MEASUREMENT OF THE VIBRATIONAL POPULATION DISTRIBUTION OF BARIUM SULFIDE SEEDED IN AN ARGON SUPERSONIC EXPANSION FOLLOWING PRODUCTION THROUGH THE REACTION OF LASER ABLATED BARIUM WITH CARBONYL SULFIDE

CHRIS T. DEWBERRY, GARRY S. GRUBBS II, KERRY C. ETCHISON, and STEPHEN A. COOKE, *The Department of Chemistry, University of North Texas, P.O. Box 305070, Denton, TX, 76203-5070.*

A chirped pulsed Fourier transform microwave spectrometer has been used to examine the reaction products of laser ablated barium with carbony sulfide. We find the J = 2 - 1, ν = 0, transition for ^{138}Ba^{32}S, at 12370.1938(20) MHz, is 8.94 times as intense as the same transition for the ^{136}Ba^{32}S isotopologue, at 12404.4384(20) MHz. This is in reasonable agreement to the ratio of the natural abundances of ^{138}Ba : ^{136}Ba = 9.12 : 1. Given this agreement we are able to use the ^{138}Ba^{32}S J = 2 - 1 spectra to qualitatively monitor vibrational populations of BaS in the supersonic expansion following the ablation event. We are able to see the J = 2 - 1 rotational transition for the parent isotopologue in up to the ν = 6 vibrational level. The ablation conditions have been altered, i.e. Nd:YAG laser power, laser pulse duration, backing gas pressure, OCS (H_2S) concentration, and carrier gas (Ar, Ne, 30:70 He:Ne and pure He), and the effects on the BaS spectrum monitored. We can also monitor OCS depletion due to the laser event by running the experiment with the laser on then off. Along side these experiments we have also recorded the nuclear quadrupole coupling constants, eQq(^{137}Ba) and eQq(^{135}Ba) in BaS and performed a multi-isotopomer fit to the experimental data. Results will be presented.