

A Periodic Table of the Elements, based on the Electronic Structure of the Atoms

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Abstract

There are some well known alternatives to the (present form) of Mendeleev's Table of Elements. A quite natural one is obtained when starting from a simple arrangement of the energy levels of the atoms.

Energy Levels of the Atoms and Periodic Table

The order in which the energy levels of atoms is filled is well known (e.g., Pauling, 1947): 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d, 7p... Although not obvious, it is not hard to discover the regularity behind this list, and this regularity is expressed by the stair-like structure at the bottom of figure 1, that has to be read in the normal reading sense (i.e., from top to bottom and from left to right). Placing in this ordered Table of Energy Levels the atoms that successively fill them (i.e., the consecutive atomic numbers) directly produces the "Periodic" Table of the Elements. Then, by construction, the particular electronic structure of a particular element can directly be read in the Table, as exemplified by the element S (see bottom of figure 1). Figure 2 presents a simplified version of the Table.

Personal note: I built this table while I was a young student (back in 1975), and always thought that this was not enough material to prepare a bona fide publication. Since then, I have never seen a Periodic Table as simple as this one. Perhaps it is time to render it universally accessible in electronic form. From where this submission. Please let me know if there is any similar version of the Table already published, that, for some reason, remains in the shadow. I will make every effort to make it known.

Reference

Pauling, L., 1947, General Chemistry, L. Pauling, Dover Publications Inc, New York.

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