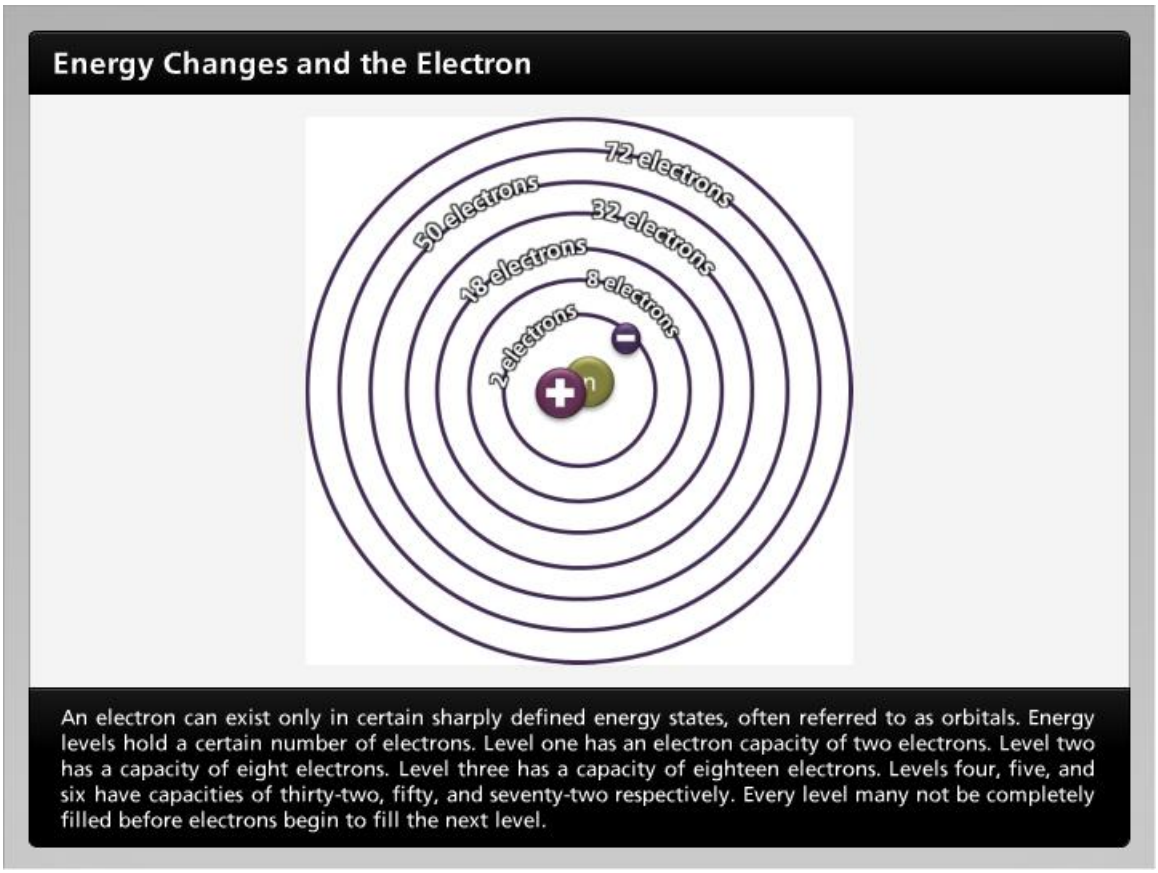

An electron can exist only in certain sharply defined energy states, often referred to as orbitals. Energy levels hold a certain number of electrons. Level one has an electron capacity of two electrons. Level two has a capacity of eight electrons. Level three has a capacity of eighteen electrons. Levels four, five, and six have capacities of thirty-two, fifty, and seventy-two respectively. Every level many not be completely filled before electrons begin to fill the next level.

