

Shell structure of atoms

© Alexey A. Potapov

Butlerov Science Foundation. Bondarenko, St. 33-44. Kazan, 420066. Russia.
Phone: +7 (843) 231-42-30; +7 (395) 246-30-09. E-mail: aleksey.potapov.icc@gmail.com

Keywords: shell structure of an atom, dipole-shell model of atoms, electronic structure of atoms.

Abstract

The purpose of this paper is to study the electronic structure of atoms. The basis for these studies is the shell model of many-electron Bohr atoms. The inconsistency of the currently accepted quantum-mechanical model of the structure of atoms, constructed on the hypothesis of a non-existent wave function in nature, is shown. The development of a physically based Bohr model is the so-called dipole-shell model of many-electron atoms. An analysis of the experimental data on the polarizabilities and ionization potentials of atoms and ions made it possible to refine the existing ideas about the shell structure of atoms. It is shown that the shells are formed in accordance with the rule $2 + 4p$, where $p = 0, 1, 2, 3$. Two-electron shells corresponding to $p = 0$ are fundamental. They form the skeleton of the atom, and their energy state is given by the quantum number n . The maximum number n is 7. From the two-electron shells, satellite 6, 10, and 14 electron shells bud. In this connection, the existing notions of 8, 18, and 32 electron shells should be clarified. In reality, these shells are compound – $8 = 2 + 6$, $18 = 2 + 6 + 10$, $32 = 2 + 6 + 10 + 14$. The set of head two-electron shells and their satellites form compound two-, three- or four-layer structures. So atoms are a system of nested multilayer shells.

References

- [1] A.A. Potapov. Renaissance of the classical atom. *Moscow: Publishing house "Nauka", LAPLAMBERT Academic publishing. 2011. 444p.* (russian)
- [2] A.A. Potapov. Science of substance. *Butlerov Communication. 2011. Vol.24. No.1. P.1-45.* ROI: jbc-01/11-24-1-1
- [3] N. Bohr. Collected works. *Moscow: Nauka. 1970. 584p.*
- [4] D.N. Trifonov. Structure and boundaries of the periodic system. *Moscow: Atomizdat. 1969. 272p.* (russian)
- [5] The chemical encyclopedia: in 5vol:vol.4. Zefirov N.C. (Ed.), Etc. *Moscow: The Great Russian Encyclopedia. 1995. 639p.* (russian)
- [6] A.N. Matveev. Atomic physics. *Moscow: Publishing house "Peace and Education". 2007. 432p.* (russian)
- [7] O. Barsukov, M.A. Eliashevich. Fundamentals of Atomic Physics. *Moscow: The Scientific World. 2006. 648p.* (russian)
- [8] Physical encyclopedic dictionary. Ch. Ed. A.M. Prokhorov. *Moscow: Sov. Encyclopedia. 1983. 928p.* (russian)
- [9] A.A. Potapov. Nature and mechanisms of binding atoms. *Moscow: RIOR: INFRA-M. 2013. 295p.* (russian)
- [10] R. Dickerson, G. Gray, J. Heit. Basic laws of chemistry. Vol.1. *Moscow: Mir. 1982. 652p.*
- [11] A.A. Potapov. Deformational polarization: search for optimal models. *Novosibirsk: Science. 2004. 511p.* (russian)
- [12] A.A. Potapov. Fundamentals basis of the matter structure. *Butlerov Communications. 2015. Vol.41. No.2. P.1-29.* DOI: 10.37952/ROI-jbc-01/15-41-2-1
- [13] S.E. Frish. Optical spectra of atoms. *Moscow.-Leningrad: Izd-vo fiz.mat. Literature. 1963. 640p.* (russian)
- [14] Physical quantities: Handbook. Ed. I.S. Grigorieva, E.Z. Meilikhova. *Moscow: Energoatomizdat. 1991. 1232p.* (russian)
- [15] A.S. Yatsenko. Optical spectra of H- and He-like ions. *Novosibirsk: Science. 2003. 216p.* (russian)
- [16] A.S. Yatsenko. Optical spectra of Li- and Be-like ions. *Novosibirsk: Science. 2005. 212p.* (russian)
- [17] A.S. Yatsenko. Optical spectra of B- and C-like ions. *Novosibirsk: Science. 2007. 205p.* (russian)

- [18] A.A. Potapov. The dumbbell model of the helium atom. *Butlerov Communication*. **2017**. Vol.50. No.4. P.96-104. DOI: 10.37952/ROI-jbc-01/17-50-4-96
- [19] A.A. Potapov. Dynamic structure of atoms. *Butlerov Communication*. **2016**. Vol.48. No.11. P.132-152. DOI: 10.37952/ROI-jbc-01/16-48-11-132
- [20] A.B. Shalinets. Forerunners of the atomic age. Elements of the third group of the periodic table of DI Mendeleev. *Moscow: Enlightenment*. **1975**. 192p. (russian)