

# As<sup>+3</sup> QUICK As<sup>+5</sup>™

Rapid Arsenic Test Kit

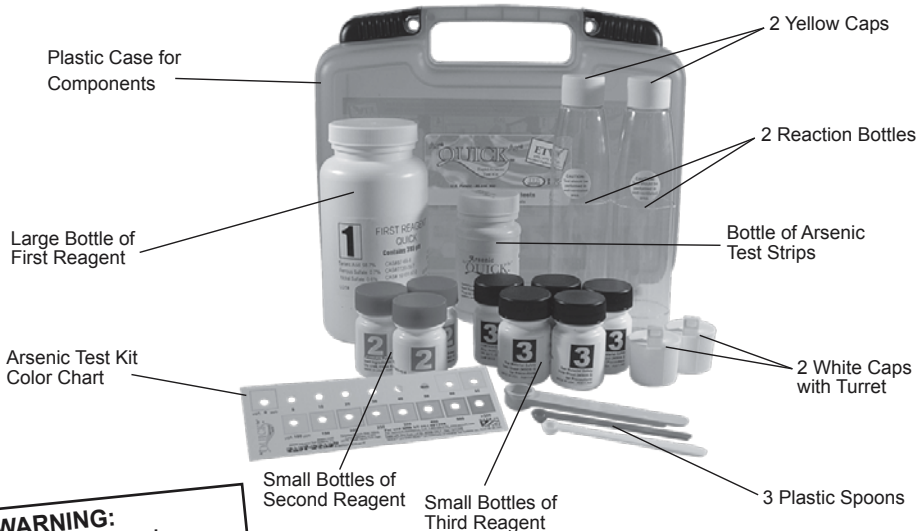
Kit Part Number: 481396  
100 Tests

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Information on the performance characteristics of this kit can be found at [www.epa.gov/etv/verifications/verification-index.html](http://www.epa.gov/etv/verifications/verification-index.html), or call ITS at 803-329-9712 for a copy of the ETV verification report. The use of the ETV® Name or Logo does not imply approval or certification of this product nor does it make any explicit or implied warranties or guarantees as to product performance.

**FOR BEST RESULTS, FOLLOW KIT INSTRUCTIONS.**



**WARNING:**  
Hydrogen and Arsine gases are generated during the test. Work in a well-ventilated area away from open flames and other sources of ignition. Review the Material Safety Data Sheet before handling any chemicals.

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481396-INST  
Revision: 01/06/12

## ABOUT KIT #481396:



**Part Number: 481396, 100 Tests**

**This test detects soluble inorganic Arsenic ( $As^{+3}$  and  $As^{+5}$ )**

This Arsenic Test Kit provides a safe, simple, and reliable way to test for Arsenic from 0 to 50 $\mu$ g/L (up to 250 $\mu$ g/L when using 1/5 dilution method). Follow the instructions carefully to get reliable results. All components are supplied in the kit except for a timer and thermometer. This test tolerates up to 2 mg/L Hydrogen Sulfide without interference. No interference was found for this test kit for Antimony up to 0.5mg/L. No interference from Iron or Sulfate was found. It is recommended that the water sample be 22°C - 28°C / 72°F - 84°F. The color chart was standardized at 24°C / 75°F. For reference purposes, record the temperature at which the sample was run. Use all reagents and test strips within the allowed shelf life as marked on each container.

### Kit Components:

- 2 Reaction Bottles, clear PVC, with 20ml (lower) and 100ml (upper) lines
- 2 White Caps, with white turret, for holding test strip
- 3 Plastic Spoons (one large pink spoon for First Reagent; one small red spoon for Second Reagent; and one small white spoon for Third Reagent)
- 1 Large Bottle of First Reagent (395gm)
- 3 Small Bottles of Second Reagent (26gm ea.)
- 5 Small Bottles of Third Reagent (28gm ea.)
- 1 Bottle of Arsenic Strips (100 total) - **Caution:** Each testing pad contains about 1mg Mercuric Bromide ( $HgBr_2$ )
- This Instruction Booklet with MSDS
- Instruction Sticker
- Plastic Bag for Used Test Strips (*Not pictured*)
- 2 Yellow Caps for mixing
- Plastic Case for Components
- Easy-Read™ Color Chart

### Options:

- Thermometer - mercury free (*US \$3.99 each - sold separately, Order # 481396-T*)
- Stopwatch (*US \$14.99 each - sold separately, Order # 481660*)

### About the Patented Reaction (Modified Gutzeit method):

Inorganic Arsenic compounds in the water sample are converted to Arsine ( $AsH_3$ ) gas by the reaction of Zinc Dust and Tartaric Acid. Ferrous and Nickel salts have been added to accelerate this reaction. The Arsine reacts with the Mercuric Bromide on the test strip to form mixed Mercury halogens (such as  $AsH_2HgBr$ ) that appear with a color change from white to yellow or brown. Potassium Peroxymonosulfate (second reagent) is added to oxidize Hydrogen Sulfide to Sulfate.

**PRECAUTIONS:** Hydrogen gas and Arsine gas are generated during the reaction. Work in a well-ventilated area away from fire and other sources of ignition. All reagents are unsuitable for human consumption and must be kept away from children and pets.

**US Patent # 6696300**

**WARNING:** Hydrogen and Arsine gases are generated during the test. Work in a well-ventilated area away from open flames and other sources of ignition. Review the Material Safety Data Sheet before handling any chemicals.



For better accuracy, we recommend running the test in duplicate for each water sample.

## Test Procedure:

(See Instruction Sticker in plastic case cover for visual help.)

