Investigation of Dominant States in Dielectronic Recombination Rates for Fe-Ions

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Dielectronic recombination (DR) cross sections and rate coefficients are calculated for the isonuclear sequence Fe^{Z+}, with $Z = 21$, 20, 19, 18, 17, and 16, in which L-shell (2p-) excitations are involved during the initial capture. Most of the dominant transitions with $\Delta n \neq 0$, using angular momentum average (AMA) approximation, are considered. It is found that the states 3pnd and 3dnd contribute most to the rate coefficients. In addition, the rates are found to increase with increasing number of electrons in the ion, (*i. e.* as Z decreases). Moreover, the rate coefficients, α^{DR}, for the studied ions are found to peak around the same energy ($kT = 30$ Ry). A semi-empirical formula for the total rates α is obtained for the 2p-excitation with $\Delta n \neq 0$ in the case of Fe^{Z+} ions. On comparing both results, the explicit calculations and the results obtained from the semiempirical formula, good agreement is found. The available results for α^{DR} may be considered as a database for future comparison with experimental and theoretical calculations. Comparison of our results with other results show the effect of the empirical rate formula.

Key words: Electron-Ion Collision; Resonance States; Auger Rates; Radiative Rates; Dielectric Recombination.