Shapes of orbitals

- The shape of s-orbital is spherical and spherically symmetrical. It has no nodal planes.
- The number of radial nodes for s-orbital = (n - 1)
- p-orbital has dumb-bell shape. It has one nodal plane.
- The three p-orbitals are mutually perpendicular to one another.
- Each p-orbital has one nodal plane.
- The lobes are oriented along the respective axes.
- p_x orbital is along the x-axis and its nodal plane is along yz plane.
- p_y orbital is along the y-axis and its nodal plane is along xz plane.
- p_z orbital is along the z-axis and its nodal plane is along xy plane.
- For p-orbital l = 1 m = –1, 0, +1
- For p_x orbital; m = +1
- For p_y orbital; m = –1,
- For p_z orbital; m = 0;
- d orbital has 4 lobes and double dumb-bell shape.
- Each d-orbital has 2 nodal planes.
- d_{xy} orbital is in the xy plane between x and y axes.
- d_{yz} orbital is in the yz plane between y and z axes.
- d_{xz} orbital is in the xz plane between x and z axes.
- $d_{x^2-y^2}$ orbital is also in the xy plane but the lobes are oriented along x and y axes.
- d_z^2 orbital is along the z-axis.
- In d_{xy}, d_{yz}, d_{zx} orbitals, the lobes are in between the respective axes.
- In $d_{x^2-y^2}$,d_z^2 orbitals, the lobes are along the axes.
- d_z^2 contains a ring called torus or collar or tyre of negative charge surrounding the nucleus in the xy plane.
- It has only 2 bit lobes oriented along z-axis.
- For d-orbital, l = 2, m = –2, –1, 0, +1, +2

- For d_{z^2} orbital, m = 0, for d_{xz} orbital, m = +1
- For d_{xy} orbital, m = –2 for d_{yz} orbital, m = –1
- For $d_{x^2-y^2}$ orbital, m = +2
- The energy of electron in hydrogen atom is determined only by the principal quantum number n.
- In multi electron atoms, the energy of electron depends on both principal quantum number and azimuthal quantum number.
- The magnetic quantum number ‘m’ indicates the number of degenerate levels or orbitals of equal energy.
- An orbital having a certain value for ‘m’ cannot accommodate more than 2 electrons.
- The maximum number of electrons in s, p, d and f sub energy levels is 2, 6, 10 and 14 respectively.
- The maximum number of electrons in a given principal quantum level 'n' is $2n^2$.
- The maximum number of sub orbitals in a main orbit = n.
- The maximum number of orbitals in a main orbit = n^2.
- The maximum number of orbitals in a sub orbit = (2l +1).
- The maximum number of e^-’s in a sub orbit = 4l + 2