

Matrix interference in the compendial limit test for aluminum in citric acid used to prepare dialysis solutions

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Since the aluminum contamination in dialysate can cause toxicity in chronic kidney disease patients who undergo long-term dialysis treatments, the presence of aluminum in substances used to manufacture dialysate must be tested to ascertain that it is not higher than the allowed limit. In most pharmacopoeias, the current test for aluminum in citric acid, an ingredient of citrate-based dialysate, is carried out by concomitantly extracting a 0.2 g/mL citric acid sample solution and a 0.04 g/mL aluminum standard solution with chloroform containing.

8-hydroxyquinoline. After the fluorescence measurement of the extracts, the fluorescence intensities (F.I.) of both solutions are compared thus insuring that the F.I. of the sample solution does not exceed that of the standard aluminum solution which is used as an acceptance criterion (0.02 ppm aluminum). From our experience and that observed by other laboratories, the F.I. readout from the citric acid sample was atypically lower than that of the standard aluminum solution and even lower than the blank (water). The aim of this work was, therefore, to assess the matrix effects in the test since citric acid, which is present at a concentration >106 times higher than aluminum, might cause the interference. By constructing and comparing the two standard curves of aluminum solutions prepared in water versus in 0.2 g/mL citric acid solution, it was found that they were absolutely different in terms of slope and y-intercept. Besides, the F.I. values on the plot of the citric acid solution were much less than those of the water. In

another experiment, the decrease in F.I. of the aluminum standard solution was clearly seen when the co-existing concentration of the citric acid increased. According to these findings which indicated citric acid interference, the compendial limit test for aluminum in citric acid should be revised; otherwise, it could yield underestimated results leading to misleading conclusions.

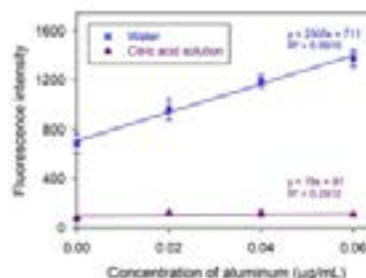


Figure 1 Standard curves of aluminum solutions prepared in water versus in 0.2 g/mL citric acid solution.

Speaker Biography

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