

INSTRUCTIONS

Read all instructions before sample collection

Before collecting sample, review the 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.

Recommended sampling locations:

1. Make-up water
2. Riser — system side
3. Three other locations (including inspectors test valve & remote locations)

Process sample immediately after collection.

If testing water sample, let water flow for 30 to 60 seconds before collecting water.

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 labeled “Sterile DI Water.” *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 labeled “Sterile DI Water.” *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 labeled “Sterile DI Water.” *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. Record results in attached FPS System Information Form.

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 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

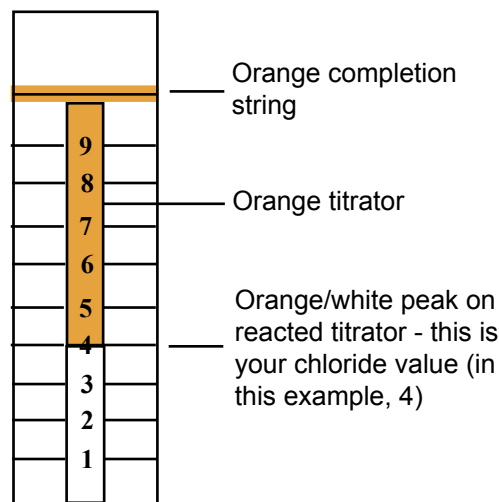
1. Dip lower end of chloride test strip into sample/slurry. **Do not** dip test strip further than 9 mark.
2. Wait for sample/slurry to saturate orange titrator and turn orange completion string dark (Approx. 5 min.).
3. Note where the tip of orange/white peak on reacted titrator falls on number scale on test strip (see Figure 1).

2D. Carbonates and Sulfide 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."
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

Figure 1



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!**

2E. Total Iron Test

1. Pour 4 ml of the sample/slurry from 15 ml sampling tube into the 5 ml sampling tube. Add contents of iron reducer pack and mix. Reducer contents will not dissolve completely.
2. Perform total iron test on sample/slurry in 5 ml sampling tube. Follow instructions provided on wrapper (Method A), and use same precautions as for other test strips.
3. Discard sample/slurry in 5 ml and 15 ml sampling tubes appropriately—remember, these tubes contain hydrochloric acid.

2F. 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.

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

Call Toll Free: 970.884.4629

Or E-mail: products@bti-labs.com

SECTION 3. INTERPRETATION

3A. Interpretation of Microbiological Results

After 5 days incubation, compare microbiological test bottles to written descriptions, below, and to attached Positive Reactions Sheet (page 6). Record results in attached FPS System Information Form. Check results again after 15 days, and record any changes. Compare microbiological results in Section 1 with Interpretations Chart, below.

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.
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.
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.

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.
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.

3B. Interpretation of Chemical Results

Compare chemical results in Section 2 with Interpretations Chart, below.

3C. Formal Interpretation

For a formal written report on results, interpretation, conclusions, and recommendations, return completed FPS System Information Form (attached) and completed test kit to BTI Products. An additional fee is assessed for this service. Call 970.884.4629 for details.

