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**Titre du document / Document title**Ionization mechanisms in CRRES chemical releases. 2. Strontium photoionization and Ba⁺/Sr⁺ collisional ionization cross-section calculations**Auteur(s) / Author(s)**WOLF P. J. ⁽¹⁾; HUNTON D. E. ⁽²⁾;**Affiliation(s) du ou des auteurs / Author(s) Affiliation(s)**⁽¹⁾ Department of Engineering Physics, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, ETATS-UNIS⁽²⁾ Space Charged Particle Effects Branch, Geophysics Directorate, Phillips Laboratory, Hanscom Air Force Base, Massachusetts, ETATS-UNIS**Résumé / Abstract**

Two particular collision processes involving electron transfer are investigated that may have impact on the analyses of ion flux data obtained in the CRRES G-1 and G-11b, upper atmospheric chemical release experiments. Ion pair production (σ_{1p}) and charge exchange ionization (σ_{CE}) cross sections are calculated as a function of collision energy for reactions between Ba/Sr atoms and O atoms and O⁺ ions, respectively, using two-state approximation theories. The cross sections for each process are calculated for both the ground and metastable states of the metal atoms. At a collision energy of 9.5 eV attained in the G-1 and G-11b CRRES releases, the calculations indicate that $\sigma_{1p} = 1.3 \times 10^{-16} \text{ cm}^2$ and $\sigma_{CE} = 2.6 \times 10^{-16} \text{ cm}^2$ for reactions involving Ba(¹S₀). The cross sections for the analogous Sr reactions are approximately $1.2 \times 10^{-6} \text{ cm}^2$ and $2.8 \times 10^{-17} \text{ cm}^2$, respectively. In addition, Sr photoionization from ³P_j metastable states is investigated. Although we calculate a 29-s photoionization time constant from these states, a kinetic analysis indicates the metastable states cannot accumulate an appreciable equilibrium population in full solar exposure. Thus photoionization from the Sr ³P_j levels does not significantly contribute to the total ion inventory.

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