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NASA TECH BRIEF

Ames Research Center

Modulated Hydrogen-Ion Flame Detector — A Concept

The problem:

To improve the sensitivity of flame ionization detectors.

The solution:

Chop the flow of the sample into the flame so that the resulting ionization will be modulated and therefore can be readily amplified independently of steady-state background ionization, thermoelectric effects, contact potentials, etc.

How it's done:

Modulation of the flow of sample into the flame of the ionization detector may be accomplished by a mechanical device which periodically interrupts flow or which changes the impedance of tubes through which the sample is flowing; for example, the sample gas stream may be modulated by a fluidic oscillator, by a periodically displaced piston, or by a variable flow restrictor such as an oscillating pintle. The periodic variation of sample concentration in the flame zone will cause the ion current passing between the sensing electrodes of the flame detector to vary and appear as an alternating current at the detector. A signal derived from the device which modulates the sample flow is shifted in phase and multiplied by the output of the ion-detecting circuit to provide a large resultant signal which is proportional to the cross-correlation between the two signals. Since the modulation period can be readily adjusted to values which are small in comparison with the periods characteristic of unwanted photoionic, photoelectric, etc. drifts, the cross-correlation between the signals from the unwanted effects and the modulation signal will be extremely small and random.

A modulated hydrogen flame detector should sharply discriminate between the desired signal and the undesired signals which often block the usual dc electrometer detecting systems used in flame detectors.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Ames Research Center
Moffett Field, California 94035
Reference: B74-10071

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

NASA Patent Counsel
Mail Code 200-11A
Ames Research Center
Moffett Field, California 94035

Source: John Dimeff
Ames Research Center
(ARC-10322)

Category 03