

November 22, 1941

Lieut. Colonel Gentzkow
Army Medical School
Washington, D. C.

Dear Colonel Gentzkow:

We are sending herewith two copies of analytical results and comments which will report the results of our studies of the field water cans. I believe that the results are sufficiently clear-cut to condemn the use of this type of can. There did not seem to be any point in laboring the question of the amounts of zinc that were found, particularly since definitely hazardous amounts of lead were found in the water. The literature on zinc is rather confusing (Mineral Metabolism, A. T. Shohl, American Chemical Monograph Series, 1939, Reinhold Publishing Company). You may, however, wish to add some comment of your own concerning the zinc on the basis of your previous experience.

For our own information I plotted the rates of uptake of lead and zinc in the various waters and I am sending this graph along for your information. It added so little to the observations, that it did not seem worthwhile to include it in the report, but the difference in rates is a matter of some interest.

It occurred to us that the presence of the die casting might influence the amount of electrolysis that would occur in the cans and we set up a parallel experiment using ordinary 3-gallon galvanized pails, to one of which a die casting was soldered. No great differences in the amount of corrosion in the two buckets were noted. On the other hand, the degree of effect would be greatly influenced by the amount of light metals, particularly magnesium in the casting, and it might be profitable in your discussions with the Quartermaster Corps to suggest that some engineering be done on the composition of the die casting if they continue to use it.

I am also sending in a day or so under separate cover your copy of the manual of laboratory methods. This is a very good book indeed and is most satisfactory

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as a manual. The arrangement and generalized information is excellent and the wealth of topic and detail should make this valuable in any analytical laboratory. The only comment and suggestion for change that occurs to me is to bring the material up-to-date in keeping with advances in analytical technic. While these are not absolutely necessary, they would add greatly to the value of your book. I will limit comments to Part II (Chemistry) and itemize the points which you might consider for change:

(1) More stress could be laid on physico-chemical methods of analysis. Methods employing the spectrograph, polarograph and photoelectric methods (colorimetry) have been developed to a sufficient degree of accuracy and reliability so that for certain analyses at least, these methods are methods of choice. Specific examples might be cited, but they are not entirely necessary since current scientific publications rarely appear without a new application or improvement in existing techniques.

(2) The chapter dealing with pH could be revised to give less theory and more practical information. This information should include instruction in the use of the pH meter now widely used for determinations and the table of indicators might be enlarged and some comment on their proper choice could be given. The tables of buffer solutions are very helpful.

(3) The chapter on toxicologic investigation could be brought up-to-date and possibly enlarged. It occurs to us that the following would be helpful.

(a) The Gutzeit method for arsenic analysis is generally considered unsatisfactory. We would suggest the molybdenum blue method as described by Hubbard (Industrial and Engineering Chemistry, Analytical Edition, in press). Our own choice would be the polarographic method by Bambach (Industrial and Engineering Chemistry, Analytical Edition, in press). This latter method is ideal from the standpoint of sensitivity and accuracy and is least time-consuming, particularly where only occasional samples are analyzed.

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(b) In connection with the analysis for mercury, our experience has indicated that the photometric method using dibetanaphthylthiocarbazone (Hubbard, Industrial and Engineering Chemistry, Analytical Edition, 12:768, 1940) is better than Winkler's method with dithizone.

(c) The dithizone procedure for lead analysis should be included, both titrimetric and photometric. Some modification of the dithizone method is now used by practically every worker in this field. Mention might be given to the spectrographic and polarographic methods as well.

(d) In connection with alkaloids, it might be well either to reproduce or arrange a scheme for the systematic identification of these compounds. Attention is directed to the scheme given by Kirby E. Jackson (Industrial and Engineering Chemistry, Analytical Edition, 10:380, 1938). In this portion the statement can be made (page 487, lines 14-15) that if the same sample is used for the determination of the volatile poisons, any alkaloids which are unstable at high temperatures may be lost (belladonna and hyoscyamus alkaloids).

With best regards, I am

Cordially yours,

WM:vr

Willard Machle, M. D.