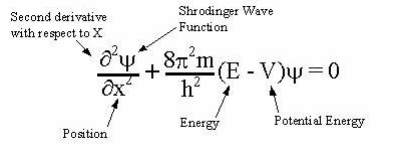
Section 4-2

Heisenberg Uncertainty Principal – it is impossible to determine the position and velocity of an electron or any other particle at the same time.

Schrödinger Wave Equation – provided wave functions that would give the probability for the location of electrons



Quantum Theory – mathematically describes the wave properties of electrons and very small particles

Orbital – a three-dimensional region around the nucleus that indicates the probable location of an electron

Quantum numbers – specify properties of atomic orbitals and properties of electrons in orbitals

There are four quantum numbers for an electron. Three are based on results of solutions to the Schrödinger wave equation that describe the energy level, shape, and orientation of an orbital. The fourth number describes the state of an electron occupying an orbital.

Section 4-2 (Cont'd)

Principal Quantum Number (n) – indicates the main energy level of electrons in orbitals.

- -Values of n are whole numbers of increasing energy levels starting with 1.
- -Electrons with the same value of n are in the same electron shell
- -There can be n^2 orbitals in an electron shell

Angular Momentum Quantum Number (l) – indicates the shape of the orbital

Value of l	Letter
0	s
1	p
2	d
3	f

Value of n	Possible l Values
1	s
2	s, p
3	s, p, d
4	s, p, d, f

Magnetic Quantum Number (m) – indicates the orientation of an orbital around the nucleus

Spin Quantum Number (+½ or -½) – indicates the fundamental spin state of an electron

- -Each oribital can have a maximum of 2 electrons with opposite spins

Each electron will have a unique set of quantum numbers

The maximum number of electrons in a shell is $2n^2$