REGULARITIES IN DEPENDENCE OF ION IONIZATION POTENTIALS ON NUMBER OF ELECTRONS AND ATOMIC NUMBER

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The analysis of experimental and calculated ionization potentials $I_N^{(Z)}$(eV) is carried out in the ground state of multicharged ions of medium and heavy elements from argon ($Z = 18$) to americium ($Z = 95$), presented in the NIST tables [1]. These data, considered in special coordinates, indicate patterns in the dependence on the atomic number of the element Z and number of electrons in the ion N. The discovered patterns allow us to approximate a large number of tabular values by simple polynomials of the form:

$$I_N^{(Z)} = Z^{4/3} 10^{\lg e_N(\sigma)} E_H, \quad \lg e_N(\sigma) = \sum_{i=0}^{i_{max}} \sum_{k=0}^{k_{max}} b_{ik} N^k \sigma^i, \quad \sigma = Z^{-1/3},$$

$$E_H = 27.211 eV.$$

The optimal division is into a group of medium elements, from argon to xenon ($18 \le Z \le 54$) with the number of electrons in the range $N \le Z - 5$ [2], and a group of heavy elements, from caesium to americium ($55 \le Z \le 95$) with the number of electrons $1 \le N \le 46$ [3]. In this case, the degree of approximating polynomials does not exceed three, and small tables of polynomial coefficients b_{ik} make it possible to estimate the ionization potentials with an accuracy of about 1 percent or higher for a total of about three thousand ions from the considered regions.

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2. G.V. Shpatakovskaya, JETP, **135**, 179 (2022)
3. G.V. Shpatakovskaya, JETP Letters, **114**, 737 (2021)