FOLLOW KIT INSTRUCTIONS CLOSELY.  
Part Number: 481396, 100 Tests

- For best results, the water temperature should be between 22°C to 28°C / 72°F - 84°F . Use a thermometer to verify the temperature of the sample.
- To the Reaction Bottle, slowly add the water sample to the marked line on the bottle (100 mL).
- Add **3 level** pink spoonfuls of First Reagent **1** to the Reaction Bottle. Cap the bottle securely with yellow mixing cap and shake vigorously for **15 seconds**.
- Uncap the Reaction Bottle; add **3 level** red spoonfuls of Second Reagent **2**. Cap the bottle securely with yellow mixing cap and shake vigorously with bottle upright for **15 seconds**. Allow the sample to sit for **2 minutes** to minimize Sulfide interference.
- Uncap the Reaction Bottle and add **3 level** white spoonfuls of Third Reagent **3**. Cap the bottle securely with yellow mixing cap and shake vigorously for **5 seconds**.
- Remove yellow mixing cap. Recap the bottle immediately and securely using the white cap (must be dry) with turret up (open).
- Remove one Arsenic test strip from the test strip bottle and immediately recap the test strip bottle. In order for the results to be accurate, the test strip must be oriented correctly, and inserted to the correct depth. Insert the test strip into the turret as illustrated in Figure 1 and Figure 2:
  - Position the strip so that the test pad and red line are facing the back of the white cap (see Figure 1).
  - Insert the strip into the turret until the red line is even with the top of the turret, and close (flip down) the turret (see Figure 2). This will hold the test strip in place. (**Note: Steps 6 & 7 should be completed within 30 seconds.**)
- Using a timer, allow the reaction to occur in an undisturbed, well-ventilated area for 10 minutes. Reaction generates small hydrogen gas bubbles.
- After the 10 minute wait (but before 12 minutes), pull up the turret and carefully remove the test strip. Do not touch the reaction pad. Use the Quick™ Easy-Read™ Color Chart to match the reaction pad color. Position the reacted test strip pad behind the punched holes, view center of test strip pad through the hole, and confirm precise color match and Arsenic level. **COMPLETE MATCHING IMMEDIATELY (WAIT NO LONGER THAN 30 SECONDS)**. After 30 seconds have elapsed, the colors begin to change (yellow colors fade and browns turn grey or black). For best color matching results use natural daylight; avoid direct sunlight.
- Record your result.



**(Mercuric Bromide strips (Arsenic test strips) will not react with arsine gas if they are wet!)**

**NOTE:** If your Arsenic level is 200 ppb or above, you can confirm the elevated levels by diluting the water sample 1 to 5. Fill the Reaction Bottle to the bottom marked line with water sample (20 mL) and add Arsenic-free water to the upper marked line. Now run steps 3 thru 10. For your true Arsenic value, multiply the result by 5 to correct for dilution and record the value.

**ATTENTION:** Soon after testing is completed, decant liquid from the bottle down a drain that is not used for food preparation and flush with water. Wet Zinc should be collected and disposed of according to local regulations. Rinse the bottle, white cap, and yellow cap with clean water. Shake off any excess water and dry the white cap with turret with a soft tissue. Drying the white turret cap is especially important if you plan to run the next test immediately. Store the used strips in the plastic bag marked "Used Mercuric Bromide (HgBr<sub>2</sub>) Test Strips". Keep the used strips inaccessible to children and pets, and dispose according to local environmental regulations.

## **SUGGESTIONS FOR BEST ACCURACY**

1. To gain confidence in using this test kit for unknown samples, it is highly recommended that you use the kit on a sample with a known inorganic Arsenic concentration value, or with a sample that has been prepared using an Arsenic standard. By making a “practice run” of the test, you will familiarize yourself with all of the procedures necessary to ensure accurate testing results. Additionally, you will have the opportunity to become familiar with the process of color matching, which will help to ensure accurate test results. ITS suggests the test be run in duplicate for better accuracy.
2. The water sample must not be preserved with Nitric Acid or any other preservation method. Small amounts of strong acids will interfere with the test results; and therefore it is best that the water sample be freshly drawn and run within 24 hours. Some water samples held for over 24 hours may read low. The water sample should not contain any significant amount of buffers. If you are planning to send a duplicate sample for ICP laboratory verification, follow preservation requirements for that sample only.
3. The water and ambient temperature are very important to ensure accurate results. As an example, a water temperature of 15°C / 59°F can result in the color development on the testing pad to be lighter than the actual Arsenic concentration in the tested sample (a false low reading occurs). When the water is cold, warm water sample to 22°C to 28°C / 72°F - 84°F before testing (using a microwave is acceptable). If the water temperature is above 28°C / 84°F your result may read low (accelerator chemistry reacts too fast). Consideration must also be made for the air temperature when running the test. Best results are from 22°C to 28°C / 72°F - 84°F (water and air). The color chart and Arsenic Scan chart are calibrated at 24°C / 75°F.
4. After the test has been run, try to rinse out the reaction bottle with clean tap water as soon as possible. When the reaction chemicals are allowed to sit in the reaction bottle after the reaction time, the zinc may begin to adhere to the bottom of the bottle. When this occurs, you may need to clean the reaction bottle with a bottlebrush. Another method for zinc removal is to use a 20% Hydrochloric Acid (reusable) rinse. Be sure to rinse the reaction bottle with clean tap water before running the next test.
5. When matching your test strip pad with the colors on the Easy-Read™ color chart, it may be helpful to find a color that is clearly lighter than the test strip pad and make note of it (as an example, we will use a value of 10 ppb). Next, find a color that is clearly darker than the test strip pad (as an example, we will use a value of 30 ppb). By defining a lowest and highest possible value range we can assume that the correct color match is 20 ppb. If the 20 ppb color matches, then you have determined your Arsenic level. In some cases, however, an exact color match will not be available. As an example, if your test strip pad is slightly darker than 20 ppb and slightly lighter than 30 ppb, you can estimate a value of 25 ppb as your result. Following these easy steps can make color matching more precise. Careful color matching will assure the best possible result.
6. Levels of Hydrogen Sulfide above 2 mg/L can interfere with this test, resulting in elevated Arsenic readings. Our test kit will eliminate up to 2 mg/L of Sulfide interference. To overcome Hydrogen Sulfide levels above 2 mg/L, allow the water sample to sit at room temperature, uncovered and exposed to air for 8 hours (about 50% of the H<sub>2</sub>S gas dissipates for every 8 hours).  
Industrial Test Systems, Inc. sells Hydrogen Sulfide detection kits (part # 481197-20) for quick, accurate verification of this interfering ion. The test kit detects levels of 0.3, 0.5, 1.0, and 2.0 mg/L (ppm). The Hydrogen Sulfide test kit contains all components necessary to run the test, and is economically priced at \$15.99 for 30 tests.
7. It has been determined that irrigation of crops with arsenic water increases the soil arsenic levels which can increase the arsenic content in the crop. This Arsenic kit can be used for screening of Arsenic levels in soil. **See procedure on Page 8.**
8. If you have any questions or comments, please feel free to contact our R&D Department at 1-803-329-0162 ext 211 or by email at: [its@sensafe.com](mailto:its@sensafe.com).

