The Golden Ratio, the Principle of Construction of Atoms

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Abstract: Exactly today fifteen years ago, the author arrived at the unique result that the ground state Bohr radius of the hydrogen atom is divided into two parts pertaining to the electron and proton, the ratio of which was amazingly a constant. This constant turned out to be the Golden ratio, a mathematical constant, known from ancient times to appear in many spontaneous creations of Nature, big and small. Further work showed that the interatomic distances in alkali metals and halogens are divided exactly into their cationic and anionic radii by the Golden ratio, the sums of which accounted precisely for the interionic distances in alkali halides. This cascaded over the years into the additivity rule of atomic and or ionic radii in the structures of small as well as large molecules. This is summarized in this short paper.

Introduction:

The theory of the hydrogen atom has perplexed the ablest of minds over a century after Bohr. For an introduction, see e.g., [1]. On considering an alternate way of interpreting the ground state energy of the hydrogen atom, as that of a condenser with two equal and opposite charges separated by the Bohr radius, the author arrived at the result (the principle of construction of atoms) that the Bohr radius is divided into two Golden sections pertaining to the electron and proton! This was confirmed by the exact additivity of the Golden ratio based alkali metal cationic radii and halogen anionic radii in alkali halides. The results were presented the next year in two conferences [2, 3]. It was then found that covalent bond lengths d(AA) between two atoms of the same kind were sums of their cationic and anionic radii, the ionic forms of which corresponded with Pauling's [4] resonance structures. The first invited paper was published in 2005 in [5]. Over the years the additivity of atomic and the Golden ratio based ionic radii has been found in many small as well as large molecules. Collected papers on this can be found in [6].

References

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