

## INSTRUCTIONS

*Read all instructions before sample collection*

**Before collecting sample**, review contents of this test kit (page 4). This kit allows testing of *one* sample. You will need one test kit for each location you are sampling.

**Determine the type** of sample to be analyzed (e.g., water or material from the inside surface of a pipe), and follow appropriate instructions below.

**Process sample immediately** after collection.

**Do not contaminate** sample by touching with non-sterile tools or hands.

**Warranty information** can be found on page 4 of these instructions.

**Dilution series in Section 1D** can be changed to suit your needs. Contact us if you require assistance.

**Important: Properly dispose of all testing materials. Needles must be destroyed before disposal by cutting or bending back the needle. Syringes must be destroyed by breaking or shattering the barrel. Federal and local laws apply.**

## SECTION 1. MICROBIOLOGICAL TESTS

**1A. Collection: Solid Samples (Nodules, Corrosion Product, Soil, Etc.)**

1. Unscrew cap from large 50 ml sampling tube. *Be careful* not to touch inside of cap or mouth of tube with hands or tools.
2. Use sterile tongue depressor to add a portion of sample—about ½ teaspoon—to sampling tube.
3. Replace cap.
4. Shake vigorously to homogenize sample. You have just created what is known as a *slurry*.
5. Proceed to step 1D-1.

**1B. Collection: Samples of Surface Scale or Biofilm**

1. Unscrew cap from large 50 ml sampling tube. *Be careful* not to touch inside of cap or mouth of tube with hands or tools.
2. Dip sterile cotton-tipped swab into water in tube to wet swab.
3. Swab an area of approximately one square inch of surface to be sampled.
4. Place cotton tip of swab into tube. Break off wooden portion of swab touched by your fingers, and discard.
5. Replace cap.
6. Shake vigorously to homogenize sample. You have just created what is known as a *slurry*.
7. Proceed to step 1D-1.

**1C. Collection: Liquid Samples**

1. Unscrew cap from large 50 ml sampling tube. *Be careful* not to touch inside of cap or mouth of tube with hands or tools.
2. Discard water.
3. Fill tube with liquid sample.
4. Replace cap.
5. Proceed to step 1D-1.

**1D. Inoculation of Media**

1. Using a marking pen, label each bottle in each string (color) of media 1 through 4. Start with purple-capped bottles.
2. Remove and discard wrappers from a sterile 1 ml syringe and an 18g needle. Without touching tip of syringe or opening of needle, place needle onto syringe. Tighten needle onto syringe by pushing in and turning needle shield clockwise.
3. Remove needle shield. Place syringe/needle into sample or slurry in large 50 ml sampling tube.
4. Withdraw 1.0 ml of sample/slurry from 50 ml sampling tube by gently pulling up on syringe plunger until sample/slurry reaches the 1.0 ml mark.
5. Flip plastic cap off first purple-capped bottle (labeled #1).
6. Insert syringe needle through rubber stopper of first bottle. Inject sample/slurry into bottle by depressing plunger.
7. Keep needle in bottle. Mix solution in bottle by gently withdrawing plunger, drawing up **1.0 ml** of media-sample/slurry mixture, and then depressing plunger, reinjecting liquid into bottle. Repeat several times.
8. Withdraw **1.0 ml** of solution from purple bottle #1 and inject into purple bottle #2. Mix as in step 7.
9. Now, withdraw **0.1 ml (one-tenth!)** of solution from purple bottle #2 and inject into purple bottle #3. Mix as in step 7.
10. Withdraw **0.1 ml** of solution from purple bottle #3 and inject into purple bottle #4.
11. Repeat steps 2 through 10 for the white, blue, red, and green-capped bottles using new 1 ml syringes and needles.
12. Keep all bottles of media in closed kit box at room temperature. Proceed to Section 2.

## SECTION 2. CHEMICAL TESTS

Perform all chemical tests on sample/slurry used in Section 1.