Sample No.	1	2	3	4	5
Location					
Date					
Result					

## **QUICK™ ARSENIC TEST KIT TROUBLESHOOTING**



<b>Problem</b>	<b>Possible Causes/Solutions</b>
Low or no color development on reaction pad after 10 minute reaction time.	<ol style="list-style-type: none"> <li>1. Temperature of the sample may be below 20°C / 68°F</li> <li>2. The strip may not have been inserted correctly. Run test again and verify strip pad is exposed to arsine gas.</li> <li>3. Correct amount of reagents may not have been added. Run test again.</li> <li>4. The reaction cap may have been loose. Run test again.</li> <li>5. The sample may contain organic arsenic or the arsenic is bound. Kit only tests for soluble inorganic arsenic.</li> <li>6. pH of the sample during 10 minute incubation is incorrect. pH should be between 1.5 to 1.7 at step 5, page 3.</li> <li>7. Test strip pad is very wet, which inhibits colorimetric reaction. Moist pad at end of test is normal.</li> </ol>
Only part of the strip reaction pad has color.	<ol style="list-style-type: none"> <li>1. Strip pad may not be facing properly. Run test again.</li> <li>2. Reaction cap may have leaked. Run test again.</li> </ol>
Little or no Hydrogen gas bubbles occur after Reagent 3 addition.	<ol style="list-style-type: none"> <li>1. Addition of Reagent 1 could have been omitted, run test again.</li> <li>2. Excess oil and grease will hinder or suppress rate of gassing, dilute sample and run test again.</li> <li>3. Strong acid may be present in sample as a preservative or from sample source because of where and how the sample was collected. Strong acids interfere with test.</li> <li>4. pH of water sample is too alkali. For proper Hydrogen gas reaction the water sample with all three reagents added should be around a pH of 1.5 to 1.7 at step 5, page 3.</li> </ol>
Color on the pad suggests more arsenic is present than is expected.	<ol style="list-style-type: none"> <li>1. Possible interference, check for sulfide.</li> <li>2. Dilute sample 1:5 and run test again.</li> </ol>
Interference due to elevated Sulfide.	<ol style="list-style-type: none"> <li>1. Allow sample to sit at room temperature, exposed to air for up to 8 hours (typically 50% of the hydrogen sulfide gas is dissipated every 8 hours).</li> <li>2. Run test again, using double the amount of Second Reagent</li> </ol>
Color on the pad is darker than the highest concentration on the chart.	<ol style="list-style-type: none"> <li>1. Dilute the sample with arsenic/sulfide free water, run test again.</li> </ol>
Color on the Arsenic test pad suggests arsenic recovery is below arsenic level expected.	<ol style="list-style-type: none"> <li>1. Cap may have leaked, run test again.</li> <li>2. Arsenic may be bound, insoluble, or organic. This kit only tests for soluble inorganic arsenic.</li> <li>3. Interference due to elevated nitrate, nitrite, Hydrogen Sulfide or lead (Pb<sup>+2</sup>) in water sample.</li> <li>4. Temperature may be too low. Run test again.</li> <li>5. The strip pad may be very wet. Be sure water temperature is below 28°C / 84°F.</li> <li>6. Sample was preserved with strong acids. Run test again without preservative acids.</li> </ol>

## **ADDITIONAL TROUBLESHOOTING IDEAS**

If the “Quick™ Arsenic Test Kit Troubleshooting at a Glance” section does not resolve the questionable result, then proceed as follows (in order given):

### **1. Initial Verification Check**

- a. Verify against the parts list that the correct kit and components were received.
- b. Verify that the storage time for the sample is within the recommended 8- hour window. Clean glass or plastic containers are acceptable for storage. Longer storage time is possible only when microbiological activity is not present.
- c. Verify that the sample is not preserved by acidification, with strong acids (especially nitric acid). Strong acids will interfere with the chemistry of the test kit.

### **2. Standard Solution Check**

- a. Run a known standard solution (such as a dilution of ITS' Cat# 800-4, 1000 ppm Arsenic standard), through the test procedure.  
*The result of the standard solution check should meet kit specification (+/- 18 ppb or +/-30%).*

### **3. Test Procedure and Test Kit Check**

- a. Verify that the correct test procedure matches the kit being used.
- b. Verify that the color chart is correct for the kit in use.
- c. Verify that the correct reaction vessel and volume are being used.
- d. Verify that the amount of reagents are correct for the sample size and kit being used.
- e. Verify that the dilution factor, if used, is correct.
- f. If using the optional Quick™ Arsenic Scan, verify that the density value is set to “Y”.

*If any part of the test kit and/or procedure is incorrect, correct the problem and repeat the test.*

### **4. Test Kit Reagents and Analytical Technique Check**

**If the standard solution check still does not match the expected results, check the reagents used in the test and the analytical technique as follows:**

- a. Verify that the reagents have not expired. While most reagents have a reasonable shelf life, storage temperature and storage conditions may affect it. Replace suspect reagents and run the standard solution check (Step #2 above) again.
- b. Examine the test strip. Verify that the pads on the strips are white and dry.
- c. If the strips are out of date or do not pass the visual check above, obtain fresh strips and repeat the test.

### **5. Reagent Contamination Check**

- a. Run a water blank (arsenic and sulfide-free) through the entire process, using the correct test procedure for your kit; include sampling, storage, digestion, and colorimetric determination when applicable. Color development on the test pad may indicate a contaminated reagent. Substitute the reagents one by one with new reagents until the reacted pad is white (shows no arsenic).

### **6. Unexplained differences to Reference Arsenic Test**

If you run ITS's Arsenic kit and find an unexplained difference when compared to a reference arsenic test method take the following steps:

1. Confirm that you are running the test according to the correct procedure.
2. Make sure your questionable sample is within the range of the test. (A sample out of range for the method may give erroneous results because of overdeveloped color.)
3. Try a 1:5 dilution of the sample with distilled or deionized water and retest the sample.
4. Test a known standard (for example, a 100 ppb Arsenic standard) to see if it is within specifications.
5. Confirm that organic arsenic is not the cause of the difference in results.

