

Some characteristics of atoms and ions of superheavy elements

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The extended periodic table of Mendeleev, including atomic numbers of elements up to $Z = 172$, is discussed in the literature [1], [2], moreover, experimental measurements are available only for elements up to Lawrence ($Z = 103$).

The theoretical study of superheavy elements requires taking into account many effects: relativistic, quantum electrodynamics, core size, etc. The Dirac-Hartree-Fock multi-configuration method and other methods are used to predict the electronic configuration, ionization potentials and other characteristics of atoms and ions of elements with atomic numbers $Z > 103$.

On the other hand, there is a quasi-classical method for describing multi-electronic systems, the accuracy of which increases with the number of particles. This was confirmed in the patterns found in the work of the author [3] in the binding energies of atoms and multiply charged ions in the case of hydrogen-like filling of electronic shells. In this paper, an attempt is made to find quasi-classical patterns in the available computational data for elements with atomic numbers in the range $Z > 103$.

[1] Pyykkö P 2011 *Phys. Chem. Chem. Phys.* **13** 161–168

[2] Smits O, Indelicato P, Nazarewicz W, M P and P S 2023 *Physics Reports* **1035** 1–57

[3] Shpatakovskaya G 2023 *Plasma Physics Reports* **49**(10) 1220–1227