544 Environmental and Outdoor Water Full Panel plus Bacteria Growth

Sciencefaircenter.com Study Kit

Each water sample is tested for this Set of parameters:

pH, Alkalinity, Water Hardness,
Total Dissolved Solids (TDS),Nitrate, Nitrite, Phosphate,
Dissolved Metals (Combined Metals Cu+2, Co+2, Zn+2,
Cd+2, Ni+2, etc.), Iron +2, plus
Bacterial Growth Indicator
(10 tests per Set)

Log onto
www.sciencefaircenter.com/documentation.tpl
for additional information on this study kit.

Find more water information at **www.sciencefairwater.com** (a web work in progress).

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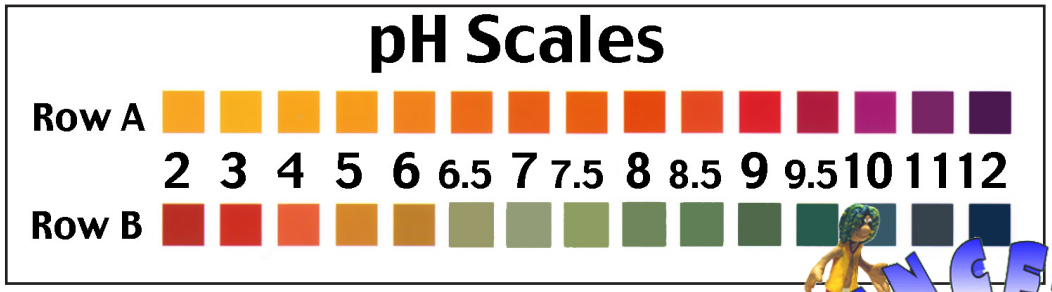
ScienceFairCenter.com
6830 NE Bothell Way #C424
Kenmore, WA 98028

SCIENCEFAIRCENTER.COM

Phone: 206-440-3008
sales@sciencefaircenter.com



110 pH Testing of Water

Colorimetric test strips. (1 test per strip)

This pH test is very versitile in that it can be used for Drinking Water testing, food processing, environmental applications or in any other water matrix.

pH is short for “Power of Hydrogen”. The balance of positively charged and negatively charged hydrogen ions in drinking water determines pH.

Water that has a low pH is acidic or aggressive and can corrode plumbing resulting in metal ions being present in drinking water and damages fixtures and pipes.

Water that has a high pH is basic and will leave scale in pipes and fixtures.

This test features two test pads both measuring at the same range using different color indicators. This makes color matching easier on the Color Comparator Chart than with other colorimetric tests.

The test reports water pH at the following levels:
2.0, 3.0, 4.0, 5.0, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10, 11, and 12
Results are obtained from this test in 1 minute.

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Note:

These pH test strips perform optimally in water with a Total Alkalinity above 80 mg/L or ppm. Water highly saturated with dissolved solids or highly buffered samples will give elevated results for pH.

Note:

National Secondary Drinking Water Regulations set forth by EPA recommend a pH level 6.5 - 8.5 .

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sales@sciencefaircenter.com

Total Alkalinity

0 40 80 120 180 240

mg/L or ppm

#105 TOTAL ALKALINITY of WATER

Colorimetric test strips. (1 test per strip)

Total Alkalinity is a fundamental parameter and water testing. Total Alkalinity indicates the buffering capacity of natural waters. A water is said to be buffered if the pH is not changed greatly by addition of acids or bases. The most effective buffering action is within the pH range of water from near 6.0 to about 8.5.

Most natural waters are buffered to some extent by reactions that involve Dissolved Carbon Dioxide (CO_2). This Carbon Dioxide is an indispensable reservoir of carbon for photosynthesis. Thus, the productivity's of water can be correlated with alkalinity and the buffering system.

The Color Comparator Chart for this test allows you to read Total Alkalinity in mg/L or ppm.

This test reports total alkalinity concentrations in water at:
0, 40, 80, 120, 180 and 240 mg/L or ppm.

Results are obtained from this test in 30 seconds.

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Total Hardness (As $CaCO_3$)

100 TOTAL WATER HARDNESS

Colorimetric test strips. (1 test per strip)

Water Hardness is composed of mostly calcium and magnesium. The water hardness comes from naturally occurring minerals in the local and regional geology being dissolved by water.

