

Electron Types

1. Valence electrons- outmost electrons with the highest energy. These take part in chemistry.
2. Core Electrons- Low energy electrons in filled shells. Held too closely and too tightly to do chemistry.

Effect of Shielding and Penetration:

1. Shielding

Electrons will be attracted to positively charged nucleus but repelled by negatively charged electrons. Hence, the electrons experience a nuclear charge less than the actual nuclear charge, called the effective nuclear charge.

Depends on the principle quantum number (n).

2. Penetration

Is the relative electron density of an electron to the nucleus of an atom.

A 2s electron will have more electron density near the nucleus than a 2p electron. Therefore more penetrating.

Depends on the principle (n) and angular quantum number (l)

Why is the 2s orbital filled before the 2p orbital?

Penetration seen from RDF graph for 2s and 2p orbitals. A small part of the 2s orbital is a little closer to the nucleus than the 1s. So, 2s electrons penetrate the core electrons causing 2s to have a minor maximum. Orbital energy of the 2s is lower than the 2p.

Why is the 4s orbital filled before the 3d?

Both 3s and 3p orbitals are filled, addition of an electron in the 4s results in less shielding over the 3d. The electron experience a higher effective nuclear charge therefore lower in energy.

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