

## THE FORMATION OF $\text{SH}^+$ VIA $\text{S}^{2+} + \text{H}_2$ 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  $\text{H}_2$  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  $\text{S}^{2+} + \text{H}_2$  affects the formation of  $\text{SH}^+$  for atomic gas exposed to an X-ray continuum typical of an Active Galactic Nucleus (AGN). As long as the fraction of  $\text{S}^{2+} + \text{H}_2$  reactions which lead to  $\text{SH}^+$  formation exceeds a few percent, this process will be the dominant formation pathway for  $\text{SH}^+$ . This potentially has major consequences for our understanding of sulfur chemistry in galaxies where the energetics is dominated by AGN activity.