Interpretations Chart

Microbiological Tests	Results	Interpretations	Explanations
Low nutrient bacteria (LNB)	0 positive bottles	None (0)	3 or more positive LNB bottles is strong indication of MIC.
	1 positive bottle	Low level (1 to 10)	
	2 positive bottles	Moderate level (10 to 100)	
	3 positive bottles	High level (1,000 to 10,000)	
	4 positive bottles	Very high level (>100,000)	
Non-LNB: ●Iron-related bacteria (IRB) ●Anaerobic bacteria (ANA) ●Acid-producing bacteria (APB) ●Sulfate-reducing bacteria (SRB)	0 positive bottles	None (0)	2 or more positive non-LNB bottles indicates advanced MIC. The more types of bacteria present & the higher the level of bacteria present, the greater the likelihood for MIC.
	1 positive bottle	Low level (1 to 10)	
	2 positive bottles	Moderate level (10 to 100)	
	3 positive bottles	High level (1,000 to 10,000)	
	4 positive bottles	Very high level (>100,000)	
Chemical Tests	Results	Interpretations	Explanations
Dissolved Oxygen	0 ppm	None	Greater likelihood for oxygen-related corrosion & microbial growth as oxygen levels increase.
	1 - 2 ppm	Low	
	>3 ppm	Moderate to high	
pH	<7	Acidic	Values below 7 are increasingly acidic & corrosive.
	7	Neutral	Value of 7 is neutral.
	>7	Alkaline	Values above 7 are increasingly alkaline & scaling.
Total Alkalinity	0 - 40 ppm	Low	The higher the alkalinity value, the higher the scaling potential.
	40 - 100 ppm	Moderate	
	>100 ppm	High	
Total Hardness	0 - 75 ppm	Soft	The higher the hardness value, the higher the scaling potential.
	75 - 150 ppm	Moderately hard	
	150 - 300 ppm	Hard	
	>300 ppm	Very hard	
Chloride	1.4 - 2.0	Relatively low	The higher the chloride value, the greater the potential for chloride-assisted pitting corrosion.
	2.0 - 3.4	Moderate	
	3.4 - 5.0	High	
	>5.0	Very high	
Carbonates	No bubbling	Absent	Indication of little potential for scaling.
	Bubbling	Present	Indication of potential for scaling.
Sulfide	No "rotten egg" odor	Absent	Neutral with respect to MIC.
	"Rotten egg" odor	Present	Strong indication of MIC.
Total Iron	0 ppm	None	The greater the iron value, the more corrosion is indicated.
Particulates	No solids/oils in tube	Absent	Indication of few foreign materials (i.e., dirt, corrosion product, etc.) in system available for deposition & plugging of system components.
	Solids/oils in tube	Present	Indication of foreign materials (i.e., dirt, corrosion product, etc.) in system. The more particulates, the more materials available to form deposits under which under-deposit pitting & MIC can occur. The more particulates, the more materials available to plug system components.

MICKit® FPS: 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 Chloride Test Strip
10. 1 Total Iron Test Strip
11. 1 Iron Reducer Pack
12. 1, 5 ml Sampling Tube
13. 1 Plastic Tubing
14. 1, 50 ml Sampling Tube with 40 ml Sterile Deionized Water—Labeled “Sterile DI Water”
15. 1, 15 ml Sampling Tube with 1 ml Dilute Acid—Labeled “2N HCl”
16. 1 Sterile Tongue Depressor
17. 1 Sterile Cotton-Tipped Swab
18. 5, 1 ml Syringes
19. 5, 18g Needles

Rev 2/15/22

WARRANTY

BTI Products, LLC's products are warranted by **BTI Products, LLC** 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, LLC 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, LLC** 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, LLC
652 Silver Hills Road
Bayfield, CO 81122
970.884.4629
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.

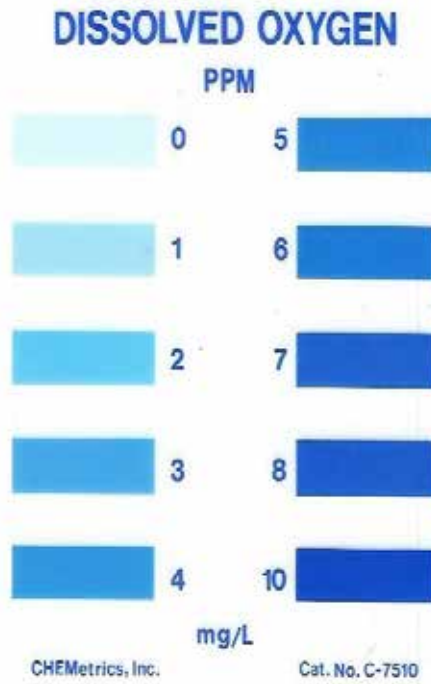
Disposal of Test Materials: Properly dispose of all kit components. Needles must be destroyed before disposal by cutting or bending back the needle. Syringes must be destroyed by breaking or shattering the barrel. Federal and local laws apply.

Used media bottles must be properly disposed of according to local regulations. Alternatively, bottles/kits may be returned to **BTI Products, LLC** for proper disposal for a fee of \$30.00 per kit.

Need Help?