If the test with a known standard solution gives the correct value in comparison with the reference method, then the sample with questionable results may have an interfering substance. The issue may possibly be resolved by a common analytical technique known as the **Spiked Recovery Test Method for Interferences** outlined below. (Note: Because this method is somewhat technical you should have already performed the easier steps listed above.)

## **ADDITIONAL TROUBLESHOOTING IDEAS - CONTINUED**

### **7. Spiked Recovery Test Method for Interferences:**

1. Add a known amount of Standard Solution to the questionable sample. This is now the "spiked sample." To avoid test results being underdeveloped, it is recommended to add the Standard Solution amount that is at least equivalent to three times the minimum detectable limit of the test (15 ppb).
2. Test the spiked and un-spiked (original) sample using the same reagents, instruments, and technique or test method. The spiked sample should show an increase equal to the amount of standard added. The value received is called the **Recovery**. Ideally the % recovery is 100%. Results are acceptable if % recovery is in the range of +/- 30%. The formula for **Calculating Percent Recovery** is below.
3. If the percent recovery is not in the acceptable range there may be interferences. If it is not possible to dilute the sample past the point of interference, and still be within the detection limit of the test kit, a different test kit with a different detection specification may be needed.

#### **Calculating percent recovery :**

The percent recovery formula is as follows:

$$\% \text{Recovery} = \frac{100(C_s - C_u)}{K}$$

**Where:**

$C_s$  = concentration found when testing the spiked sample

$C_u$  = concentration found when testing the unspiked sample (NOTE: result should be adjusted for the dilution of the spike volume if volume change is more than 5%)

$K$  = concentration of the spike added to the sample

#### **Example 1:**

An unspiked sample measures 30 ppb Arsenic. A separate 1000 ml portion of the questionable sample was spiked by adding 0.1 ml or 100  $\mu\text{L}$  of a 1000 ppm Arsenic Standard Solution. This is the equivalent of adding 100 ppb Arsenic to the water sample. The spiked solution was measured by the same method as the original sample. The Spiked result was 150 ppb ( $C_s$ )

$C_s$  = 150 ppb

$C_u$  = 30 ppb

$K$  = 100 ppb

$$\% \text{Recovery} = \frac{100(150-30)}{100} = 120\% \text{ (Recovery result acceptable)}$$

Acceptable percent recovery values are 70-130% (+/- 30 %)

#### **Example 2:**

In another water sample using a similar spiked method as in Example 1 the results were

$C_s$  = 75 ppb

$C_u$  = 50 ppb

$K$  = 100 ppb

$$\% \text{Recovery} = \frac{100(75-50)}{100} = 25\% \text{ (Recovery result unacceptable)}$$

This percent recovery value is low and would suggest that the water sample using this test is about 75 % below expected value for Arsenic. So in this example, you can calculate the Arsenic in this sample to be 200 ppb. This is determined as follows: multiply the correction interference factor (for this example the 100 divided by 25 equals 4.0) Then multiply the 4.0 X 50 (As concentration found in this sample or  $C_u$ ).

**Note:** This example has never been known to occur; but is included as a theoretical possibility.

## SOIL SCREENING METHOD FOR ARSENIC

### (Non-Digestion Method)

#### Scope and Application:

1. This method is valid for detection of Inorganic Arsenic in soil.
2. The minimum Arsenic detection with 0.5 g of soil is 1.0 mg/kg.

#### Sample Handling and Preparation (Recommended but not required):

3. Dry soil for at least 1 hour at 60°C / 140°F or until completely dry.
4. Remove visible debris/stones from dried soil.
5. Grind the dried soil into a fine powder and mix until homogenous using a coffee grinder or a mortar and pestle.  
(a Coffee Grinder works well)

#### Interferences:

6. Test tolerates up to 2 mg/kg of Hydrogen Sulfide, 9000 mg/kg of Iron, and 1500 mg/kg of Lead.

#### Test Procedure:

7. Weigh out 0.5 g of the dried soil and transfer to the Reaction Bottle supplied in the Arsenic Quick™ Kit (Part # 481396). Note: If the Sample Handling and Preparation steps are omitted, then use 1g of soil. One gram is used on assumption that soil is 50% moisture by weight.)
8. Fill the bottle to the upper marked line on the Reaction Bottle with 100 mL of Arsenic-free tap water or Distilled water.
9. Follow the standard test procedure for the Arsenic Quick™ Kit starting with Step 3 on page 3.

#### Calculation:

10. Multiply the test result by 300 (correction multiplier) to get the Arsenic concentration in the soil as mg Arsenic/kg Soil. (Example: 40 µg/L x 300 = 12 mg Arsenic/kg Soil)

**NOTE:** Because when compared to Acid Digestion/ICP-MS Arsenic analysis, this soil screening method gives typically 50% lower value; a correction multiplier of 300 is used (use 200 as a multiplier if you desire actual measured level).

## SOIL SCREENING METHOD FOR ARSENIC

### (Digestion Method)

#### Scope and Application:

1. This method is applicable to the determination of Inorganic Arsenic in soil.
2. The method is applicable in the range from 5 to 500 mg As/kg soil.

#### Sample Handling and Preparation:

3. Dry soil for at least 1 hour at 60°C / 140°F or until completely dry.
4. Grind the dried soil into a fine powder using a coffee grinder or mortar and pestle and mix until sample is pulverized.  
(a Coffee Grinder works well)

#### Interferences:

5. Test can eliminate up to 2 ppm of Hydrogen Sulfide.
6. Iron concentrations above 9000 mg Fe/kg in soil will give low Arsenic results.
7. Lead concentrations above 1500 mg Pb/kg in soil will give low Arsenic results. (Note: Lead levels of 5000 ppm or greater are considered as Superfund Contamination.) The lead poisons the zinc reaction and suppresses the generation of Hydrogen and Arsine gas. To minimize lead interference, 0.2 g of Potassium Iodide (KI) should be added in the digestion procedure.

