MICROSLIT INJECTORS IN A SUPERSONIC SLIT JET EXPANSION: A NEW TOOL FOR RADICAL SYNTHESIS AND KINETICS

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A new experimental capability for studying radical kinetics using direct absorption IR spectroscopy will be presented. The hydrocarbon radical species are made using a discharge to dissociate alkyl halides in the upstream region of a pulsed slit supersonic expansion. A series of microslit injectors (0.3 mm diameter) in the jaws defining the slit orifice allows pulsed introduction of secondary species downstream of the discharge but prior to the free jet expansion. Subsequent kinetics can be investigated by spectroscopically monitoring radical densities either i) at a fixed laser probe distance as a function of stagnation partial pressures or ii) as a function of distance downstream. Models of this pseudo-first order radical-neutral reaction will be discussed. Additionally, a model of this flow system using simple electronic circuit analysis has been developed, now enabling characterization of the slit valve and microslit injectors such that partial pressures can be varied and controlled. Test results will be presented for alkyl peroxyl radical formation from alky + O_2 reaction kinetics.