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## How to interpret the trends in the periodicity of changes in atomic radii?

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### Abstract

This article substantiates the recommendation for the use of an analytical formula that relates the radius of an atom to the coordinates of an element in the Periodic System. This expression is actually a generalization of the previously proposed formula, suitable for alkali metals, for the case of polyvalent atoms. The proposed multiplicative ratio takes into account not only the factor of expansion of the corpuscle associated with the growth of the main quantum number, but also the opposite factor of its compression caused by an increase in the population of the valence shell. In the expression under consideration, the role of the latter factor is limited, however, by increasing the number of the external quantum layer, i.e., the distance from the core. As a result, such an approximation allows us to move from the qualitative level of analysis of the dependence of the radii of atoms on their position in the periodic table to the quantitative level.

The adequacy of the considered approach is confirmed by the examples of typical reactive elements of both octaves. The good agreement of the obtained estimates of atomic radii with the known data allows us to recommend the developed scheme for use in scientific, applied and educational-methodical spheres. As for the radii of single atoms formed during the sublimation of substances, it is noted that, judging by the published very different information, the multiplier corresponding to the expression of the empirical radius increases by about half, while the exponent of the power function of the main quantum number decreases to 1/3.

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