#### Equipment/Apparatus Needed:

8. Heating Block (Hach® COD Reactor Model 45600 or Equivalent)
9. Borosilicate screw cap style glass test tube (16 x 125 mm, Pyrex # 99449-16x or 99449-16xx or Equivalent) with Teflon lined screw cap (Pyrex # 9998-15 or Equivalent)
10. Transfer Pipette
11. Thermometer
12. 50 mL or 100 mL Volumetric Flask

#### Reagents Needed:

13. 50% (v/v) Hydrochloric Acid [HCl]
14. Distilled Water (or Arsenic-free Tap Water)

#### Safety Considerations:

15. Use a well-ventilated fume hood when handling Hydrochloric Acid (concentrated or 50%).
16. Wear Personal Protective Equipment (Gloves, Safety Glasses/Goggles, Lab Coat or Apron) when handling Hydrochloric Acid.

#### Digestion Procedure:

17. Weigh 0.5 g of the dried soil and transfer to a glass test tube.
18. Pipette 4.5 mL of 50% (v/v) HCl into the test tube, secure the screw cap tightly on the test tube and shake upright for 5 seconds. (To minimize particles clinging to the upper walls of test tube and cap, it is recommended not to invert the test tube.)
19. Place test tube in heating block for 1 hour at 95°C. Mix sample at least twice during digestion by carefully shaking test tube upright.
20. After digesting the soil for 1 hour, remove the test tube from the heating block and allow to cool.
21. Cautiously open test tube containing Digested Soil Sample and point cap away from eyes and body. Transfer the cooled digest to a 50 mL volumetric flask. Wash the test tube several times with Distilled or Arsenic-free water and add wash water to the flask without exceeding 50 mL volume. Fill to 50 mL volume with distilled water.

#### Test Procedure:

22. Transfer 10 mL of the 50 mL diluted digest to the Reaction Bottle supplied in the Arsenic Quick™ Kit (Part # 481396). Fill the Reaction Bottle to the upper marked line with Arsenic-free tap water or Distilled water.
23. Follow the standard test procedure for the Arsenic Quick™ Kit starting with Step 3 on page 3.

#### Calculation:

24. Multiply test result by 1000 (Example: 50 µg/L becomes 50 mg/kg)

# QUICK™ ARSENIC SCAN INSTRUCTIONS (INSTRUMENT SOLD SEPARATELY) FOR USE WITH ARSENIC QUICK™ TEST KIT:

## Instrument Components:

1. Quick™ Arsenic Scan Unit (R710 Color Reflection Densitometer, part number 481305)
2. Operation Manual (109 page book)
3. Calibration Reference Card
4. 18 Month Limited Warranty and Registration Card
5. AC Adapter (110VAC)
6. Carrying Case
7. White Opaque Plastic Card (2 3/8" x 7")
8. Conversion Table for the Following Arsenic Test Kits:  
Arsenic Quick™ Test Kit



Locate the ridged, black latch  
The measurement shoe is now

## 1. Instrument setup for Arsenic measurement:

- Remove the instrument from the case and turn the instrument over with the bottom facing up. between the two (2) screws near the round end of the measurement shoe. Slide it forward. unlocked, and will lift up by spring action from the body of the instrument.
- Locate the "OFF/ON" switch at the square end of the instrument where the data port and DC 9V connector ports are located. Gently slide the switch to "ON".
- Turn the instrument upright so that the LCD screen and six soft keys (3 black buttons, menu, exit, help) are facing upward.
- Depress once any one of the six soft keys on top of the unit. The LCD display will turn on.
- The instrument is now ready to make density measurements.

## Notes:

- The instrument is calibrated, and ready for use when received.
- The AC adapter (supplied) may be used while performing color density measurements. Be sure the power switch is "OFF" before connecting the adapter to prevent any surge in power.
- When the unit will stand unused for a long period of time slide the power switch to "OFF".
- Typically, over 100 measurements can be made when using the battery pack only.

## 2. Strip measurement:

- Run the test sample according to the arsenic kit instructions.
- Read the strip with the Quick™ Arsenic Scan instrument within 30 seconds of completing the test.
  - Place the reacted strip with colored test pad facing upward on the white opaque plastic card (2 3/8" x 7"). It is very important that the white opaque plastic card provided (or a white substance) is placed under the reacted strip for accurate measuring.
  - Position the target circle of the base shoe over the color pad so that the pad is centered in the black outlined circle (as illustrated).
  - Press the body of the instrument down until the optical head is in contact with the target circle. The message "Measuring..." will appear in the LCD. A "Y" and a number next to the "Y" will appear in the LCD (For example, Y = 0.19 indicates a yellow color density of 0.19).
- Use the number in the LCD (in the example 0.19) and compare with the Data Table provided to determine the concentration of arsenic in the sample. Be sure that you are using the appropriate Data Table for your test kit. 0.19 equals 20 µg/L or ppb Arsenic.
- Record the "Y" value and the concentration of Arsenic from the appropriate Data Table for future reference. Note: Use of the Quick™ Arsenic Scan unit will yield more precise results when compared to using the Easy-Read™ color chart for color matching determinations.

## 3. Calibration of Instrument:

See details on pages 34-40 in the Color Reflection Densitometer Operation Manual. It is recommended that "Quick Cal" (pages 39-40) be performed weekly. It is also recommended that "Standard Calibration" (steps 4, 5, & 8 in the manual) be performed when "Quick Cal" results are not within the allowed +/- variance of the "Y" values (White, Black, & Solid {Yellow}) listed in the reference table below:

Step 1: White	Step 2: Black	Step 3: Solid (Yellow)
Y value +/- 0.01	Y value +/- 0.06	Y value +/- 0.03

The Conversion Table below is valid for (Zinc) Reagent 3 lot 9035.

