How to Use Your Test Kit

1) Measuring Chlorine or Bromine

There are three yellow-cap bottles in the Taylor test kit; DPD Reagent #1, DPD Reagent #2, and DPD Reagent #3. The first two are used to measure free active chlorine (or bromine); DPD #3 is used to measure total chlorine, from which a combined chlorine level can be calculated.

- **Rinse the comparator tubes several times in the pool. Scoop enough water from elbow depth to fill the small tube to the 9ml mark (seen on the outer left side of tube).**
- **Add 5 drops of DPD reagent #1 to the water in the tube. DO NOT SKIP THIS STEP.**
- **Add 5 drops DPD #2 replace cap and invert several times to mix. Compare color to Cl scale on front of tube using natural light against a light background. THIS IS YOUR FAC or FREE ACTIVE CHLORINE reading. If using a bromine feeder, read the right column of numbers under Br)**

- If you get no color at all you may have too much chlorine present and it is bleaching out the reagent color. This is the problem when you see a bright red flash as you put the DPD #2 just before it turns clear, or if you can smell chlorine on your wet hand, yet the test result is colorless. **Depending on the pH, a chlorine tests that bleaches out often indicates chlorine levels above 20ppm and requires a dilution with distilled water (or tap water) to get a reading.**

- **To do a dilution**: Look on the left edge of the small tube. You will see the 9 ml mark, and also a 4.5ml (for a 1-1 dilution) and 1.8ml mark (for a 1-5 dilution). If your chlorine test is actually bleaching, use the 1-5 dilution. If it is reading off the scale (a very, very dark red) and you suspect it's higher than 5ppm, use the 1-1 dilution.
- For a 1-5 dilution, fill the tube with pool water to the 1.8 ml mark and fill the rest of the tube with distilled water all the way up to the 9 ml mark. Run DPD test as usual, read color AND MULTIPLY THE RESULT BY 5. So if you run a 1-5 dilution and get a read of 3ppm then the actual chlorine level is 3x5=15ppm.

- If you want a **combined chlorine** reading (chloramines) add 5 drops of DPD #3 to the above mix and observe color change (if any). THIS IS YOUR TOTAL CHLORINE READING. To calculate combine chlorine take the total chlorine level and SUBTRACT the free chlorine level.
- Total Chlorine – Free Active Chlorine = Combined Chlorine or TAC-FAC = CC. So if your regular test reads 2ppm (FAC), then you use DPD#3 and get a reading of 3ppm (TAC) then you have 1 ppm combined chlorine and you need to use breakpoint chlorination to get rid of it.

2) Measuring pH

There are three red-cap bottles in the Taylor test kit; R-0004 is Phenol Red and used to measure pH. R-0005 is sulfuric acid used for an ACID DEMAND test, and R-0006 is sodium carbonate (soda ash) used for a BASE DEMAND test.

- **Rinse the comparator tubes several times in the pool. Scoop enough water from elbow depth to fill the large tube to the 44ml mark (seen on the outer right side of tube).**
- **Add 5 drops of R-0004 (Phenol Red), cap and invert to mix.**
- **Compare color to pH scale on front of tube using natural light against a light background.**

- The other two red caps are not needed very often, but are very useful if you need to adjust your pH and you're not sure how much acid or soda ash to add to the pool. Let's say you tested the pool and the color came up dark pink, indication a pH of 8.0 or more, and you want to bring the pH down to 7.6. **Using the ACID DEMAND test it's easy to find out how much acid you need to add to the pool to bring the pH down to 7.6.**
- Think of the bright pink water in the comparator tube (pH of 8) as a miniature swimming pool. When you add one drop at a time of R-0005 (Acid Demand test) to this "miniature pool" you are simply adding acid and you'll see how it will change the color of the pH test. Let's say you added 3 drops of R-0005 and your pH changed to 7.6. NOW we need to convert the volume of this little tube to the volume of the actual pool you're testing…. it's already done for you on the treatment tables included with you kit, OR you can turn to **page 43 table 4-10** in your Health Department Pool handbook. If you used 3 drops to bring the pH down to 7.6 and you have a 20,000-gallon pool, the table shows that you need 1.25 quarts of muriatic acid to adjust the pH in the pool.

- The **Base Demand** test works on the same principle. If your pH is bright yellow (too low), you have too much acid in the water and you know you need to add soda ash but you're not sure how much. Next you add drops of R-0006, which is simply a solution of soda ash, to that yellow water in your tube until your pH comes up, then use the Table 4-9 on page 43 for Base Demand in the same manner to convert those drops to pounds of soda ash.