1. Record results in attached Test Data Sheet.

### 2A. Dissolved Oxygen Test (for Water Samples Only)

*Skip this test if testing solid or swab samples.*

1. Place plastic tubing up into pipe from which water sample will be collected.
2. Flow water sample through tubing and into bottom of large 50 ml sampling tube until it is overflowing and no air bubbles are present in sampling tube.
3. Place dissolved oxygen ampoule, tapered end first, into 50 ml sampling tube until ampoule is 3/4 submerged in sample.
4. Snap tip by *gently* pressing end of ampoule against side of 50 ml sampling tube. Let ampoule fill with sample.
5. Remove ampoule from 50 ml sampling tube. Invert several times, allowing air bubble to travel from end to end.
6. Wait **2 minutes**.
7. Compare ampoule color with attached Dissolved Oxygen Color Chart (page 5). Chart should be illuminated from above by a bright, white light. Be sure to place ampoule on both sides of color bar before concluding it gives the best match. Placing ampoule between and parallel to color bars aids in readings.

### 2B. pH, Total Alkalinity, Total Hardness, Free Residual Chlorine Tests

*Be careful not to touch test zones on test strips.* Make all color comparisons under a bright, white light.

Remove each test strip from its packet. **Use care** not to rip into instructions or color charts on the wrappers! Follow instructions provided on wrappers.

### 2C. Chloride Test

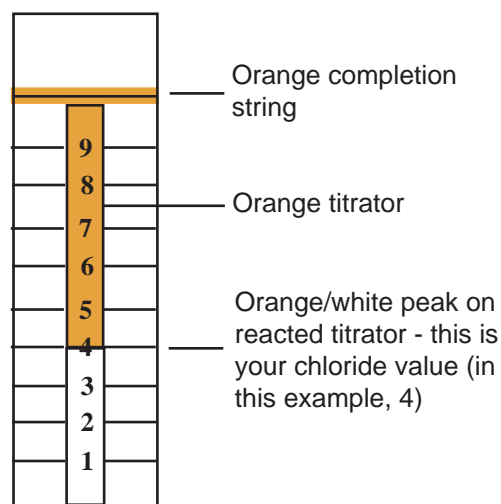
1. Dip lower end of chloride test strip into sample/slurry. **Do not** dip test strip further than 9 mark.
2. Wait for sample/slurry to saturate orange titrator and turn orange completion string dark.
3. Note where the tip of orange/white peak on reacted titrator falls on number scale on test strip (see Figure 1).
4. Use attached Chloride Conversion Chart (page 5) to convert this number to parts per million (ppm).

### 2D. Carbonates, Sulfide, Total Iron Tests

**Caution:** 2 Normal hydrochloric acid (2N HCl) is a strong acid. *Avoid contact with skin and eyes, and avoid breathing vapors!* If contact is made with skin or eyes, flush with large amounts of fresh water.

1. Remove cap from small 15 ml sampling tube labeled "2N HCl."

Figure 1



2. Pour sample/slurry from large 50 ml sampling tube into the small 15 ml sampling tube until liquid line reaches the 6 ml mark. You will have added 5 ml of sample/slurry.
3. If solution bubbles, this indicates the presence of carbonates.
4. Hold mouth of 15 ml sampling tube about six inches from your nose. With your hand, wave any vapors from tube toward your face. If solution smells like rotten eggs, this indicates the presence of sulfide. **Avoid directly breathing vapors!**
5. Cap 15 ml sampling tube, and shake well.
6. Wait **5 minutes**.
7. Perform total iron test on sample/slurry in 15 ml sampling tube. Follow instructions provided on wrapper, and use same precautions as for other test strips.
8. Discard sample/slurry in 15 ml sampling tube appropriately—remember, this tube contains hydrochloric acid.

### 2E. Particulates Test (for Water Samples Only)

*Skip this test if testing solid or swab samples.*

1. Rinse large 50 ml sampling tube with fresh water sample.
2. Fill 50 ml sampling tube to top with water sample.
3. Wait approximately **1/2 hour** to allow any sediment present to settle to bottom of 50 ml sampling tube.
4. Record amount and characteristics of sediment.
5. Discard sample in 50 ml sampling tube.
6. Proceed to Section 3.