\*\*Note: For best accuracy dilute and retest samples with scan values above 0.65

**Arsenic Scan Conversion Table for Arsenic Quick™ Kit Part # 481396**

Match the instrument reading to the corresponding As level (in ppb) as found in the table below:								"Ihara (Y) Reading" = Yellow density value					
Ihara (Y) Reading	As Level (ppb)	Ihara (Y) Reading	As Level (ppb)	Ihara (Y) Reading	As Level (ppb)	Ihara (Y) Reading	As Level (ppb)	Ihara (Y) Reading	As Level (ppb)	Ihara (Y) Reading	As Level (ppb)		
0.00	*BDL	0.15	10	0.30	57	0.45	105	0.60	175	0.75	265	0.90	>400
0.01	BDL	0.16	12	0.31	60	0.46	110	0.61	180	0.76	270	0.91	>400
0.02	BDL	0.17	14	0.32	63	0.47	115	0.62	185	0.77	280	0.92	>400
0.03	BDL	0.18	17	0.33	67	0.48	120	0.63	190	0.78	290	0.93	>400
0.04	BDL	0.19	20	0.34	70	0.49	124	0.64	195	0.79	300	0.94	>400
0.05	BDL	0.20	22	0.35	73	0.50	128	**0.65	200	0.80	>300	0.95	>400
0.06	BDL	0.21	24	0.36	77	0.51	132	0.66	205	0.81	>300	0.96	>500
0.07	BDL	0.22	27	0.37	80	0.52	136	0.67	210	0.82	>300	0.97	>500
0.08	BDL	0.23	30	0.38	83	0.53	140	0.68	215	0.83	>300	0.98	>500
0.09	BDL	0.24	35	0.39	86	0.54	145	0.69	220	0.84	>300	0.99	>500
0.10	BDL	0.25	40	0.40	89	0.55	150	0.70	225	0.85	>300	1.00	>500
0.11	3	0.26	43	0.41	91	0.56	155	0.71	230	0.86	>300	----	----
0.12	5	0.27	47	0.42	94	0.57	160	0.72	240	0.87	>300		
0.13	7	0.28	50	0.43	97	0.58	165	0.73	245	0.88	>400		
0.14	9	0.29	53	0.44	100	0.59	170	0.74	255	0.89	>400		

# MSDS 1

## Material Safety Data Sheet

### Section 1 Chemical Identification

Catalog # / Description: Part Number 481196-D  
Name: First Reagent

### Section 2 Composition / Information on Ingredients

CAS#: 87-69-4	L-Tartaric Acid	98.7%
CAS#: 7720-78-7	Iron (II) Sulfate · 7H <sub>2</sub> O	0.7%
CAS#: 10101-97-0	Nickel (II) Sulfate · 6H <sub>2</sub> O	0.6%

### Section 3 Hazards Identification

Precautionary Statements:

- May be irritating to eyes and nasal passages.
- Low toxicity orally, moderately toxicity intravenously.
- Tartaric Acid is reported to have an oral rabbit LD50 at 5000 mg/kg, and a dermal rat LD50 at 485 mg/kg.

Tartaric Acid Reagent has minimal toxicological effect.

However, inhalation may cause irritation of respiratory tract; ingestion in large amounts may cause gastrointestinal upset; skin or eye contact may cause mild irritation; prolonged exposure may cause allergic reaction. Wash hands after use.

- Iron (II) Sulfate is harmful if swallowed or inhaled.

Causes irritation to skin, eyes, and respiratory tract.

Affects the liver. Oral mouse LD50: 1520 mg/kg.

- Nickel Sulfate is toxic. Harmful if swallowed. Possible risk of irreversible effects. May cause sensitization by inhalation and skin contact. Possible carcinogen.

Toxicity data: oral rat LD50: 264 mg/kg.

### Section 4 First-Aid Measures

• If swallowed, wash out mouth with water. Call a physician or the Poison Control Center as a precaution.

- In case of skin contact, flush with copious amounts of water for at least 15 minutes.

• In case of contact with eyes, flush with copious amounts of water for at least 15 minutes.

- If inhaled, remove to fresh air. If breathing is difficult, give oxygen and seek medical advice.

### Section 5 Fire Fighting Measures

Not Applicable since the amount of First Reagent per kit is negligible.

### Section 6 Exposure Controls / Personal Protection

Do not expose to eyes, skin, or clothing. Keep away from children and pets. Wash hands thoroughly after handling. Maintain general hygienic practices when using this product.

### Section 7 Physical and Chemical Properties

Appearance and Odor:

- Solid/semi-solid, white powder. Soluble in water.

Physical Properties:

- Melting Point: Not Applicable
- Vapor Pressure: Not Applicable
- Specific Gravity: Not Applicable
- Vapor Density: Not Applicable

Stability:

- Stable when stored under proper conditions.

Hazardous Polymerization:

- Will not occur.

Incompatibilities:

- Reaction with silver, zinc, aluminum in the presence of water or moisture will release explosive Hydrogen gas.

### Section 8 Toxicological Information

Acute Effects:

- Do not breathe dust! Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

### Section 9 Other Information

The above information is believed to be correct but does not purport to be all-inclusive and shall be used ONLY as a guide. Keep away from children and pets. Store in a dry, cool place. Keep container tightly closed.

# MSDS 2

## Material Safety Data Sheet

### Section 1 Chemical Identification

Catalog # / Description: Part Number 481196-E  
Name: Second Reagent (2 MPS)

### Section 2 Composition / Information on Ingredients

CAS#	10058-23-8	Potassium Peroxymonosulfate	43%
CAS#	7646-93-7	Potassium Bisulfate	23%
CAS#	7778-80-5	Potassium Sulfate	29%
CAS#	7727-21-1	Potassium Peroxydisulfate	3%
CAS#	546-93-0	Magnesium Carbonate	2%

Comments: NOTE: CAS# for mixture is 70693-62-8

### Section 3 Hazards Identification

Emergency Overview:

- Physical Appearance: White, granular material
- Immediate Concerns: DANGER. CORROSIVE. Causes skin and eye damage. Wear goggles or face shield and rubber gloves when handling. May be fatal if swallowed. Irritating to nose and throat. Avoid inhalation or dust. Remove and wash contaminated clothing before reuse.

Potential Health Effects:

- Eyes: DANGER. Corrosive. Causes eye damage. Do not get in eyes.

### Section 4 First-Aid Measures

EYES: If contact with eyes occurs: Immediately flush with cold water for at least 15 minutes. Then get immediate medical attention.

SKIN: If contact with skin: Rinse off excess chemical and flush skin with cold water for at least 15 minutes. If skin irritation develops, seek medical attention.

INGESTION: If swallowed: Do not induce vomiting. Drink 1-2 glasses of water to dilute the stomach contents. Never give anything by mouth to an unconscious person. Call a physician immediately.

INHALATION: If inhaled: Remove to fresh air. If breathing is difficult, have trained person administer oxygen. If not breathing, give artificial respiration. Call a physician immediately.

### Section 5 Fire Fighting Measures

- This product is not flammable or combustible.
- Will release oxygen when heated, intensifying a fire.

