CHARACTERISTICS OF THE ATOM AND THE FIRST ION OF F-METALS

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Based on experimental and theoretical data, the relationship [1] between the size of an atomic system, its ionization potential and polarizability, their dependence on the atomic number are discussed for two groups of homologues, lanthanoides and actinoids.

The work continues the research started in [2] for the atoms of these elements. It has been shown that for atoms with hydrogen-like filling of f-states, a fairly accurate approximation of the dependences of polarizability on the ionization potential in both groups and polarizability on the atomic number for actinoids is possible. Atomic volume values (in atomic units) have been predicted for heavy actinoids with an oxidation state of +3: fermium ($V_a \simeq 183$), mendelevium ($V_a \simeq 181$) and nobelia ($V_a \simeq 179$).

For single-charged ions, calculations of the maximum density radius R_{max} [3] are used based on the multi-configuration Dirac-Fock model (MCDF), taking into account many subtle effects.The dependence of the ion radius R_{max} on the atomic number is investigated, and the relationship $R_{max} \sim I_p^{-1}$ [1] for both groups is checked.

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