SHELL: area that you will find the electrons spinning around the nucleus

ELECTRON CONFIGURATION: how the electrons are organized around the nucleus, each electron shell has size limitations, only a certain number of electrons fit into each shell. The configuration shows the electron number in each shell.

EXCITED STATE: electrons are in higher-than-normal shells, due to an energy absorption.

GROUND STATE: electrons are in the lowest energy level, in their normal energy levels or shells.

ORBIT: Bohr mistakenly thought that electrons flew around the nucleus, like planets around the Sun, in a path.

QUANTUM: the exact amount (quantity) of energy an electron needs to absorb to jump from one energy level to a higher energy level or shell.

PROTON: the positively charged particles in the nucleus, which have mass of 1 amu

NEUTRON: the neutrally charged particles in the nucleus, which have mass of 1 amu

ELECTRON: the negatively charged particles circling a nucleus, having zero mass in high school.

NUCLEUS: the core of an atom that contains protons and neutrons

SUB-ATOMIC particles: smaller than atoms. Include the protons, neutrons and electrons; and all the smaller particles we don't really talk of in high school like the quarks, leptons, mesons, bosons, muons, neutrinos, etc.

ATOMIC NUMBER: the number of protons (& electrons) in any atom is its atomic number

ATOMIC MASS: the sum in amu, of the neutrons and protons of an atom

ISOTOPE: chemically identical atoms with a different number of neutrons. All atoms come in different isotopes with different numbers of neutrons in the nuclei. Every atom is an isotope, the most common isotope has mass that rounds to the nearest whole number from the periodic table atomic mass.

ION: a charged atom that has more, or less, electrons than normal. Metals can lose electrons and become positive ions (cations). Nonmetals can gain electrons to become negative ions (anions). Metals and nonmetals can bond only by forming into ions first. Atoms do not have to become ions.

CATION: a metal that has lost one or more electrons and is now positively charged

ANION: a nonmetal that has gained one or more electrons and is now negatively charged

BRIGHT LINE SPECTRA: When an electron gains exactly enough energy the electron can jump to a higher energy level. When this electron loses that exact amount of energy and falls back to the ground state, it emits this specific amount of energy which can be seen as light. This light is the spectra, a physical property of matter. The spectra is a mixture of colors we see as one color. A refractive lens can separate these colors into the unique bright line spectrograph that is unique for all substances.

DALTON Atomic MODEL: John Dalton was the first modern scientist to develop a model of the atom, he imagined it as a solid sphere, with each type of element made up of pure spheres particular to that element. Each sphere had a unique mass, corresponding to the element's mass. This was the Billiard Ball Model because his model was akin to billiard (pool) balls.

THOMPSON Atomic MODEL: the second model of the atom by JJ Thompson, who discovered the electron as a separate part of the atom. He imagined electrons stuck in the solid mass of the atom which was positively charged. It's called "plum pudding" model because it was explained to be akin to his wife's chopped plum cake (pudding in the UK).

RUTHERFORD Atomic MODEL: by using his famous gold foil experiment Ernest Rutherford determined that atoms are mostly empty space, that the nucleus was positively charged, and that the electrons flew around it. This is the first "real" atomic model with electrons flying outside the nucleus.

THE GOLD FOIL EXPERIMENT: Rutherford's classic experiment of shooting positively charged alpha particles at a thin foil of pure gold. The alpha particles mostly zoomed right through which shows the gold atoms were mostly empty space. Some alpha particles bounced off at angles or even backward, showing that when a small positive alpha particle hit the gold nucleus it did not stick, which shows the nucleus was bigger and denser than the alpha particles, and was positively charged.

BOHR Atomic MODEL: Niels Bohr fixed the problems with the Rutherford model of why the electrons don't fall into the nucleus when they lose energy while flying around the nucleus. He determined that the electrons flew in specific paths, or orbits, like the planets around the Sun. These orbits were also energy levels. He said if electrons stayed in these orbits, they'd never lose energy. Their speed and spin around the nucleus were perfectly able to keep them from falling inward. Orbits turned out to be wrong, we know think electrons are in shells.

WAVE MECHANICAL or MODERN Atomic MODEL: It puts electrons into "shells". Most shells also contain sub-orbitals (which are not taught in this course). These shells are the zones, or areas of high statistical likelihood of finding electrons. Electrons do not follow neat paths or orbits, but the shells are still described as energy levels. This model was developed with math called quantum mechanics. It's a "statistical approach to locating electrons. Many scientists contributed to developing this model over time.

ENERGY LEVELS: also called electron shells. These are the zones where the electrons fly around a nucleus.

VALENCE electrons: the electrons in the outermost shell, or highest energy level. Boron has a 2-e configuration, meaning the first 2 electrons are in the first shell, and there are 3 valence electrons in the 2nd. Lithium has 3 electrons, in a 2 - 1 configuration. Li has 1 valence electron.

NOBLE GASES: Gases in group 18. They tend not to bond with any other atoms at all. They have complete or stable valence electron shells, making them unusually stable.

COMPLETE SHELLS: the electron energy levels or shells that have the maximum number of electrons that fit due to size and physics (charge and velocity, etc.). The maximum numbers of electrons in the first four energy levels are: 2, 8, (8 or 18), and (8, 18, or 32). Shell #3 and higher can fill up but can also stretch out bigger too.

HEISENBERG UNCERTAINTY PRINCIPLE: Werner Heisenberg proved mathematically that you could measure the velocity of an electron but never be able to determine its position, or, you could determine the position of a particular electron but then not be able to measure its exact velocity. This is not on the regents exam but it is way cool.