

## SECTION II

# X-Ray Spectrochemical Methods

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Three methods are presented in this Section. Two are wavelength dispersive (standard) methods wherein the elements are detected and measured separately; this may be either sequential or simultaneous depending on the instrument. The third is an energy dispersive method in which all elements are detected and measured simultaneously with the same detector.

The first method analyzes a flux-fused sample and is typical of the type of procedure in which the fused sample is then ground and pelletized. The second method uses a pressed powder sample without fusion. This particular method uses no additives for grinding aid or binder that remain in the sample after preparation. Sample preparation is, thus, much simplified. The third method uses a typical pressed powder sample preparation in which the sample and binder/grinding aid must be weighed.

All of the methods use interelement corrections as has been found necessary for general analysis of cement and clinker. Interelement corrections can be avoided in some cases if analysis is restricted to samples from a single source and if the composition range is sufficiently narrow; that is not the case when qualifying under the requirements of ASTM Methods for Chemical Analysis of Hydraulic Cement (C 114).

Particle size effects are not significant in any of the methods included. The fusion eliminates it in the first method, the particle size requirement eliminates it in the second, and the third makes provision for it by testing with X-rays.

The mineralogical effect, variations due to the crystalline species in which the various elements appear, is not considered in any of the methods. When analysis is restricted to portland cement and clinker, mineralogy is so similar that this effect is not significant. It also is not significant, obviously, in any fused sample so long as the original constituents dissolve in the melt. When using pressed powder samples, the analyst should be aware that the mineralogical effect may be significant for some raw materials, raw meals, and blended cements.

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