

NASA TECH BRIEF



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Spectrophotometric Technique Quantitatively Determines NaMBT Inhibitor in Ethylene Glycol-Water Solutions

The problem:

In studies of heat transfer media, problems of corrosion and formation of insoluble residues made it necessary to find an improved method of quantitatively determining the sodium mercaptobenzothiazole (NaMBT) inhibitor in ethylene glycol-water solutions. The improved method must be faster and more accurate than wet chemical techniques. It must also reduce analysis time, require smaller samples, and should be able to detect extremely small concentrations of mercaptobenzothiazole.

The solution:

A spectrophotometric method, using a ratio-recording ultraviolet-absorption spectrophotometer, permits analysis of NaMBT in ethylene glycol-water solutions with high accuracy.

How it's done:

Analyses are made using a spectrophotometer with a hydrogen lamp energy source. Sample preparation depends upon the condition of the sample and the expected NaMBT concentration; samples which contain insoluble residues or which appear cloudy must be filtered prior to analysis. The samples also must be quantitatively diluted using distilled water (1:100) because of the extreme sensitivity of the technique.

The spectrophotometer records a continuous curve representing the concentration of the NaMBT in the ethylene glycol-water solutions. The samples are scanned from 360 to 200 millimicrons, using a one centimeter sample cell (with distilled water in the reference cell). The maximum absorption at 311 millimicrons is compared to a previously prepared calibration curve to determine the amount of NaMBT present.

This technique has a limit of detection of 250 ppm and is accurate to 0.005 percent.

Notes:

1. A calibration curve was prepared for use with the spectrophotometer in determining the amount of NaMBT in heat transfer solutions. Several solutions of known NaMBT concentration (in the range of 0.060 to 0.220 percent by weight of 50 percent NaMBT for adequate coverage) were prepared and analyzed. The concentrations were plotted against the absorbance at 311 millimicrons for each sample and the curve was prepared, based on Beer's Law of Absorption.
2. Care must be taken to insure that no interferences are present in the ethylene glycol-water solution that will give an absorbance reading at 311 millimicrons.
3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B67-10573

Patent status:

No patent action is contemplated by NASA.

Source: G. G. Garrard
of North American Aviation, Inc.
under contract to
Manned Spacecraft Center
(MSC-11496)

Category 03



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Development of a New...

...in the Field of...

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The results of the experiments show that the proposed method is capable of measuring the rate of change of a physical quantity with a precision of...

The proposed method is simple and easy to use, and it is suitable for use in a wide range of applications. It is particularly useful for measuring the rate of change of a physical quantity in situations where the rate of change is very small...

This work was supported by the National Aeronautics and Space Administration under Grant No. NGL-44-001-001. The author wishes to thank the following individuals for their assistance in the development of this project:...

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