

ATOMS AND THE PERIODIC TABLE

The modern atomic model

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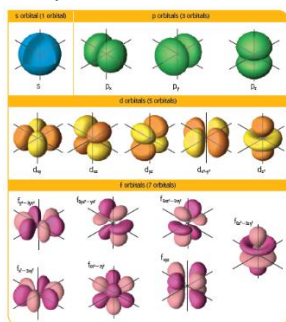
Erwin **Schrödinger** (1887-1961) concluded that **each energy layer or level of an atom's shell had several sub-levels**. Schrödinger also established how many levels there were in each layer and how the electrons were distributed in each one of them.

Atomic orbitals

An **orbital** is an area where there is a high probability (greater than 90 %) of finding an electron.

Orbitals could have **different shapes and sizes** depending on the layer of the shell. Each layer may have various orbitals with the same (or a very similar) shape and a different orientation. These are orbitals of the same type.

Each type of orbital is designated with a letter (s, p, d, f), and if there are several, a subscript indicating its spatial orientation is added.



The location of the orbitals

Schrödinger's investigations led to the discovery of the orbitals in each layer of the atom's shell:

- Layer 1: one s orbital.
- Layer 2: s and p orbitals.
- Layer 3: s, p and d orbitals.
- Layer 4 and following layers: s, p, d and f orbitals.

Orbital energy

In general, an orbital's energy depends on its layer.

All orbitals of the same type in the same layer have the same energy, unless the atom is in a magnetic field. Each layer represents an energy level, and each type of orbital is a sub-level.

The Moeller diagram is a mnemonic tool that indicates the order of the orbitals according to their energy.

