

NISTIR 6242

ANNUAL CONFERENCE ON FIRE RESEARCH
Book of Abstracts
November 2-5, 1998

Kellie Ann Beall, Editor

Building and Fire Research Laboratory
Gaithersburg, Maryland 20899

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U.S. Department of Commerce
William M. Daley, *Secretary*
Technology Administration
Gary Bachula, *Acting Under Secretary for Technology*
National Institute of Standards and Technology
Raymond G. Kammer, *Director*

**Diode Laser Measurements of HF concentrations from Heptane/Air Pan Fires Extinguished by
FE-36 and FE-36 plus Ammonium Polyphosphate**

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The mandatory phasing out of halons 1301 (CF_3Br) and 1211 (CF_2ClBr) for use as the primary fire extinguishing agent aboard U.S. Army combat vehicles has led to the development of replacement agents such as FE-36 ($\text{C}_3\text{F}_6\text{H}_2$) and FM-200 ($\text{C}_3\text{F}_7\text{H}$). These chemicals though effective at extinguishing fires, typically are deficient in terms of increased weight and volume requirements needed for fighting the most difficult military fires. The increased amounts of replacement agent required for extinguishment poses a concern with the levels of hydrogen fluoride formed as the primary decomposition product [1]. This concern has limited the acceptance of these agents for deployment in occupied spaces.

The two mechanisms by which HF concentrations can be decreased in real fire situations extinguished by FE-36 or FM-200 are 1) reduce the time required to extinguish the fire, or 2) release a scavenging agent in conjunction with the fire suppressant chemical to remove HF from the affected space. These mechanisms are investigated here with tunable diode laser absorption spectroscopy (TDLAS) measurements of HF concentrations produced from a series of enclosed heptane/air pan fires extinguished by FE-36 or FE-36 plus ammonium polyphosphate (APP). A potential chemical scavenging agent of HF is APP which is a commercially available chemical with fire retardant properties where the agent is typically suspended in an extinguisher as a gel and released as a white powder. A series of extinguishment tests were conducted with FE-36 and FE-36 plus APP. By measuring how much the HF concentrations are reduced in fires extinguished with FE-36 plus APP compared to fires extinguished by FE-36 alone, the effectiveness of APP as a HF scavenging agent will be demonstrated and evaluated.

1. McNesby, K.L., Daniel, R.G., Widder, J.M., and Miziolek, A.W., *Applied Spectroscopy* 50: 126-130 (1996).