Hardness is a key water parameter and its control is important to assure proper water quality. Low Hardness (Soft water) can contribute to corrosive water. High Hardness (Hard water above 400) can lead to clarity and scaling problems. Water softeners are used to reduce Total Hardness of water.

Testing for hardness in tap water is very common and is very quick and easy with these test strips. The Color Comparator Chart for this test allows you to read Total Hardness in mg/L or ppm.

This test reports calcium hardness concentrations in water at 0, 40, 80, 120, 180, 250, 425, 1000 mg/L or ppm.

Results are obtained from this test in about 5 seconds.

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Background Information

Total Hardness (TH) is a measure of the total amount of calcium and magnesium that has naturally leached into the water during its journey through the watershed. In the U.S. water hardness is most often reported as milligrams per liter (mg/L) or parts per million (ppm) as calcium carbonate (CaC03).

It is difficult to produce soap suds in water with high levels of calcium and magnesium ions, hence the term “hardness”.

In addition to reducing the effectiveness of soaps and detergents, hard water may cause an insoluble scale to form on fixtures and on the inside of pipes. Scale formation depends on several factors, one of which is pH.

The EPA does not regulate the levels of hardness in the water supply. There are, however, generally recognized levels that describe the amount of hardness in a water sample:

Hardness as Calclum carbonate (ppm)	**Classification**
0-60	Soft
61-120	Moderately Hard
121-180	Hard
>180	Very Hard

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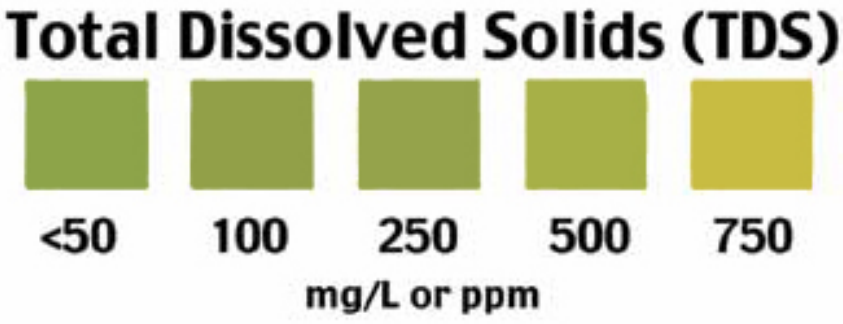

#145 Total Dissolved Solids in Water

Colorimetric test strips. (1 test per strip)

Testing for Total Dissolved Solids (TDS) in tap water is very common and is very quick and easy with these test strips. The EPA Secondary Drinking Water Standard for for TDS is 500mg/L or ppm.

The color chart for this test allows you to read TDS in milligram/L or ppm.

The Color Comparator Chart for this test reports Total Dissolved Solids levels in water at:
0, 50, 100, 250, 500, 750 mg/L or ppm.
(Note: concentration units are milligrams per Liter or parts per million).

Results are obtained from this test in about 30 seconds.

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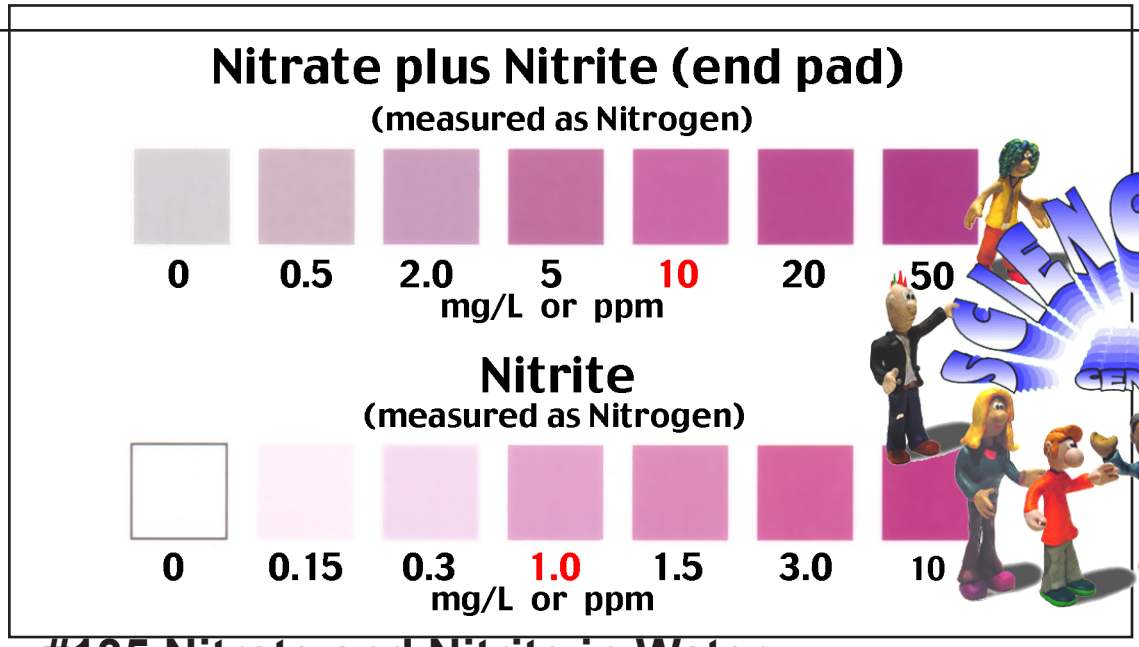