Acidic mist may be present.

- Exercise caution when fighting any chemical fire.
- Extinguishing Media: Water

### Section 6 Exposure Controls / Personal Protection

Do not expose to eyes, skin, or clothing. Keep away from children and pets. Wash hands thoroughly after handling. Maintain general hygienic practices when using this product.

### Section 7 Physical and Chemical Properties

Appearance and Odor:

- Solid. Granular, free-flowing solid. White.
- Odorless

Physical Properties:

- Melting Point: Not Applicable
- Vapor Pressure: Not Volatile
- Specific Gravity: 1.1 to 1.4
- Vapor Density: Not Volatile

Stability:

- Stable when stored under proper conditions.

Hazardous Polymerization:

- Will not occur.

Incompatibilities:

• Mixing with compounds containing halides or active halogens can cause release of the respective halogens if moisture is present. Mixing with cyanides can cause release of hydrogen cyanide gas. Mixing with heavy metal salts such as those of cobalt, nickel, copper, or manganese can cause decomposition with release of oxygen and heat.

### Section 8 Toxicological Information

Acute Effects:

- Skin Absorption: >11,000 mg/kg in rabbits
- Oral LD50: 2,000 mg/kg (rat)
- Inhalation LC50: >5 mg/l (rats) (4-hour)

### Section 9 Other Information

The above information is believed to be correct but does not purport to be all-inclusive and shall be used ONLY as a guide. Keep away from children and pets.

# MSDS 3 Material Safety Data Sheet

## Section 1 Chemical Identification

Catalog # / Description: Part Number 481196-F  
Name: Third Reagent (3 Zinc)

## Section 2 Composition / Information on Ingredients

CAS #: 7440-66-6  
Chemical Name: Zinc >99%  
Synonyms:

- Blue powder, granular zinc, zinc dust, zinc powder

## Section 3 Hazards Identification

Precautionary Statements:

- Flammable solid. This material, like many powders, is capable of causing a dust explosion.
- If inhaled, remove to fresh air. If breathing is difficult, give oxygen and seek medical advice.

## Section 4 First-Aid Measures

- If swallowed, wash out mouth with water. Call a physician or the Poison Control Center.
- In case of skin contact, flush with copious amounts of water for at least 2 minutes. Remove contaminated clothing and shoes.
- In case of contact with eyes, flush with copious amounts of water for at least 5 minutes. Call a physician.
- If inhaled, remove to fresh air. If breathing is difficult, give oxygen and seek medical advice.

## Section 5 Fire Fighting Measures

Fire/Explosion Hazard:

- Dust may form a flammable/explosive mixture with air. May form explosive mixture with oxidizers.
- Extinguishing Media:
  - Sand or inert dry powder. Do not use water.

## Section 6 Exposure Controls / Personal Protection

Do not get in eyes, on skin, on clothing. Keep away from children and pets. Wash hands thoroughly after handling. Use with adequate ventilation. Maintain general hygienic practices when using this product.

## Section 7 Physical and Chemical Properties

Appearance and Odor:  
Solid bluish-gray powder  
Physical Properties:

- Melting Point: 419°C
- Vapor Pressure: Not Applicable
- Specific Gravity: 7,14
- Vapor Density: Not Applicable

Stability:

- Stable when stored dried and at room temperature.

Hazardous Polymerization:

- Will not occur.

## Section 8 Toxicological Information

- Skin and eye irritation may result from intermittent exposure.
- Avoid creating dust. DO NOT breathe dust.

## Section 9 Other Information

The above information is believed to be correct but does not purport to be all-inclusive and shall be used ONLY as a guide. Dispose of empty bottle as normal trash. Keep away from children and pets.

# MSDS 4 Material Safety Data Sheet

## Section 1 Chemical Identification

Catalog # / Description: Part Number 481196-G  
Name: Arsenic Quick™ Testing Pad

## Section 2 Composition / Information on Ingredients

CAS #: 7789-47-1  
Synonyms:

- Toxic ingredient is: Mercuric Bromide.

## Section 3 Hazards Identification

Precautionary Statements:

- Toxic poison is contained in testing pad (about 1mg / strip).
- Mercuric Bromide is reported to have an oral rat LD50 at 40mg/kg, and a dermal rat LD50 at 100mg/kg.

## Section 4 First-Aid Measures

- If swallowed, wash out mouth with water. Call a physician or the Poison Control Center as a precaution.
- In case of skin contact, flush with copious amounts of water for at least 2 minutes. Remove contaminated clothing and shoes.
- In case of contact with eyes, flush with copious amounts of water for at least 5 minutes.
- If inhaled, remove to fresh air. If breathing is difficult, give oxygen and seek medical advice.

## Section 5 Fire Fighting Measures

Not Applicable since the amount of Mercury per kit is negligible.

## Section 6 Exposure Controls / Personal Protection

Do not expose to eyes, skin, or clothing. Keep away from children and pets. Wash hands thoroughly after handling. Maintain general hygienic practices when using this product.

## Section 7 Physical and Chemical Properties

Appearance and Odor:

- Solid/semi-solid, white paper pad (containing Mercuric Bromide) attached to plastic strip.

Physical Properties:

- Melting Point: Not Applicable
- Vapor Pressure: Not Applicable
- Specific Gravity: Not Applicable
- Vapor Density: Not Applicable

Stability:

- Stable when stored under proper conditions.

Hazardous Polymerization:

- Will not occur.

## Section 8 Toxicological Information

Acute Effects:

- Each strip contains about 1mg Mercuric Bromide so toxicological effect is minimal because of the amount. However, material is toxic and should be handled carefully to minimize exposure. Place all used test strips into plastic bag labeled "Used Test Strips". Dispose of used strips per environmental and regulatory requirements in your community. Wash hands after use.

## Section 9 Other Information

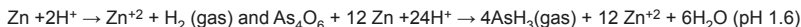
The above information is believed to be correct but does not purport to be all-inclusive and shall be used ONLY as a guide. Dispose of the used test strips as regulations require. Keep away from children and pets.

# LETTER FROM THE KIT INVENTOR

Thank you for purchasing our U.S. Patented (# 6,696,300) Arsenic Quick™ II Kit. Our company has trademarked the kits Quick™ because of the short 14 minute time for analysis.

