

February 26, 1943

Dr. Ben Arnoff,
Medical Section,
Industrial Commission of Ohio,
Columbus, Ohio.

Dear Dr. Arnoff:

Thanks very much for sending me the description of the method of analysis for lead employed in Dr. Davidson's laboratory. I regret very much that I cannot commend this method as satisfactory. Therefore, in order to be honest and at the same time reasonable, I shall have to go into some detail to explain the situation.

The method as described is one of the poorer modifications of the Fairhall method. I am familiar with it and with the men who use it. It gave quite unreliable results in the hands of Myers and his associates, and it cannot be made to yield satisfactory results in the hands of the most skillful chemists available. Accordingly, it has been abandoned for a period of about ten years, and it can only be referred to as an obsolete and discredited method. This is particularly true in view of the fact that there are at least four methods available at the present time which are much more sensitive, much more specific, and much more precise. The method actually is to be condemned quite unreservedly. It will not give reliable results for two reasons. First, it is not sufficiently sensitive to deal with the small quantities of lead that occur in blood, small samples of urine, spinal fluid, and small samples of tissues. Second, it is not specific, since no effort is made in the method to eliminate certain other metals which always occur in small quantities in the tissues, and which may be found in considerable concentration from time to time. I refer here to copper and bismuth particularly, but there are others which will also occur. In order to be reasonably specific, it would be absolutely necessary to separate out the lead as the sulfate before making a determination of the chromate. The failure to use this step is likely to yield high results which are not due to lead at all.

A further criticism could be made in that this method is laborious and very exacting in the skill of the operator. It is, in fact, one of the most difficult of the quantitative chemical procedures. Before the days of the Dithizone and the Spectrographic and the Polarographic methods, we spent years in devising a method that would give reasonably satis-

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factory results. We finally succeeded in obtaining an accuracy that was satisfactory in dealing with a quantity of lead in excess of 1/10 of a milligram. Actually, however, the loss in the various steps of the analyses were of the order of 0.07 milligrams per sample. This meant that the method was quite unsatisfactory, except when large samples were available for analysis. Accordingly, we went in search of more sensitive methods, as the result of which the present quantitative spectrographic was developed. About this time, we and other workers began to investigate the Dithizone method proposed by Fischer and Leopoldi. There are now several modifications of this method which are quite satisfactory for use, and none of these obsolete methods should be employed at present in attempting this difficult type of diagnostic analytical work.

This, I believe, is a very good example of the necessity of the adoption of substantially uniform methods among those that are to do work of this kind. If I were in your position, I would not accept the results obtained by the use of methods of this type as being of any diagnostic value; rather I would tactfully urge the necessity of adopting more precise and more sensitive methods.

If I can be of any service to you along the lines I have suggested, in achieving your purpose, I should be glad to do so.

Very truly yours,

Robert A. Kehoe, M. D.

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