- **Weird things that can happen to your pH test:**

On a rare occasion you may have strange pH test results, such as grape juice purple or lime green. A bright purple result means there's an extreme amount of chlorine in the water, usually in this case the chlorine test was bleaching out and it's somewhere around 25 ppm. I've only seen this occur in spa pools where chlorine spikes are common. There is a way to remove this excess chlorine from the test water to get an accurate pH test simply by adding a couple drops of the green cap R-0007 sodium thiosulfate, but why bother. The only way to deal with this situation is to drain all or part of the spa and adjust your chemistries with fresh water.

Lime green pH test result is a sign that you better start thinking about replacing that heater coil soon because you just ate it away with too much acid. If it's a spa, drain it all and refill.

On other occasions you may do your pH test and notice that it's starts out very yellow, and within seconds it creeps up to orange or pink before your eyes. This may indicate that your pH is unstable and the next thing you need to do is look at your **buffer system or Total Alkalinity.**

3) Measuring Total Alkalinity

There are three green-cap bottles in the Taylor test kit;
R-0007 is Thiosulfate and used to remove all chlorine from the test sample.
R-0008 is the Total Alkalinity Indicator (dark green color) and
R-0009 is a sulfuric acid solution that will change the green test water to red. This type of test is called a titration, in other words, you are adding a chemical in small amounts until you get a desired result (i.e., turning the water from green to red)

- **Rinse the comparator tubes several times in the pool. Scoop enough water from elbow depth to fill the large tube HALFWAY to the 25ml mark (seen on the outer right side of tube).**
- **Add 2 drops of R-0007, swirl to mix**
- **Add 5 drops of the green R-0008, swirl to mix**
- **Now, take the R-0009 and add one drop at a time to the green water and swirl after each addition. After a few drops you may see the water turn from green to muddy purple. Keep adding, one drop at a time until it turns to a clear bright pinkish red. This is your endpoint.**

- **How many drops did it take to get this result?** It will vary with each pool. If it took 6 drops, then take that number and **multiply it by 10** to get your Total Alkalinity (TA). In this case the total Alkalinity is 60ppm. The desired range is 80-120ppm so you know you need to add Sodium bicarbonate to raise you alkalinity.

If your TA is 60ppm and you want to raise it to 100ppm you simply go to the table in your test kit book, or use the Table 4-12 on page 40 of your Health Department Handbook. On the left column you see the desired increase, in this case it would be 40 ppm that you want to raise the TA, and follow it over to the pool volume column. So if you had a 20,000-gallon pool and you wanted to raise the TA from 60ppm to 100ppm you would need to add12 pounds of sodium bicarbonate to the pool.

If you get a strange muddy orange color, or any color other than red at the end result of your Total Alkalinity test, you may have too much chlorine in the sample or your test reagents may be expired.

4) Measuring Cyanuric Acid (Stabilizer)

There are two white cap bottles of R-0013 in the Taylor test kit, along with a clear plastic mixing bottle. These two bottles hold enough test reagent for only about 6 tests. The best thing to do is to carry a large stock bottle of R-0013 in your truck and use it to refill a smaller bottle in your test kit as you run low.

- **There are two lines on the mixing bottle for this test. The first line is the amount of pool water needed. Next, fill the bottle up to the second line with R-0013. Cap and shake the bottle for 30 seconds.**

- **Now, look at the small comparator tube on your test block. Inside the tube, down at the bottom, is a small black dot. Watch this dot as you squirt the mixture you just made into the small comparator tube a few drops at a time.** If you have a lot of stabilizer in your water the mixture will be milky white and it will block out the dot with a few drops. Add the mixture until you can no longer see any trace of this dot as you look down into the tube.

- **At this point stop and look on the outside of the test block along the small tube on the side that's close to the big tube. There are measured lines that start at 100 near the bottom and end at 30 near the top. Read the level where your stabilizer mixture blocked out the dot.** This is the amount of stabilizer in the pool in part per million (ppm). For example, if you made your mixture and filled the tube halfway before the black dot blocked out, you will see the side measures about 50ppm.

The maximum amount of stabilizer allowed in spas is only 40ppm. With spas on erosion feeders, this is one of the most common violations we encounter as inspectors. As a maintenance person, you need to check the stabilizer in spas using trichlor tabs at least 3 times a week in order to keep the level under control. In pools, a 100ppm maximum limit is allowed, and does not need to be checked as often. If you have a pool on liquid chlorine, and you're having problems with algae or with keeping the chlorine levels up in the summer, you may need to add stabilizer. In this case, the test mixture will remain clear, instead of turning milky white, or will just have a light haze to it (trace amount of stabilizer) and the black dot remains fully visible during the test.

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One last tip: Be nice to your test kit! Don't leave it on your dashboard. Keep it clean, and avoid sudden changes in temperatures. If a reagent is a year old, or has turned a funny color, replace it with a new bottle.