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The MCAS Electron Orbital Model as the Underlying System of the Periodic Table[1]

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Abstract

The current popular version has proven quite adequate for many scientists even with a stubborn adherence to the stoic spdf-quantum-theory. Thus, this perspective requires that H be placed over Li and/or F even though it has little or no chemical similarity to either of them. This view of the electron structure of atoms also requires a number of "rules","spin-reversal-pairingl", and "orbital hybridization" to explain even the simplest aspects surrounding the electron structure and chemical bonding; mathematical orthogonality between periodic levels is a sham; and increasingly weirder shaped orbitals are needed to make the math fit the stoic spdf model. Transition and rare-earth/lanthanide series appear without physical rationale. In light of all these spdf-associated problems, the arrangement and behavior of the elements in the periodic table is addressed herein according to the dynamic MCAS electron orbital model.

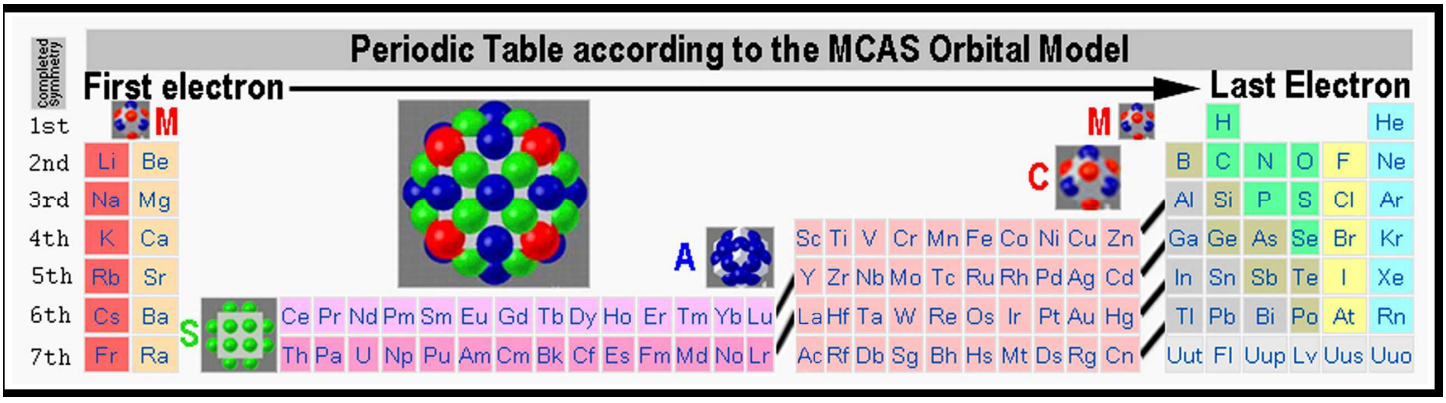
Expanded Periodic Table According to the MCAS Orbital Model

The MCAS electron orbital model[2] is based on the principles that electrons

- Are particulate in our 3D worldly concept with a negative "aura" that yields wave behavior, thus "AND duality"
- Repel one another; mathematical "spin-reversal" to allow then to cohabitate does not change the fact that electrons oppose one another
- Exhibit quantum energy level behavior because they interact with the nucleus. A simple, classical mechanic (Newtonian) machine demonstrates why electrons are modeled with the principal quantum numbers[3]. It is a timing phenomenon.
- Occupy very similar orbital space while filling 3D space. Thus, a particulate electron moving, even at random, in the d_z2 and f orbitals of the spdf model is illogical.
- Are not bound to fill underlying orbitals. Thus, underlying electrons can dynamically rearrange to provide optimal distribution and lower energy.

With the MCAS model itself presented elsewhere, its relationship to the periodic table is presented below. For those familiar with the extended form, it should be self-explanatory. Three notes, however:

- The first two elements in each row easily lose electrons to revert to the previous noble gas "completed symmetry"; only under extreme conditions would a hydrogen nucleus exist striped of all electrons. Thus, Hydrogen forms covalent bonds rather than ionic ones.
- Underlying electrons order so that only two "layers" of the same type of orbitals are occupied (see diagonal connecting lines); contrasting with the stoic spdf model.
- La and Ac are not part of the series which bear their name; they are "A" orbital and not S orbital related.