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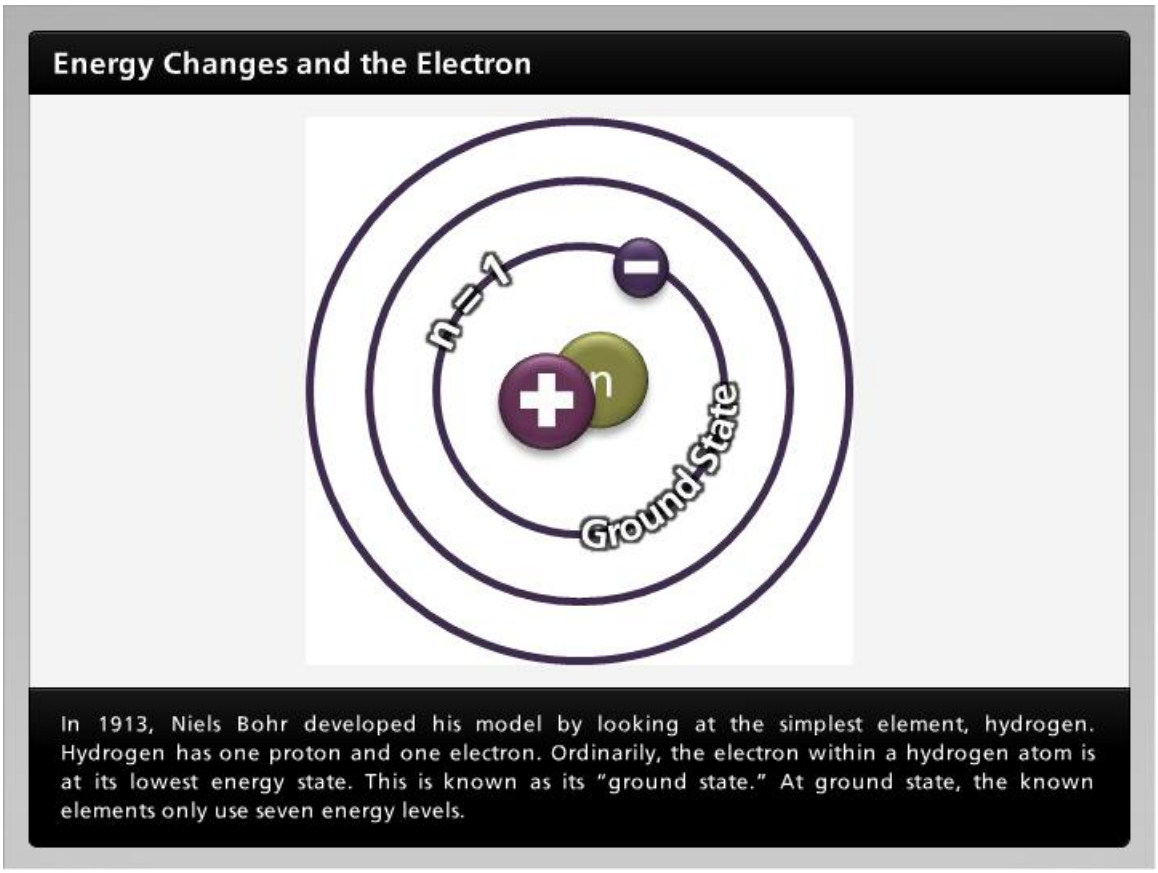

In 1913, Niels Bohr developed his model by looking at the simplest element, hydrogen. Hydrogen has one proton and one electron. Ordinarily, the electron within a hydrogen atom is at its lowest energy state. This is known as its "ground state." At ground state, the known elements only use seven energy levels.

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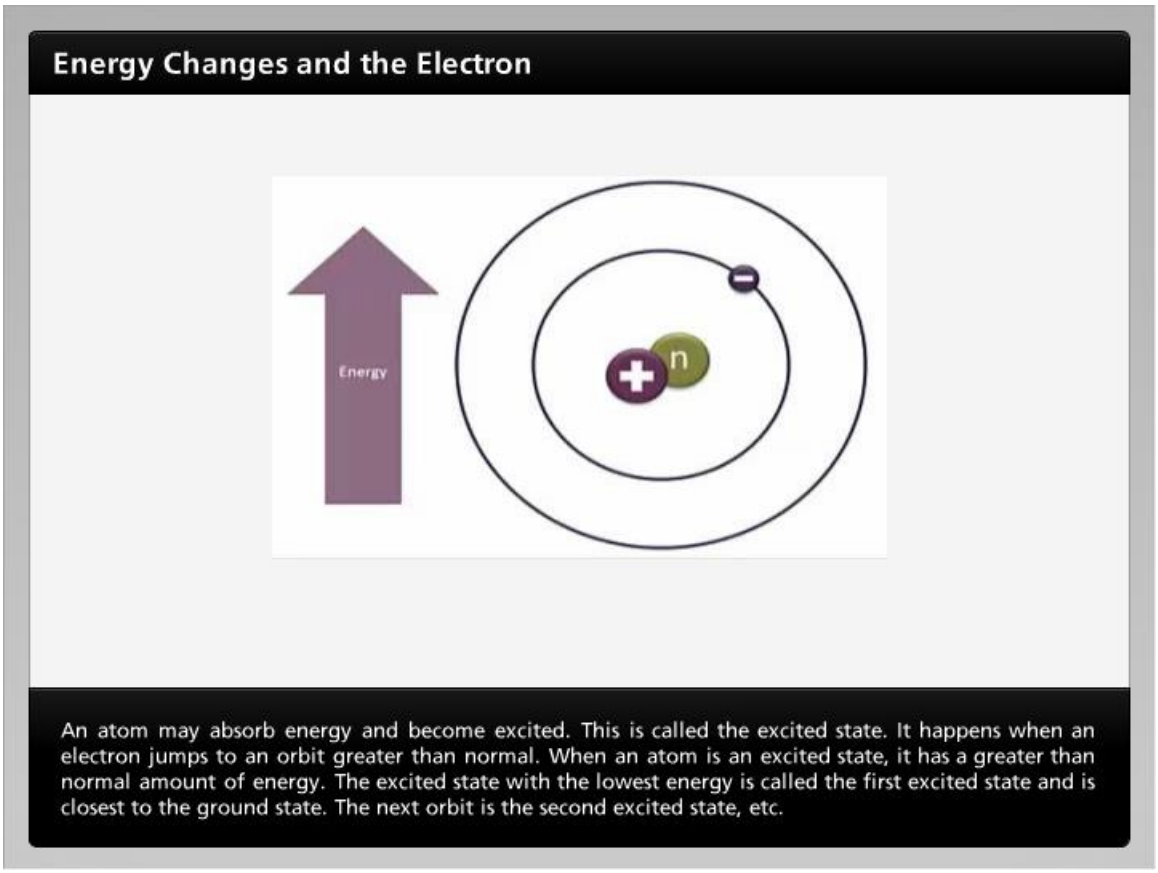

