These are the vocabulary words that you certainly should know.

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

ELECTRON CONFIGURATION: each orbital has certain limitations of size and numbers of electrons that can fit into each orbital. The configuration shows the electron number in each of the orbitals.

EXCITED STATE: when an atom has electrons in higher than normal orbitals due to an energy absorption

GROUND STATE: when an atom has its electrons in the lowest and normal orbitals

ORBIT: Niels Bohr thought that electrons flew around like planets around the sun, each in its own orbit.

QUANTUM: the exact amount of energy needed to jump an electron from one energy level to a higher energy level

PAULI EXCLUSION PRINCIPLE: Wolfgang Pauli determined that electrons in specific orbitals must have opposing spins. <u>This is cool</u> but not on the regents exam

PROTON: the positively charged particle in the nucleus with a mass of 1 amu

NEUTRON: the neutrally charged particle in the nucleus with a mass of 1 amu

ELECTRON: the negatively charged particle circling a nucleus, having nearly zero mass

NUCLEUS: the core of an atom, containing the protons and neutrons

SUB-ATOMIC: pertains to the particles making up an atom, proton, neutron and electron; and other smaller particles such as quarks, leptons, mesons, 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 atom with a different number of neutrons. Average atomic masses are decimals because of the proportions of each type of isotope in an element. Each kind of isotope as a mass in whole amu.

ION: an atom that has a changed number of electrons. Atoms make ions to "get" an full outer orbital of electrons. Ions can be positive or negative.

BRIGHT LINE SPECTRA: When an electron gains enough energy the electron can jump to a higher energy level. When this electron loses that energy and falls back to the ground state, it emits this specific amount of energy which can be seen as light. Through refractive lenses, this mixture of light is broken into specific wavelengths, in a patter of lines.

DALTON'S MODEL: John Dalton was the first modern scientist to create a model for the atom, he imagined it as a solid sphere, with each particular element made up of pure spheres particular to that element. Each sphere had a different mass, corresponding to the element's mass. AKA the Billiard Ball Model.

THOMPSON'S MODEL: the second improvement in concept, JJ Thompson discovered the electron as a separate part of the atom, and imagined them floating in a solid positively charged lump. AKA the "plum pudding" model.

RUTHERFORD'S 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. The first "real" atomic model.

THE GOLD FOIL EXPERIMENT: Rutherford's classic experiment of shooting positively charged alpha particles at a this foil of pure gold. The particles mostly zoomed right through showing that the gold atoms were mostly empty space. Some bounced off at angles or even right back at the source, showing that when a positive particle hit the gold nucleus it did not stick (making the nucleus positive as well as dense).

BOHR'S MODEL: Niels Bohr fixed Rutherford's problems of why don't the electrons fall into the nucleus when they lose energy from the flying around the nucleus. He determined that the electrons flew in specific paths, or orbits, like the planets around the Sun. He said as long as they stayed in these orbits they'd not lose energy. Their speed and spin around the nucleus was enough to keep them from falling in.

QUANTUM MECHANICAL MODEL: or the modern model, polished by Edwin Schrödinger, It placed the electrons into "orbitals", areas of statistical likelihood of being found rather than in orbits. He showed that the electrons were more free than the planetary orbits proposed by Bohr. This model was developed after the math called quantum mechanics was worked out by others. A "statistical approach to locating electrons.

ENERGY LEVELS: also called electron orbitals. These are the places for electrons to fly around a nucleus

VALENCE ELECTRONS: the electrons in the highest energy level for any atom. Helium has 2 electrons both in the first orbital. It has 2 valence electrons. Lithium has a total of 3 electrons, with a 2 - 1 configuration. Lithium has 1 valence electron.

NOBLE GASES: all gases of group 18. They do not combine with the "peasant" atoms of the other elements. They form almost no natural compounds or molecules. Their complete outer energy levels make them unlikely to form any sort of bonds with other atoms.

COMPLETE ORBITALS: the electron energy levels or orbitals are limited to specific numbers of electrons 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 32.

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 velocity. Not on the regents exam either but it's way cool.