

# Condensation of Ultra-Cold Neutrons in the Light of the Concept of Nuclear Exchange Beta-Forces. About the Possibility of Obtaining of Neutron Substance in Laboratory Conditions

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Today, the neutron matter and neutron stars are already substantially rooted in the nuclear physics and astrophysics, and it is logical to have their consideration of them in terms of chemical properties and principles of general chemistry.

The formation of a neutron substance, in addition to gravitational neutronization, is considered, other mechanisms, such as the condensation of ultracold neutrons (UCN) and neutronization due to a critical increase in the atomic number in the Periodic system of elements (PS). The stability of the neutron substance is substantiated already at the micro level due to Tamm interaction (*exchangeable  $\beta$ -nuclear forces*) [1] and not only at the macro level due to the gravitational interaction, as it is now considered in astrophysics [2].

It should be noted that G.A. Gamow [3] first spoke about the condensation of cold neutrons (1946). Rarely mention this idea, which over time has found application in the theory of neutron stars. Gamow in 1937–38 showed that when a neutron gas is compressed, a new superdense state of matter arises. The possibility of obtaining a neutron substance in terrestrial laboratory conditions is considered.

A neutron substance is a very concrete physical reality, urgently demanding its rightful place in the PS and studying not only physical, but also chemical, and possibly even in the near future, engineering and technical properties. We also consider the possibility of a "chemical" interaction of UCN with molecules of substances with an odd number of electrons.

It is proposed to extend the PS beyond the limits of classical chemical substances and to cover a much wider range of matter in the universe, based on the forgotten ideas of D.I. Mendeleev. Moreover, PS begins with neutron and its isotopes (dineutron, tetraneutrone, etc.) and ends the neutron stellar substance [2].

**Keywords:** neutron, neutron stars, neutron substance, periodic system of elements, neutronization, Tamm interaction, condensation of UCN.

## References

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