

FREE RADICAL SPECTROSCOPY AND DYNAMICS BY LASER ABSORPTION TECHNIQUES

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Tunable continuous wave laser-based spectrometers have been used to record new spectra of molecular free radicals in the infrared and near infrared. This talk will concentrate on spectra of ethyl (C_2H_5) close to 530 cm^{-1} and a number of carbenes and other species at near infrared wavelengths. In C_2H_5 , the spectrum is due to the CH_2 out-of-plane rocking fundamental with complicated torsion-rotational structure that has now been analyzed to provide estimates for the torsional barrier and its change on vibrational excitation. At near-IR wavelengths, frequency modulation techniques can be used to increase the absorption sensitivity since the dominant noise source here is due to the probe laser; detector noise is negligible. This is not the case in the infrared where detector and laser source noise are comparable in magnitude. Examples from recent work on HCB_r both at room temperature and in a jet-cooled source and simple metal containing radical species formed in an ablation source combined with a free jet expansion will be described.

Acknowledgement: This work was carried out at Brookhaven National Laboratory under contract DE-AC02-98CH10886 with the U. S. Department of Energy and supported by its Division of Chemical Sciences, Office of Basic Energy Sciences.