#135 Nitrate and Nitrite in Water

Colorimetric test strips. (2 tests per strip)

Nitrate /Nitrite test strips are for testing water in many applications from drinking water to water used to wash produce.

Nitrates and nitrites occur normally in nature from the breakdown of ammonia in the nitrogen life cycle. Nitrates in nature cause plant and algae growth that may affect the balance of water-based ecosystems.

Nitrate is found in fertilizers and animal waste. Rain tends to wash fertilizers containing nitrates into nearby natural water systems and ground water. Groundwater used as drinking water that contains nitrogen represents a hazard to babies. Many die every year as a result from “Blue Baby Syndrome.”

The Color Comparator Chart for this test reports concentrations compatible with EPA limits of total nitrogen and nitrite nitrogen in water.

The test reports levels of:
NO3 (as N): 0, 0.5, 2.0, 5, 10, 20, 50 mg/L or ppm;
NO2 (as N): 0.15, 0.3, 1, 1.5, 3, 10 mg/L or ppm.

Results are obtained from this test in 1 minute.

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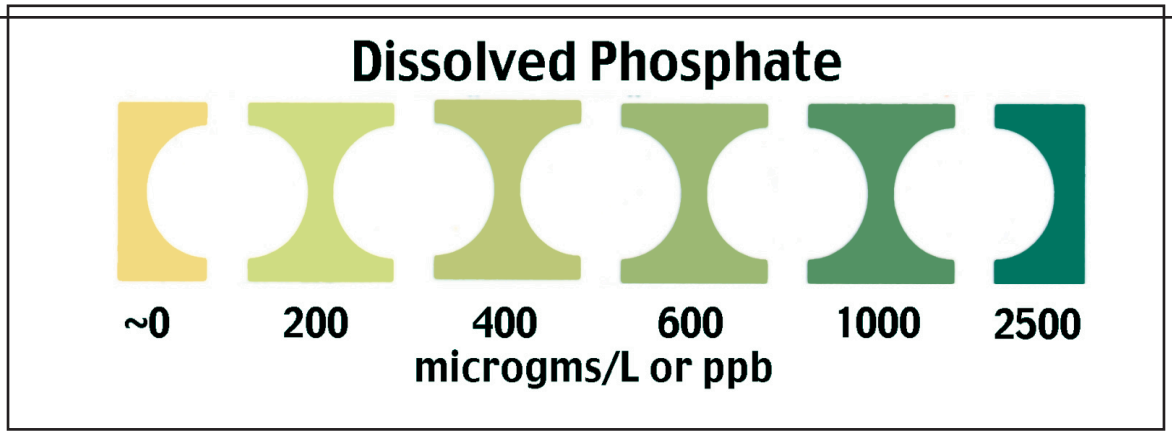

#140 Dissolved Phosphate in Water

Colorimetric test strips. (1 test per strip)

Testing for Dissolved Phosphate in water is common, but usually found in low concentrations. Because of low concentrations, phosphate is involved with regulating bilogical growth and productivity in natural waters.

The color chart for this test allows you to read Dissolved Phosphate in micrograms/L or ppb.

The Color Comparator Chart for this test allows you to read Phosphate levels in water at:
~0, 200, 400, 600, 1000, 2500 microgms/L or ppb.
(Note: concentration units are micrograms per Liter or parts per billion).

Results are obtained from this test in about 1 minute.