## SECTION 3. INTERPRETATIONS

### 3A. Interpretations of Results

After 2, 5, and 15 days incubation, compare microbiological test bottles to written descriptions, below, and to Positive Reactions Sheet (page 6). Record results in attached Test Data Sheet, and record any changes.

1. Purple-capped bottles detect viable low nutrient bacteria (LNB). These bottles will turn cloudy if LNB are present. Record highest bottle number to turn positive (1 through 4).
2. White-capped bottles detect viable iron-related bacteria (IRB). A positive reaction for IRB results when the media turns rust-colored or green-black (either with or without the formation of deposits) or when iron is deposited in the bottom of the bottle, usually turning the media from golden to clear. Iron deposits may be rust, white, black, gray, or green in color. A cloudy appearance, formation of slime in the bottle, or a combination of both is **not** a positive reaction for IRB. Record highest bottle number to turn positive (1 through 4).
3. Blue-capped bottles detect viable anaerobic or facultatively anaerobic bacteria. These bottles will turn cloudy if anaerobes (ANA) are present. Record highest bottle number to turn positive (1 through 4).
4. Red-capped bottles detect viable organic acid-producing bacteria (APB). These bottles will turn cloudy orange or cloudy yellow if APB are present. Record highest bottle number to turn positive (1 through 4).
5. Green-capped bottles detect viable sulfate-reducing bacteria (SRB). These bottles will turn black or will have black slime form on the iron nail along the bottom of the bottle if SRB are present. The presence of black or gray flecks is **not** a positive reaction for SRB. Record the highest bottle number to turn positive (1 through 4).

### 3B. Calculating the Number of Bacteria in Your Sample

**NOTE:** You have performed serial, decimal dilutions of your sample in these media bottles. This means you can get an approximation of the numbers of viable bacteria in the sample using the chart below:

Highest Bottle # to Turn Positive	Range of Viable Bacteria per mL of Sample or Slurry
1	1 to 10
2	10 to 100
3	1,000 to 10,000
4	≥100,000

### 3C. Formal Interpretation

For a formal written report on results, interpretation, conclusions, and recommendations, return completed Analytical Requests Sheet (attached) and completed test kit to BTI Products. An additional fee is assessed for this service. Call (800) 798-4650 for details.

For technical assistance, to request MSDS, or to place an order:

Call Toll Free: 800.798.4650

Or E-mail: [products@bti-labs.com](mailto:products@bti-labs.com)

**MICkit® Comprehensive:  
List of Kit Contents**

1. 4 Bottles BTI-LNB Medium (Purple Flip-Off Caps)
2. 4 Bottles BTI-IRB Medium (White Flip-Off Caps)
3. 4 Bottles BTI-ANA Medium (Blue Flip-Off Caps)
4. 4 Bottles BTI-APB Medium (Red Flip-Off Caps)
5. 4 Bottles BTI-SRB Medium (Green Flip-Off Caps)
6. 1 Dissolved Oxygen Ampoule
7. 1 pH/Total Alkalinity Test Strip
8. 1 Total Hardness Test Strip
9. 1 Free Residual Chlorine Test Strip
10. 1 Chloride Test Strip
11. 1 Total Iron Test Strip
12. 1 Plastic Tubing
13. 1, 50 ml Sampling Tube with 40 ml Sterile  
Deionized Water—Labeled “Sterile DI Water”
14. 1, 15 ml Sampling Tube with 1 ml Dilute Acid—  
Labeled “2N HCl”
15. 1 Sterile Tongue Depressor
16. 1 Sterile Cotton-Tipped Swab
17. 5, 1 ml Syringes
18. 5, 18g Needles

Rev 9/1/09

**WARRANTY**

**BTI Products, LP's** products are warranted by **BTI Products, LP** to perform as described in the technical literature supplied with each product, provided the products are used, stored, and maintained in accordance with the directions provided. They must also be used before the expiration date. Adequate quality control must be done by the user of the products.

