



# Testing Freshwater pH

## - The Best Test For Your Hobby Dollar -

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**F**or most aquarists, water quality is an elusive and sometimes illusive property. There are many books and magazine articles that explain what water quality is. Some even explain briefly how to test certain aspects of it. But, it's important for the consumer to know which company produces the best test for their pH dollar. The aquarium hobby's expanding at an incredible rate and so is the number of companies vying for your hobby dollar. After reading what follows, you'll be better able to spend your hard earned money wisely and get the most accurate, easy to use, cost worthy pH test kit available.

### How pH Testing Works

The most common pH test kits are the "wet" type. With this type, you place a known volume of aquarium water (usually 4-6 milliliters) in a clear test vial. Two or three drops of a pH dependent color indicator is then added to the test vial. The resulting color of the solution is then compared to a color gradient pH chart to determine the pH. Variants of these types of kits also exist in which the liquid indicator is replaced by a powdered, granular, or tablet form of indicator.

Another type of test kit is that of the "dry" type. To use this kit you simply dip a test strip in a sample of aquarium water. These test strips are coated with a pH dependent color indicator. Similar to that of the wet kits, the resulting color of the test strip is compared to a color gradient pH chart to determine the pH.....

### How The Testing Was Done

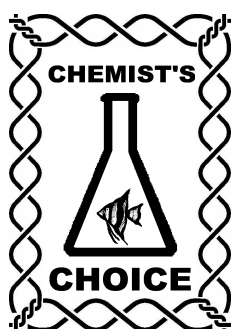
Five test solutions were chosen that were known to have pH's in the range of aquarium pH test kits. These were: 1) A sample of "typical" aquarium water of pH 7.1, 2) A hydrochloric acid solution of pH  $6.80 \pm 0.01$ , 3) A sodium bicarbonate (baking soda) solution of pH  $7.30 \pm 0.01$ , 4) A

sodium hydroxide solution  $\text{pH } 7.70 \pm 0.01$ , and 5) Analytical buffer solution (clear) of  $\text{pH } 7.00 \pm 0.01$ . The hydrochloric acid solution was prepared from analytical grade 0.1376M stock solution. The sodium hydroxide solution was prepared from the anhydrous solid weighed on an analytical balance to the nearest 0.001 grams and dissolved in ultra-pure de-ionized water.

Five identical vials were each filled with one of the test solutions and were labeled. The labels were obscured and the vials were mixed to a random order. A test kit was chosen and a vial was selected randomly for testing, until all vials had been selected. The tests were performed exactly following the respective manufacturers' instructions included in the packaging. The results of the tests were recorded. The pH of another sample of the same solution was then checked with an analytical pH meter (accurate to 0.01 units) and those results were recorded. The label was then removed from the vial and the identity was noted. This procedure was repeated for each test kit.

## Interpreting The Results

Each pH kit tested has an evaluation box like the one to the right. A kit's accuracy was judged based on how close the observed reading was to that of the analytical pH meter's reading.



Test Kit Name	
Accuracy:	
Ease Of Use:	
Avg. Price:	\$0.00
Cost Per Test:	0¢

The accuracy was then fit to a scale of 1 to 5 flasks, with 5 being the most accurate. A kit's ease of use was judged based on many factors. A few of the factors were: 1) ease of filling the test vial, 2) ease of adding the indicator, 3) ease of comparing the sample reading to the provided pH chart, 4) ease of spilling the test vial, 5) ease of following the manufacturer's directions, etc. Some factors were more important than others, but all of them were taken into account in evaluating the kit's ease of use. The evaluation was then fit to a scale of 1 to 5 fish, with 5 being the most easy to use. After all of the evaluations were completed, the kit with the best overall performance and price was given the chemist's choice award (shown above). The results were compiled into an "at-a-glance" table (**page 4**) for easy direct comparison of specific brands and how they stacked up to each other.....