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NOTE ON THE ESTIMATION OF MINERAL ACID IN VINEGAR.

By PHILIP SCHIDROWITZ, Ph.D.

(Read at the Meeting, December 5, 1906.)

IN a paper on the "Determination of Mineral Acids in Vinegar" (*Journ. Soc. Chem. Ind.*, 1906, pp. 836-838), by F. W. Richardson and J. Leonard Bowen, the authors refer to a process suggested by me in a paper read before this Society in 1903 (*ANALYST*, 1903, p. 233 *et seq.*). Their remarks in this connection call for some comment. In the first place, they say, referring to my process: "The method is based upon

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the supposition that the addition of ethyl alcohol to a solution of acetic acid entirely prevents the reaction of the latter with the indicator" (methyl orange). It is necessary to point out that this is not a "supposition," but a fact, and that, moreover, this fact was not discovered by me, but that the literature bearing on the point was quoted in my paper. Messrs. Richardson and Bowen did not, perhaps, regard the matter from the point of view of modern physical chemistry, for if they had done so they might possibly have come to the conclusion that this "supposition" was by no means a surprising one. In this connection, also, their statement that "There are no facts to show that, when sulphuric acid is present to the extent of only one in a thousand, it really does decompose any small amounts of alkaline acetate in the cold," is a little remarkable.

Secondly, referring to some experiments on my process, they say: "As the following table shows, we could get any results we wished for by varying the amounts of alcohol and vinegar." With reference to this statement, it is only necessary to say that in my paper specific instructions are given as to the quantity of alcohol to be used, and that I myself showed that a variation in this regard gives unsatisfactory results.

From the general comment concerning my process, I gather that those portions of my paper dealing with the use of a control and of methyl-orange paper under certain conditions were entirely ignored by Messrs. Richardson and Bowen. Further comment, therefore, on their criticism of my paper seems unnecessary, if I except their somewhat extraordinary statement that "It is obvious that a method which depends upon the exact adjustment of the amounts of an adjunct to attain an end reaction, which at the best is indefinite, is scarcely suited to the requirements of a *busy analyst*" (the italics are mine).

In this connection I would point out that my process scarcely takes as many minutes as the process put forward by Messrs. Richardson and Bowen does hours.

I may further point out that independent experiments by C. Rossi (*L'industria Chim.*, 1904, vi., 253, 254, and *THE ANALYST*, 1905, p. 274), published about a year after my paper appeared, entirely confirm my work, and that several of my colleagues who have tried the process have privately communicated to me their substantial agreement with my results. It is possible, therefore, in the light of my above remarks, that Messrs. Richardson and Bowen's failure to obtain satisfactory results was not entirely due to the defects of the process.

In conclusion, I would point out that a process such as mine, although requiring perhaps a little careful manipulation in special cases, has one advantage over an indirect process such as that of the authors referred to, and that is—that if a positive result is obtained, there is not the slightest doubt that mineral acid *is* present. The indirect process is probably more accurate when we are dealing with vinegars of normal constitution, but on occasion—as, for instance, in the case of a vinegar to which mineral acid has been added, and which has subsequently been partly neutralized—the indirect process may give an absolutely fallacious result.

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DISCUSSION.

Mr. F. D. RATCLIFF remarked that it was generally agreed that at the present day it was somewhat a waste of time to look for mineral acid in vinegar. At its present price of 80s. per ton, 0·1 per cent. of sulphuric acid on 1,000,000 gallons would cost £17 17s., while the same quantity of acetic acid from grain would cost for raw materials about £104. It did not seem likely that any vinegar manufacturer would run the attendant risk of trouble for the sake of the difference between £17 17s. and £104 on 1,000,000 gallons, especially since the old ideas as to the advantages of adding sulphuric acid to vinegar had been exploded. He had tried Dr. Schidrowitz's method, and should like to submit that the degree of accuracy claimed for it by the author—namely, 0·01 per cent.—was too close. He (the speaker) had made a solution of 0·245 per cent. of sulphuric acid in 4 per cent. white vinegar, and had titrated it with soda after addition of alcohol as recommended by Dr. Schidrowitz. The result when absolute alcohol was used was 0·17, and with a similar quantity of 80 per cent. alcohol it was 0·27. He believed that the author had not mentioned the strength of alcohol to be used.

Dr. SCHIDROWITZ said that the direction was that "alcohol" should be used, by which absolute alcohol was meant.

Mr. RATCLIFF, continuing, said that without doubt the paper test was capable of indicating the presence of a very small quantity of sulphuric acid. This was clearly seen if the colours shown by normal vinegar without sulphuric acid and vinegar containing, say, 0·1 per cent. of sulphuric acid were compared. He had not been able, however, to determine accurately the added acid in this way, because the colours ran so much into one another. Nevertheless, it was a very quick way of ascertaining whether or not mineral acid was present.