An atom may absorb energy and become excited. This is called the excited state. It happens when an electron jumps to an orbit greater than normal. When an atom is an excited state, it has a greater than normal amount of energy. The excited state with the lowest energy is called the first excited state and is closest to the ground state. The next orbit is the second excited state, etc.

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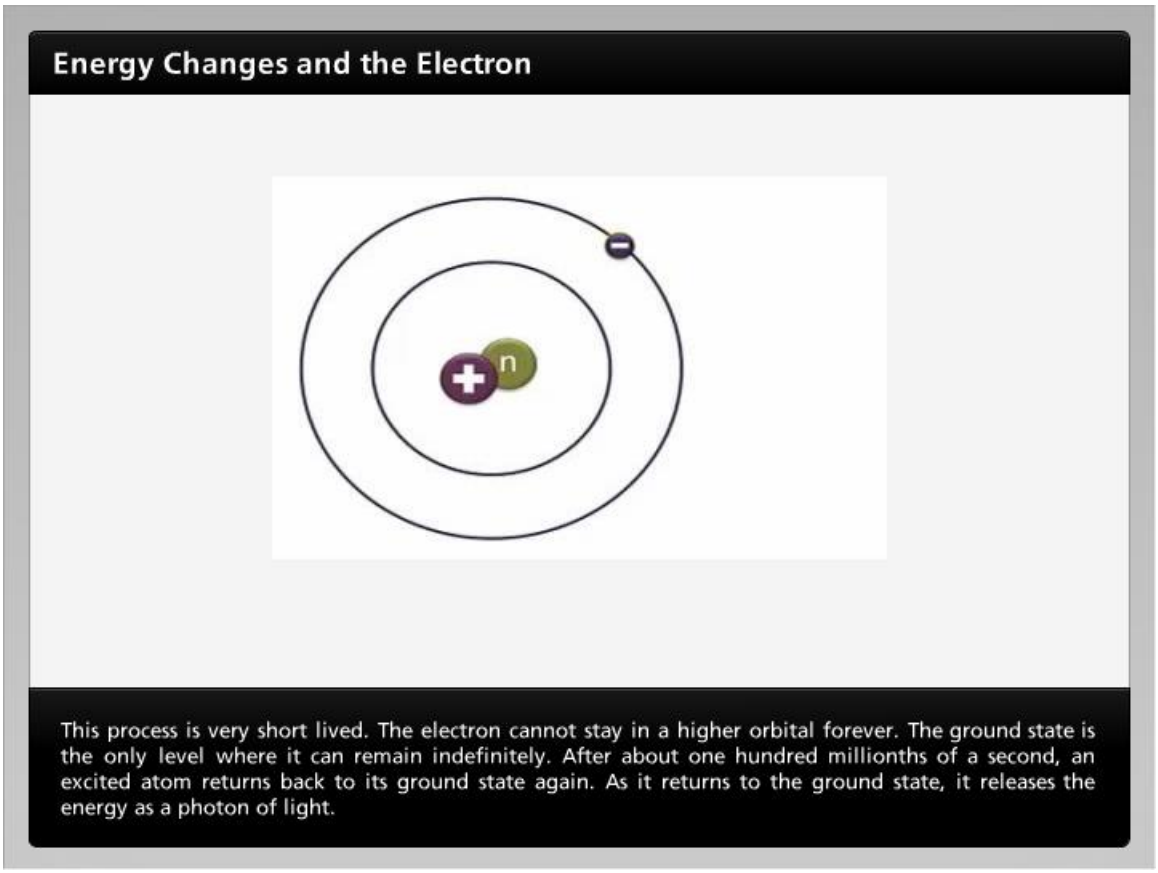