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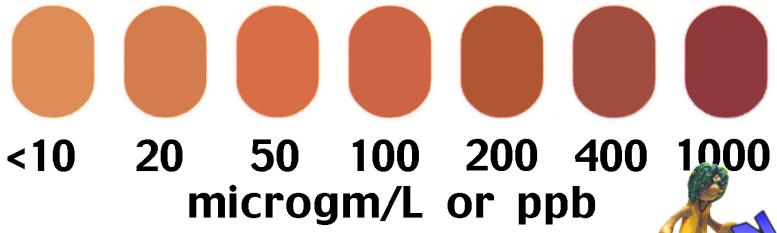
Dissolved Metals



#150 Dissolved Metals in Water

Colorimetric test strips. (1 test per strip)

Testing for Dissolved Metals, also referred to as Trace Metals, in tap water is very common and is very quick and easy with these semiquantitative test strips. Each test strip result indicates the combined presence of heavy metals (Cu+2, Co+2, Zn+2, Cd+2, Ni+2, Pb+2, etc…) in water.

The color chart for this test allows you to read Dissolved Metals in micrograms/L (ugms/L) or parts per billion (ppb). The color chart was calibrated using mixed metals solution.

In the presence of one specific metal, or a high concentration of a specific metal, colors such as purple, red, or brown may appear. In this situation, matching levels based on color intensity may be necessary to reach semiquantative results.

The Color Comparator Chart for this test reports mixed Dissolved Metals levels in water at:
<10, 20, 50, 100, 200, 400, 1000 microgms/L or ppb.
(Note: concentration units are micrograms per Liter or parts per billion: ppb.)

Results are obtained from this test in 2 1/2 minutes.

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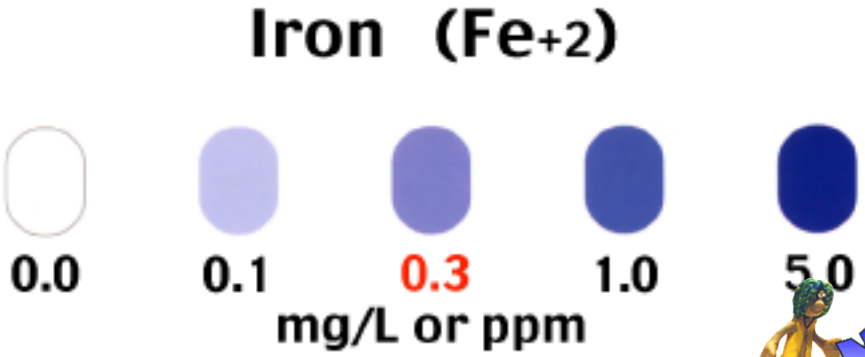

#155 Iron (Fe^{+2}) in Water

Colorimetric test strips. (1 test per strip)

Testing for Iron in tap water is very common and is very quick. Each test strip result indicates the presence of Iron in the ferrous (Fe+2) state in water.

The color chart for this test allows you to read Iron+2 in milligram/L or ppm.

The presence of Iron in water contributes to the reddish brown stains on porcelin and plumbing fixtures. It can also add a metalic taste and odor to drinking water.

The Color Comparator Chart for this test reports mixed Iron (Fe+2) levels in water at:
0.0, 0.1, 0.3, 1.0, 5.0 milligms/L or ppm.
(Note: concentration units are milligrams per Liter or parts per million).
Best results are obtained when water is room temperature.

Results are obtained from this test in 2 1/2 minutes.

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Bacteria Growth Check

fastidious aerobic bacteria in water

Estimated Bacteria Growth Level
Colony Forming Units (CFU) / 100ml
< = Less > = Greater

180 Bacteria Growth Check

Colorimetric test strips. (1 test per strip)

Bacteria Growth Check is a test strip that has been specially formulated with Brain Heart Infusion media that allows maximum cultivation of fastidious aerobic bacteria found in some waters. This test could be used in a variety of applications, however it is not specific for any particular type of bacteria.

You can dip these strips in water or swab surfaces with them. The Bacteria test procedure then requires you to return the test strip into a clear plastic bag for incubation. After 48 hours of room temperature incubation, any fastidious bacteria on the test pad will multiply and turn the test pad pink to red. The darker and more consistent the test pad, the more bacteria that are present.

Bacteria Growth Check tests only a small water sample and requires a significant quantity of bacteria to show a change on the test pad.

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