



# A FIELD TEST KIT FOR ARSENIC IN DRINKING WATER: LABORATORY EVALUATION.



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## Introduction

Worldwide, there are millions of people using drinking water polluted with arsenic including in Argentina, Australia, Bangladesh, Chile, China, Hungary, India, Mexico, Peru, Taiwan, and Thailand. Arsenic contamination in ground water may occur because of dissolution of natural material or from industrial effluent. The concentration of arsenic in ground water varies widely, so it cannot be accurately predicted by testing of small number of water samples. The major exposure to arsenic is by ingestion resulting in arsenicosis, which leads to cancer, reproductive effects and effects in skin, blood vessels, and limbs. Those people with arsenic poisoning experience great suffering and are often in the poorest regions and communities. Because of the constraints of cost, and too many samples to test, the Quick Arsenic field test kit is a useful tool for detecting concentrations of arsenic.



► **Figure 1. Map of the distribution of arsenic.**

## Objective

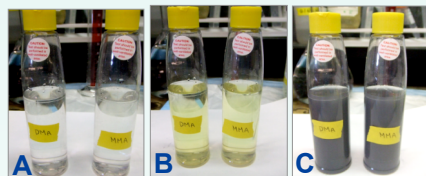
This report tries to find out whether the mineral and chemical composition in the drinking water plays a role in the test kit results.

## Method

I am using the Quick Arsenic field test kit to test the effect of synthetic urine, MMA, DMA and salts in test kit accuracy.

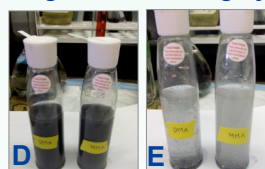


► **Figure 2. The Quick Arsenic field test kit. There are Reaction Bottle, three of Quick Reagent, and test strips in the kit.**



to Reaction Bottle and shake vigorously. (B) The color changes while add second reagent in the bottle becoming light yellow. (C) After add the third reagent, it become gray and cloudy.

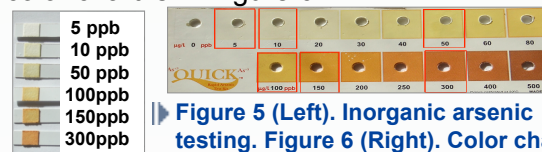
► **Figure 3. Three steps of adding reagent procedure**



► **Figure 4. (D) Insert the strip into the turret and close it. Let it sit 10 minutes. (E) It become light gray after 10 minutes.**

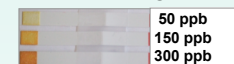
## Result

1. Testing the inorganic arsenic in de-ionized water (DI water) with concentration of 5, 10, 50, 100, 150, and 300 ppb in Figure 5. The color chart is in Figure 6.

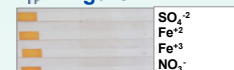


► **Figure 5 (Left). Inorganic arsenic testing. Figure 6 (Right). Color chart.**

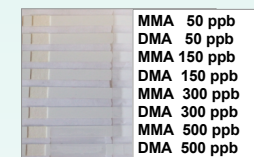
2. Then, I test the different concentration of inorganic arsenic in synthetic urine and comparing of the result of the DI water as shown in Figure 7.



► **Figure 7.**



► **Figure 8.**



► **Figure 9.**

3. Finally, as shown in Figure 8, I add different salts of  $\text{SO}_4^{2-}$ ,  $\text{Fe}^{+2}$ ,  $\text{Fe}^{+3}$ , and  $\text{NO}_3^-$  in the 200 ppb of inorganic arsenic in DI water. The result of  $\text{NO}_3^-$  is much darker.

4. Besides, I also test the organic species of arsenic methylarsonic acid (MMA) and dimethylarsinic acid (DMA). As shown in Figure 9., If there are different concentrations of 50, 150, 300, and 500 ppb of organic arsenic, the strip shows no color.

## Conclusion

The field test kit is for testing inorganic arsenic. It does not work on organic arsenic, even in high concentrations. Its limitation is 10 ppb from the past literature, but in my tests, color was seen at 5 ppb.

In comparing the result of DI water and synthetic urine, synthetic urine gave less of a response. When arsenic is constant, the presence of  $\text{NO}_3^-$  in a darker color or stronger response.

## Acknowledgments

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