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CHARACTERIZATION AND IDENTIFICATION OF SUPER-EFFECTIVE THERMAL FIRE EXTINGUISHING AGENTS. FINAL REPORT. NGP PROJECT 4C1890

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Createspace. Paperback. Book Condition: New. This item is printed on demand. Paperback. 144 pages. Dimensions: 11.0in. x 8.5in. x 0.3in. The use of halon 1301 for fire fighting is being phased out due to its deleterious effects on stratospheric ozone. This report summarizes the findings of a three year study designed to characterize and identify super-effective thermal fire-fighting agents as possible replacements for these widely used compounds. Four distinct aspects related to the effectiveness of potential thermal agents have been considered. First, existing thermodynamic databases maintained by NIST have been searched in order to identify chemical compounds which are predicted to extract large amounts of heat from a combustion zone. Second, two liquids that were identified as being particularly interesting during the database search were tested experimentally for their extinguishing effectiveness. Third, detailed chemical-kinetic modeling and experimental studies of extinguishing volume fractions in simple flame systems were employed to improve the understanding of the effects of thermal agents on diffusion flames. Fourth, empirical heat transfer correlations for spray cooling of a surface were used to estimate the efficiencies of surface cooling by thermal agents. The database searches used two primary sources -- the Design Institute for Physical Properties database containing 1458 compounds from 83 family types and a smaller database, REFPROP, containing 43 compounds which is tailored to refrigerant applications. Additional substances were included that are not well represented in these databases. Compounds having high 1) heats of vaporization, 2) liquid-phase heat capacities, and 3) total heat absorption due to phase changes (if applicable), heating of a liquid (if applicable), and the heating of the gas phase to combustion temperatures were identified. The results are reported in tables of compounds ordered in terms of their ability to extract heat. The following recommendations are made based on the findings of the study:...



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