

# This Week's Citation Classic

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Kitson R E & Mellon M G. Colorimetric determination of phosphorus as molybdivanadophosphoric acid. *Ind. Eng. Chem. Anal. Ed.* **16**:379-83, 1944. [Purdue University, Lafayette, IN]

**This paper described a spectrophotometric study of molybdivanadophosphoric acid and justified its recommendation for measuring phosphorus colorimetrically. An improved method was proposed, using it, to determine phosphorus in plain carbon and low-alloy steels. [The SCI<sup>®</sup> indicates that this paper has been cited over 135 times since 1961.]**

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"During my undergraduate years at Mt. Union College, I worked nights as a routine chemist in a steel foundry. One of the more time-consuming and difficult analytical procedures was that for measuring phosphorus in steel. This was done then by dissolving the steel in nitric acid, precipitating the phosphorus as ammonium molybdiphosphate, carefully filtering and washing the precipitate, dissolving the precipitate in a known amount of base, and back-titrating the excess base with standard acid.

"I undertook my graduate training under M.G. Mellon at Purdue. He was deeply interested in analytical applications of heteropoly acids, especially those which lead to a colorimetric analysis. Purdue had one of the then new CM spectrophotometers, which made possible considerable refinement of most colorimetric methods. As a

possible thesis program, he suggested a thorough literature search of the heteropoly acids to be followed by studies of specific new applications to colorimetric methods which might suggest themselves from this review.

"The literature study turned up several references to molybdivanadophosphoric acid as a colorimetric method for the determination of phosphorus in steel. The method had not found wide use for several reasons. It appeared that the method could be improved by a careful spectrophotometric study (only visual colorimetric studies had been run up to that time). Remembering the tedious procedure for measuring phosphorus in steel that I had used so many times, I suggested and, with Mellon's approval, undertook a study of the method. I was able, with Mellon's guidance and experience in spectrophotometry, to eliminate some of the problems encountered earlier, to define an improved procedure for determining phosphorus in steel, and to show, using Bureau of Standards standard steel samples, that it gave results at least as precise as the much more laborious titrimetric procedure. The simultaneous publication of this work and the onset of availability of modestly priced colorimeters and spectrophotometers led to rapid adoption of the method.

"I have not followed the literature in this field since leaving graduate school so I am not aware of the context in which the paper is being cited. I can only assume that the procedure was, as I thought it would be, a very useful one and that the basic spectrophotometric study provided a base for its application to other types of steel and to other materials beyond the plain carbon steel in which I was most interested."