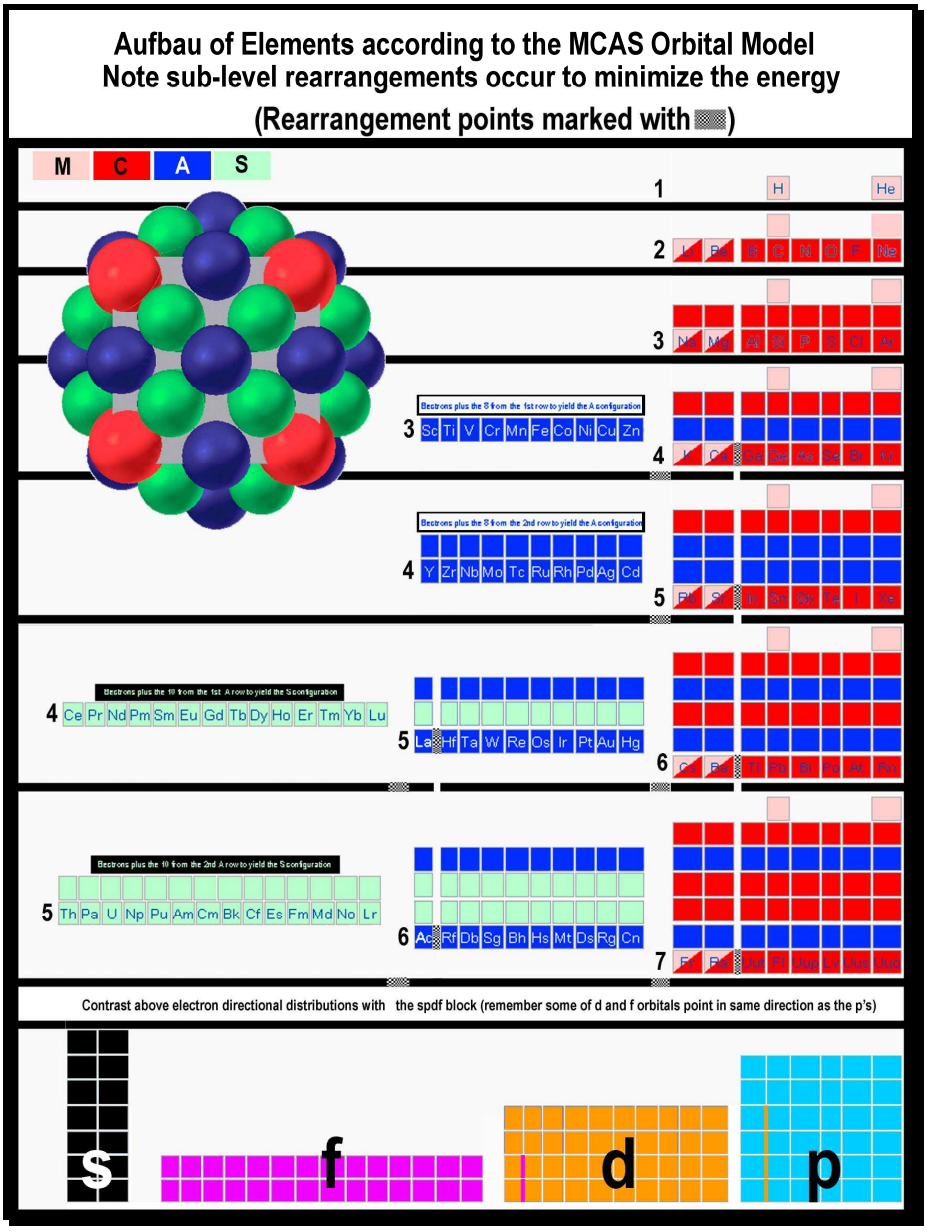
[1] This was part of a handout at The Third International Conference on the Periodic Table, Cusco, Peru 2012; http://vixra.org/abs/1208.0068

[2] Several citations: a)Challenging Science (2005) http://pages.swcp.com/~jmw-mcw/, Joel M Williams; b) The MCAS Electron Orbital Model, http://vixra.org/pdf/1205.0114v1.pdf, Joel M Williams; c) The MCAS Electronic Structure of Atoms, http://gsjournal.net/Science-Journals/Essays/View/4019

[3] a) Why do electron orbitals have discrete quantum numbers?, http://pages.swcp.com/~jmw-mcw/Quantum%20Numbers%20from%20a%20Simple%20Quantum%20Mechanics%20Machine.htm, Joel M Williams; b) The Bohr Model, Electron Transfer and Newtonian-derived Quantum Numbers, http://gsjournal.net/Science-Journals/Essays/View/4083

Aufbau of the Periodic Table Elements
According to the MCAS Orbital Model

To better understand the aufbau of the periodic chart and why the transition element series and lanthanide and actinide series occur where they do, the following figure is presented. Before the 4-lobed M-orbitals can add more electrons and become C-orbitals at the 4^{th}-7^{th} levels, some underlying electron redistribution must take place. Thus, 8-electrons from a C-orbital series are moved to an A-orbital series which is then completely filled. After this, electron filling can convert the M-orbitals to C-orbitals. Likewise, when a third level of A-orbitals is started at La or Ac, an underlying A-orbital series must be redistributed to an S-series with 8 electrons returning to an M-series. Remember that the electron in the "La" or "Ac" orbital is there for the S-series elements that follow and accounts for the +3 behavior of those elements; esp the lanthanides. The symmetry maintained and the more even distribution of electrons is readily apparent when viewed in this manner. In the spdf model, electron density is just piled on top of electron density, especially in the p's, without sub-level redistribution. How s-orbitals can be orthogonal to themselves (the last includes all those below in its space) and with other orbitals with whom they share space is a great contradiction to the spdf model. It is not clear what drives the d and f series elements to occur where they do in the spdf model. That such is modeled is a different matter.



Aufbau of the Periodic Table Elements
from a different perspective

While the previous figure showed the electron distribution in-line with the conventional periodic table arrangement with the lowest-mass elements at the top, the following figure gives a different view. Here, the emphasis is on the electron loading as the number of electrons surrounding the nucleus increases. This reversal may help some see the sub-level reordering easier.

Aufbau of Elements according to the MCAS Orbital Model
Note sub-level rearrangements occur to minimize the energy
(Rearrangement points marked with ▒)
(arranged from lowest electron loading upward)