Increasing the filling of ultracold KRb molecules in a 3D optical lattice\textsuperscript{1} STEVEN MOSES, JACOB COVEY, JILA, NIST, and University of Colorado, Boulder, BRYCE GADWAY, University of Illinois at Urbana-Champaign, BO YAN, MATTHEW MIECNIKOWSKI, JUN YE, DEBORAH JIN, JILA, NIST, and University of Colorado, Boulder — Ultracold polar molecules, with their long-range electric dipolar interactions, offer new opportunities for studying quantum magnetism and many-body physics. Recently, our group observed spin exchange interactions between KRb molecules in a 3D optical lattice (Yan \textit{et al.}, \textbf{Nature} \textbf{501}, 521-525 (2013)), which is one of the first steps towards studying lattice spin models with polar molecules. The lattice fillings were about 10\% or less in these experiments. Future experiments will benefit greatly from lower entropies and higher lattice fillings. Here, we have investigated the molecular creation process in a 3D optical lattice with the goal of maximizing the filling fraction. We start by loading a BEC of Rb and a degenerate Fermi gas of K into a 3D optical lattice. In the absence of K, Rb is a Mott insulator. We study how the Mott insulator and the filling of Rb are affected by the presence of K and develop a strategy to maintain high Rb filling throughout the molecule production process. We also find that we can convert a large fraction of these Rb to molecules when we operate with low Rb numbers.

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