**BTI Products, LP** disclaims any implied warranty of merchantability or fitness of its products for any other purpose than described in its technical literature, and in no event shall **BTI Products, LP** be held liable for any consequential damages arising out of the aforesaid express warranty.

Should you have questions about this product or any of the products and services we provide, please call or write:

**BTI Products, LP**  
652 Silver Hills Road  
Bayfield, CO 81122  
800.798.4650  
products@bti-labs.com

*We welcome all comments and inquiries.*

**Usage & Storage:** Use by expiration date printed on kit box label. Store test materials in a cool, dry place out of direct sunlight. Do not eat or drink any of the contents of the kit. Keep out of the reach of children. Material Safety Data Sheets available upon request.

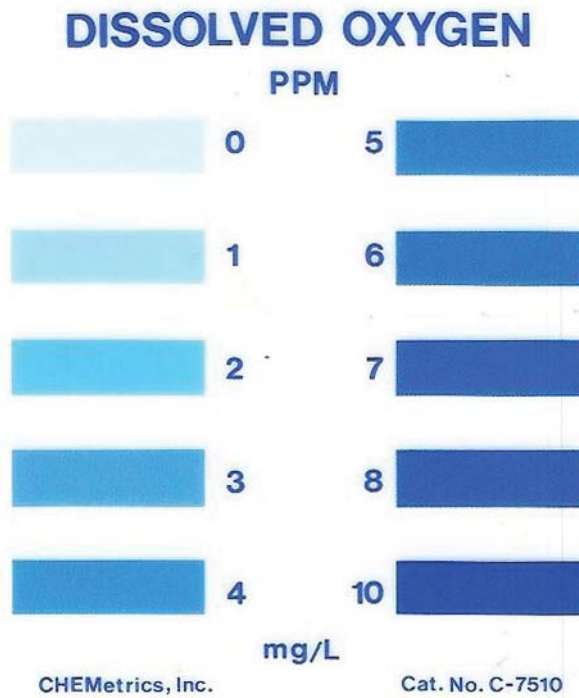
**Disposal of Test Materials:** Properly dispose of all kit components. Needles must be destroyed before disposal by cutting or bending back the needle. Syringes must be destroyed by breaking or shattering the barrel. Federal and local laws apply.

Used media bottles must be properly disposed of according to local regulations. Alternatively, bottles/kits may be returned to **BTI Products, LP** for proper disposal for a fee of \$15.00 per kit.

Need Help?

Call 800.798.4650

## Dissolved Oxygen Color Chart



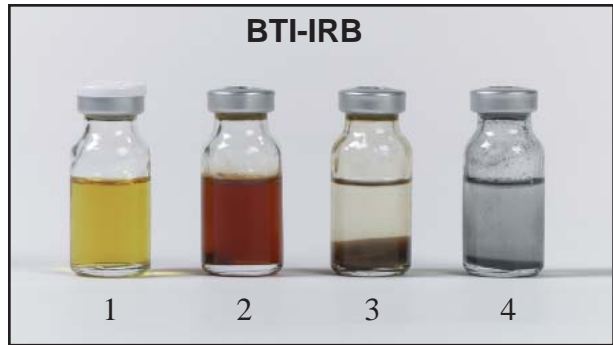
## Chloride Conversion Chart

Number on chloride test strip	ppm (mg/L) Chloride	Number on chloride test strip	ppm (mg/L) Chloride
1.0	26	4.4	190
1.2	32	4.6	205
1.4	39	4.8	221
1.6	45	5.0	239
1.8	53	5.2	257
2.0	60	5.4	277
2.2	68	5.6	297
2.4	76	5.8	320
2.6	85	6.0	344
2.8	94	6.2	370
3.0	104	6.4	397
3.2	114	6.6	428
3.4	125	6.8	461
3.6	137	7.0	497
3.8	149	7.2	537
4.0	162	7.4	581
4.2	176	7.6	631