The Drinking Water standard of the US EPA and the World Health Organization (WHO) allows a maximum contaminant level of 10 ppb (µg/L) for Arsenic. The old US EPA level of 50 ppb (µg/L) remains as the maximum contaminant level for many countries in the world.


For several years, Industrial Test Systems, Inc. (ITS) committed a major research & development effort to provide better and safer arsenic test kits. The goal was achieved. The test was made safer by using tartaric acid, instead of strong acids, for the reduction of inorganic arsenic (As<sup>+3</sup>/As<sup>+5</sup>) to arsine gas. For these efforts a US Patent was granted for the acceleration of the arsenic detection chemistry by the addition of metal enhancers, iron and nickel salts. This permits Arsenic field tests to be completed faster. The Quick™ II series of kits use a modified Turret cap which allows detection of arsenic below 10 ppb (µg/L). The reduction reactions utilized in all kits are as follows:



The analysis is performed in a closed reaction bottle (plastic) with an appropriate volume of sample (50 to 500 ml). After the 10 minute reduction reaction, the mercuric bromide strip or testing pad is removed and matched to the color chart or color analyzed by the Quick™ Arsenic Scan instrument. A light yellow to brown color change indicates that arsenic is present. The color intensity is proportionately related to the concentration of arsenic in the sample. NOTE: ITS test kits detect free inorganic arsenic only. ICP-MS methods detect inorganic and organic arsenic. If organic arsenic is present, ITS kit results can be expected to give lower values when compared to ICP-MS results.

## Quick™ Arsenic Test Kits Available:

US Patent # 6696300

PRODUCT NAME (PART NUMBER)	NO. OF TESTS		OPTIMUM RANGE* ppb (µg/L)	TYPICAL COLOR CHART DETECTION LEVELS ppb (µg/L)	TYPICAL ACCURACY** OF DUPLICATES USING QUICK™ ARSENIC SCAN	PRICE IN US \$
Arsenic Quick™ Mini Kit (481396-5) <small>(Can also be used for soil analysis.)</small>	5	YES	10 to 200	0, 5, 10, 20, 60, 100, 300, 500, >500, >>500	+/-18 ppb or +/-30%	\$25.99
Arsenic Quick™ II Mini Kit (481303-5)	5	YES	3 to 20	<1, 2, 3, 4, 5, 6, 7, 8, 10, 13, 20, 25, 30, 40, >50, >80, >120, >160	+/-1.2 ppb or +/-16%	\$44.99
Arsenic Low Range Quick™ II Mini Kit (481301-5)	5	YES	1 to 10	<0.5, 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 12, >20, >30, >50	+/-0.8 ppb or +/-14%	\$54.99
Arsenic Ultra-Low Quick™ II (481300-5)	5	YES	0.5 to 6	0, 0.3, 0.7, 1.0, 1.5, 2, 2.5, 3, 3.5, 4, 5, 6, 8, 10, 13, 20, >20	+/-0.4 ppb or +/-12%	\$69.99
Arsenic Quick™ Kit (481396) <small>(Can also be used for soil analysis.)</small>	100	YES	10 to 200	0, 5, 10, 20, 30, 40, 50, 60, 80, 100, 150, 200, 250, 300, 400, 500, >500	+/-18 ppb or +/-30%	\$169.99
Arsenic Low Range Quick™ (481297-I)	50	YES	7 to 80	<2, 4, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 100, >150, >300	+/-8 ppb or +/-25%	\$179.99
Arsenic Quick™ II (481303)	50	YES	3 to 20	<1, 2, 3, 4, 5, 6, 7, 8, 10, 13, 20, 25, 30, 40, >50, >80, >120, >160	+/-1.2 ppb or +/-16%	\$219.99
Arsenic Low Range Quick™ II (481301)	50	YES	1 to 10	<0.5, 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 12, >20, >30, >50	+/-0.8 ppb or +/-14%	\$349.99
Arsenic Ultra-Low Quick™ II (481300)	25	YES	0.5 to 6	0, 0.3, 0.7, 1.0, 1.5, 2, 2.5, 3, 3.5, 4, 5, 6, 8, 10, 13, 20, >20	+/-0.4 ppb or +/-12%	\$299.99
Quick™ Arsenic Scan Instrument (481305)	1 meter	YES	N/A	0.01 to >1.00 color density ppb (µg/L) (as low as 0.2 ppb (µg/L) arsenic)	(see above)	\$1,599.99

Information on the performance characteristics of Quick™ can be found at [www.epa.gov/etv](http://www.epa.gov/etv), or call ITS at 1-800-861-9712 for a copy of the ETV verification report. The use of the ETV® Name or Logo does not imply approval or certification of this product nor does it make any explicit or implied warranties or guarantees as to product performance.

\*Range can be expanded by diluting the sample with Arsenic-free water.

\*\*As with any test, actual results will fall within a range around the actual value. The Typical Accuracy listed is from data generated by a technician in our lab using the Quick™ Arsenic Scan instrument measuring interference-free aqueous arsenic standards. Kit expected accuracy is the larger of the two values listed. (Example using Quick™: If the mean is 40 ppb, then the typical accuracy is +/-18 ppb which is larger than +/-12 ppb (40 ppb X 30%).

Where precision is important, ITS recommends that you run the water sample in duplicate, since the typical color matching is within one color block. For best precision consider the purchase of our Quick™ Arsenic Scan instrument. This unit is ideal for use with all test kits. Please contact our sales department at 803-329-9712 for more information or to order the Quick™ Arsenic Scan instrument.

Typical shelf life of kits is over 12 months. The kit includes First Reagent (Tartaric acid with iron and nickel salts); Second Reagent (MPS, an oxidizer); Third Reagent (zinc dust); and mercuric bromide strips, which contains about 1mg mercury per strip. After use, the strips should be discarded according to local environmental regulations. Valuable safety information about the kit is in the MSDS literature. As a safeguard to minimize the operator's exposure to arsine and hydrogen gas, please run all tests in a well-ventilated area away from open flames and other sources of ignition. Arsine gas is highly toxic; and this precaution becomes more urgent if the water sample has high arsenic levels.

Cordially yours,

Ivars Jaunakais, Analytical Chemist  
email: [Ivars@sensafe.com](mailto:Ivars@sensafe.com)