THE FORMATION OF SH^+ VIA S^{2+} + H_2 IN X-RAY DOMINATED REGIONS

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A. Dalgarno first suggested thirty-two years ago that doubly-ionized X^{2+} elements reacting with H_2 could lead to the formation of molecules in regions with a significant X-ray flux. However, few investigations of the effects of X^{2+} on the formation of molecules have actually been conducted. Recent studies have found the reaction rate coefficients to be orders of magnitude higher than previously thought. This fact, combined with a renewed interest in the physics and chemistry of X-ray Dominated Regions (XDRs), points to a need to study the effects of X^{2+} on molecule formation. We investigated how S^{2+} + H_2 affects the formation of SH^+ for atomic gas exposed to an X-ray continuum typical of an Active Galactic Nucleus (AGN). As long as the fraction of S^{2+} + H_2 reactions which lead to SH^+ formation exceeds a few percent, this process will be the dominant formation pathway for SH^+. This potentially has major consequences for our understanding of sulfur chemistry in galaxies where the energetics is dominated by AGN activity.