This process is very short lived. The electron cannot stay in a higher orbital forever. The ground state is the only level where it can remain indefinitely. After about one hundred millionths of a second, an excited atom returns back to its ground state again. As it returns to the ground state, it releases the energy as a photon of light.

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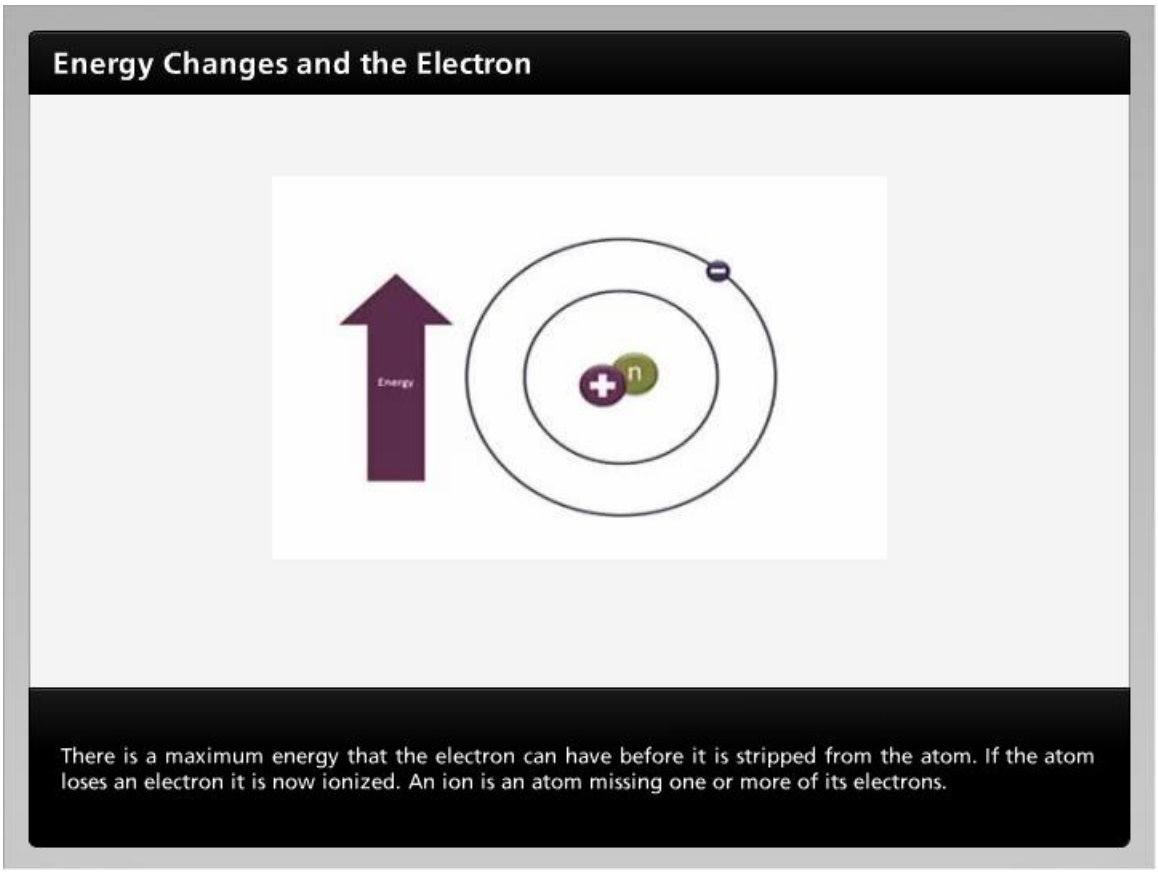

There is a maximum energy that the electron can have before it is stripped from the atom. If the atom loses an electron it is now ionized. An ion is an atom missing one or more of its electrons.