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**Rapid Methods**

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**for Chemical Analysis**

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**of Hydraulic Cement**

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Ronald F. Gebhardt, *editor*

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**STP 985**

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***Rapid Methods For  
Chemical Analysis of  
Hydraulic Cement***

*Ronald F. Gebhardt, editor*



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# Preface

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In the late 1960s and early 1970s, a major effort was made by ASTM Subcommittee C1.23 on (then) Chemical Analysis to allow the use of rapid methods of analysis for cements. There was a basic consensus that this was needed because of the rapid shift away from classical analytical chemistry to instrumental methods of analysis. In fact, many laboratories, particularly those that were more progressive and had access to funds, had switched almost exclusively to rapid and instrumental methods for cement analysis. Many laboratories had not run a cement analysis in accord with ASTM Referee Methods for years and freely admitted that they no longer had the capability to do so. This had been a conscious decision, made largely because a full analysis by Referee Methods required a week.

Several instrumental methods were in fairly common use, such as atomic absorption spectrometry, X-ray (emission) spectrometry, and a spectrophotometric/titrimetric scheme developed by Z. T. Jugovic. Except for the Jugovic methods, there were several varieties of methods using any given instrument type, for example, AA or X-ray.

Consensus largely broke down at this point because of the tradition that analytical methods be printed in their entirety in the *Annual Book of ASTM Standards*. With at least three AA methods and three X-ray methods, all lengthy and apparently of equivalent (claimed) precision and accuracy, the Subcommittee faced a virtually insurmountable technical and political task. If one method of a generic type should be selected, the author would surely be gratified, but the authors of the competing methods would be offended, particularly since results using each method were approximately equivalent.

The approach of using a round-robin test program for all methods in an attempt to prove one better than the others was judged to be a more monumental task than desired by the subcommittee, even if enough participants could be found. Results from each method were likely to be about equivalent; the task would have taken several years; and it probably would have been inconclusive.

Someone, identity not known after these many years, suggested that the obvious approach for rapid and instrumental methods was to set standards for precision and accuracy that must be met by any method and then allow the analyst to select his own method so long as he could prove that it worked. This approach achieved consensus, resulting in the inclusion of Rapid Methods as Optional Methods in ASTM Methods for Chemical Analysis of Hydraulic Cement (C 114-77), which first appeared in the *1977 Annual Book of ASTM Standards*.

A list of references was (temporarily) appended to C 114, pending completion of this special technical publication (STP), to provide guidance to the analyst who might not have a rapid method readily at hand. At this same time, the Subcommittee promised to put together an STP which would contain in one place a number of examples of rapid methods

for the analysis of hydraulic cement. That promise, after over ten years and several changes of editors through retirement, job changes, and other causes, is finally being met.

Even though there have been many improvements in instrumentation since most of these methods were written, the principles are still the same. Also, many analysts are using instruments very similar, if not identical, to those used in developing these methods since few of us have the inclination or funds to obtain every new model that comes out. In any event, the material provided herein provides guidance in the general field of instrumental analysis.

This STP is sponsored by ASTM Committee C-1 on Cement and Subcommittee C1.23 on Compositional Analysis.

*Ronald F. Gebhardt*

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