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Fifth

Progress Report

on the
Mechanisms of Fire Ignition and Extinguishment

by

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Covering period 1 July to 31 December 1958

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MECHANISMS OF FIRE IGNITION AND EXTINGUISHMENT

1. SUMMARY

Work has been continued in the evaluation of dry powders by comparison of the efficiencies of a number of them on 1-in., 6-in., and 10-in. diameter n-heptane fires. Construction of a mass spectrometer has been started for the purpose of sampling ions from flames. Exploratory work has been completed on the characteristics of magnesium fires.

2. EXTINGUISHMENT BY POWDERS

The relative efficiencies of a number of powders has been compared on 1-in. and 6-in. diameter n-heptane fires and some preliminary results have been obtained on 10-in. diameter fires. These results are included in a report which is being put into final form for publication. Some work has been done toward extending the study to 3-ft diameter fires.

3. THERMAL REACTIONS

The recently completed literature survey of thermal processes in flames indicated the importance of ionic reactions. It is probable that extinguishment results from interference with these rather than with other flame processes. In order to identify the ions present in normal and inhibited flames and get a semi-quantitative estimate of their relative abundances, it was decided to sample ions directly from flames into the analyzer tube of a mass spectrometer. A simple mass spectrometer was almost completely constructed by Mr. Robert Mills, a summer trainee, before he returned to school. No further work has been done.

4. EXTINGUISHMENT OF MAGNESIUM FIRES

Exploratory work on the characteristics of small magnesium fires has been completed. Additional work has been done on methods of extinguishment of such fires. The results of the observations will be contained in two reports which are now in rough draft form.

SECTION 1

The first paragraph of the document is a general statement of the purpose of the study. It discusses the importance of the research and the objectives of the project. The text is somewhat blurry but appears to be a standard introductory paragraph.

SECTION 2

The second paragraph provides a detailed overview of the methodology used in the study. It describes the data collection process, the sample size, and the statistical methods employed for data analysis.

SECTION 3

The third paragraph presents the results of the study. It discusses the findings, including any significant differences or correlations observed. The text is dense and contains several data points and statistical references.

SECTION 4

The final paragraph concludes the document by summarizing the key findings and providing recommendations for future research. It also includes a brief discussion of the limitations of the study.

of 100 ft/min would rotate the anemometer steadily. It is concluded, therefore, that the air flow rate in the access opening was less than 100 ft/min with the window fully open. Smoke tests made with the window fully open indicated some back flow from the hood to the room with the blower running.

5. Discussion

If the air circulation rate with the window fully open was about equal to that measured with it raised $4 \frac{5}{8}$ in. from the bottom, the average air velocity for the entire opening would be about 80 ft/min. Thus, it is probable that the actual air flow rate was between 80 and 100 ft/min with the window fully open and with a static pressure of $1/4$ in. W.G. on the discharge of the blower.

An operator standing in front of the fume hood window and working with the window wide open, as would be required for satisfactory access, might create some blocking of the air inlet and thus increase the average air velocity somewhat in the remaining free area. However, this blocking effect would probably be small because the operator would normally stand a few inches away from the plane of the inlet opening.

of 100 ft. the wind velocity the anemometer measures. It is assumed
therefore, that the air flow in the tunnel passing the test
100 ft. with the anemometer. These data are used to determine
the air velocity from the flow in the tunnel to the test
blower nozzle.

2. - Discussion

If the air circulation rate with the anemometer is known, it can
be determined that at least 1/2 in. from the bottom, the velocity
is zero for the entire opening. It is assumed that the
velocity at the center of the flow is between 10 and 15 ft./min.
The anemometer is a device for measuring the velocity of the
flow of air.

An anemometer is used to measure the velocity of the flow of air
at the time it is used, and would be required for calibration
and also for the purpose of the air flow in the tunnel. The
velocity measured in the tunnel is the velocity of the air
flow. It is assumed that the velocity of the air flow is
A few inches from the tip of the flow nozzle.



OPEN
 FRONT VIEW
 FULL BODY

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SIDE VIEW

PENCIL HOOD