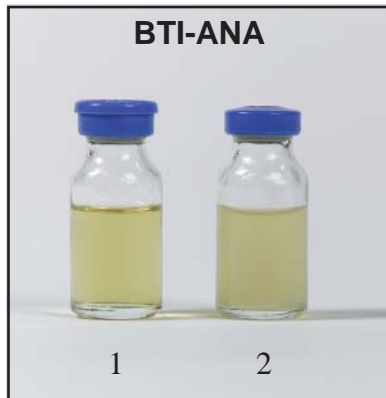
## MICkit® Comprehensive - Positive Reactions Sheet



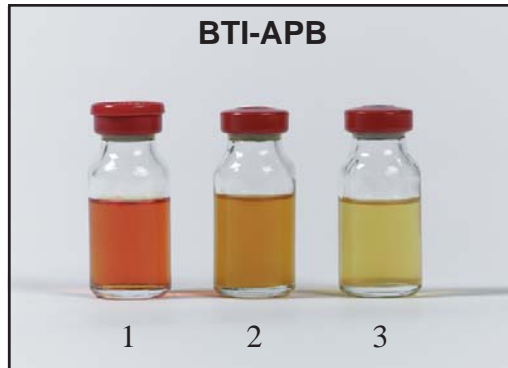
1. Uninoculated (Negative)
2. Positive—Cloudy
3. Positive—Cloudy with slime



1. Uninoculated (Negative)
2. Positive—Rust color change
3. Positive—Rust-colored deposits
4. Positive—Black-colored deposits



1. Uninoculated (Negative)
2. Positive—Cloudy



1. Uninoculated (Negative)
2. Positive—Cloudy orange
3. Positive—Cloudy yellow



1. Uninoculated (Negative)
2. Positive—Black
3. Positive—Black slime formation on iron nail

# ANALYTICAL REQUESTS SHEET

Please fill out completely and return with the sample(s).

Send to: BTI Products, LP  
652 Silver Hills Road  
Bayfield, CO 81122  
800.798.4650  
products@bti-labs.com

## I. Sample Information

1. Sample name or site designation \_\_\_\_\_
2. Date sample collected \_\_\_\_\_
3. Date sample shipped \_\_\_\_\_
4. Type and location of sample \_\_\_\_\_
5. Company name and address \_\_\_\_\_
6. Contact name \_\_\_\_\_
7. Telephone and email \_\_\_\_\_
8. PO or Credit Card # \_\_\_\_\_
9. Name on card \_\_\_\_\_
10. Billing address \_\_\_\_\_

Please indicate below which analyses you wish to have performed on the sample. If you have any questions, please contact us at 1-800-798-4650.

---

## II. Sample Analyses

### A. Microbiological Analyses

- |  | Cost Per Sample | Yes |
|--|-----------------|-----|
| 1. Viable culture  |                 |     |
| a. MICKit <sup>®</sup> Comprehensive – Inoculated by client and read by BTI Products | \$250           | ___ |
| b. Other (specify) _____   | ___             | ___ |
| 2. Other (specify) _____   | ___             | ___ |

### B. Other

- |                          |       |     |
|--------------------------|-------|-----|
| 1. Pipe analysis         | Quote | ___ |
| 2. Photodocumentation    | Quote | ___ |
| 3. Other (specify) _____ | ___   | ___ |

## MICKit® COMPREHENSIVE TEST DATA SHEET

<b>Sample Information</b>	
Facility	
Sample Name or Designation	
Test Date	
Type of Sample Tested	
<b>Chemical Results</b>	
Dissolved Oxygen (ppm)	
pH	
Total Alkalinity (ppm)	
Total Hardness (ppm)	
Free Residual Chlorine (ppm)	
Chloride (ppm)	
Carbonates (yes or no)	
Sulfide (yes or no)	
Total Iron (ppm)	
Particulates/Oils (specify which present)	
Color of Particulates (rust-colored, black, etc.)	
Texture of Particulates (fluffy, granular, fine, etc.)	
Amount of Particulates Present (ml in tube)	
<b>Microbiological Results</b>	
Low Nutrient Bacteria (per ml)	
Iron-related Bacteria (per ml)	
Anaerobic Bacteria (per ml)	
Acid-producing Bacteria (per ml)	
Sulfate-reducing Bacteria (per ml)	