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A RAPID X-RAY DIFFRACTION METHOD FOR THE DETERMINATION OF QUARTZ IN INDUSTRIAL DUSTS

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METHODS for determining quartz in industrial dusts have received much attention for many years. Practically all the tools and technics of analytical chemistry and of mineralogy have been used in one or more of these methods, a number of which are soundly conceived and are used routinely by many laboratories. They have, however, some shortcomings that limit their usefulness, a fact recognized by many analysts.

The petrographic technic has long been used in the field of mineralogy for the identification of mineral species. Basically, it depends on the effects of various crystals on light, both normal and polarized, and requires the use of a special type of microscope for the observation of these effects. Faust [1] has described such a microscope. This technic has been adapted to the quantitative determination of quartz by Foster and Schrenk [2] and by Williams.[3] This technic, while theoretically sound, falls heir to difficulties which seriously limit its application. Special technics are necessary to analyze samples containing particles smaller than 10 microns, while particles smaller than 2 to 5 microns do not lend themselves to analysis by petrographic methods. As stated by Hamlin,[4] quartz particles under 3 microns in size are of greatest significance from the standpoint of producing pathological conditions. It can be seen, then, that the most serious quartz hazard cannot be readily evaluated by petrographic examination. Foster and Schrenk [2] have suggested a method for dealing with this problem, but their method is based on two assumptions and on a theoretical consideration of particle size distribution. Inasmuch as industry very often uses size-limiting methods in crushing and screening, such theoretical considerations may be invalid in such cases. Petrographic methods have the further disadvantage of requiring a great deal of skill and experience on the part of the analyst.

The ultimate chemical analysis of a sample does not give accurate indication of the molecular combination of the elements present and is not useful enough in

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