A COMPARISON OF THE METHODS OF STUDYING THE SPECTRA OF THE AsH_2 RADICAL

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The first studies of the $^2A_1$-$^2B_1$ electronic band system of the AsH_2 and AsD_2 radicals were made at Sheffield University in the period from1966 to 1968 by Dixon, Duxbury and Lamberton using flash photolysis of arsine and deuterated arsine. The bands have a complex rotational structure associated with that of an asymmetric rotor. Band centres of the $0,v_2,0$-$0,0,0$ progression were identified for v_2'=0 tp v_2'=5, although only the structure of the bands from v_2'=1 to 3 was analysed in detail. After a long time interval in 1986 a low resolution emission spectrum of AsH_2 was recorded by NI et al. However, it was not until 2007 that He and Clouthier studied the electronic transition of jet-cooled AsH_2 using laser induced fluorescence and wavelength-resolved emission. Following on from this in 2009 Zhao and colleagues recorded absorption spectra of the AsH_2 radical by cavity ringdown spectroscopy. Finally in 2012 Grimminger and Clouthier recorded the equivalent transitions in AsD_2 and AsHD. They also carried out ab initio calculations. By comparing the recent spectroscopic results with those of Dixon et al, we wish to show the complementarity of the different methods for understanding the behaviour of AsH_2 and AsD_2 radicals.