Call 970.884.4629

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

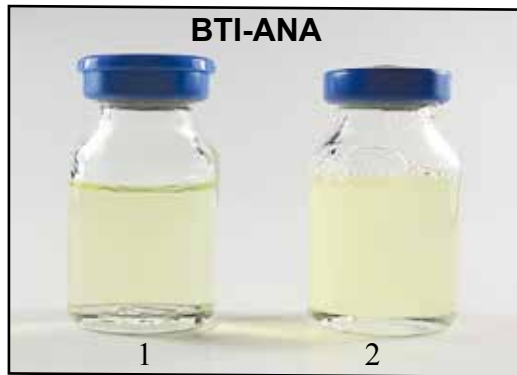
MICKit[®] FPS - Positive Reactions Sheet



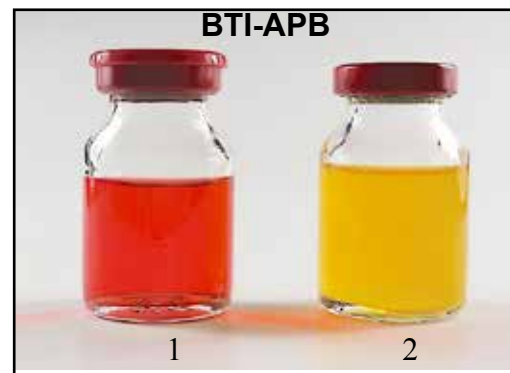
1. Uninoculated (Negative)
2. Positive—Cloudy with possible slime formation



1. Uninoculated (Negative)
2. Positive—A darker rust color change
-Positives can include rust-colored slimes and/or deposits, or black-colored deposits



1. Uninoculated (Negative)
2. Positive—Cloudy
-An amber color change does not indicate a positive



1. Uninoculated (Negative)
2. Positive—Cloudy orange or yellow
-Slime formation without a color change does not indicate a positive



1. Uninoculated (Negative)
2. Positive—Black color change
-Positives can include black slime formation on iron nail



BTIproductsLLC

ANALYTICAL REQUESTS SHEET

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

Send to: BTI Products, LLC

652 Silver Hills Road

Bayfield, CO 81122

970.884.4629

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 970.884.4629.

II. Sample Analyses

A. Microbiological Analyses

- | | Cost Per Sample | Yes |
|--|-----------------|-------|
| 1. Viable culture | | |
| a. MICKit® FPS – Inoculated by client and read by BTI Products | \$470 | _____ |
| b. MICKit® FPS -- Inoculated and read by BTI Products | \$595 | _____ |
| 2. Other (specify) _____ | _____ | _____ |

B. Other

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

SYSTEM INFORMATION	System #1	System #2	System #3	System #4	System #5
Type of system (wet, dry, including preaction, or deluge)					
Date system installed (month, year)					
Date of major renovations (month, year)					
Number of floors					
Number of risers					
Grid, loop, or tree system					
Fire and/or jockey pump (yes or no)					
Static pressure (psi)					
System volume (gal)					
Type backflow preventer					
Type pipe material (black steel, galvanized, copper, plastic)					
Mains: pipe schedule (5, 10, 30, 40, other)					
Branch lines: pipe schedule (5, 10, 30, 40, other)					
Fittings on mains (welded, screwed, roll grooved, cut grooved, other)					
Fittings on branch lines (welded, screwed, roll grooved, cut grooved, other)					
Sprinkler orientation (upright, pendent, sidewall)					
Source of make-up water (municipal, well, reservoir, pond, river, other)					
Storage tank volume (gal)					
Storage tank material (steel, concrete, wood, synthetic, other)					
Underground volume (gal)					
Underground materials of construction (steel, ductile, CPVC, other)					
Frequency of main drain test					
Frequency of inspectors test					
Location of inspectors test (riser, remote)					
Total number of times system was drained and refilled (last 5 years)					
Slime present (yes or no & clock position in pipe)*					
Tubercles present (yes or no & clock position in pipe)*					
Sediment present (yes or no & clock position in pipe)*					
Pipe obstructed (yes or no--if yes, cross section % obstructed)*					
Pitting corrosion present (yes or no & clock position in pipe)*					
Pinholes present (yes or no & clock position)					
Date(s) first leak(s) detected					
Location of leaks (riser, feed main, cross main, branch lines--all that apply)					

Answers to items marked with an asterisk () are obtained through visual inspection of inner diameters of pipe. This can be done using BTI Products, LLC's MICKI® Pipe Inspection Kit or similar test method.