DROP COUNT TESTS

INSTRUCTIONS FOR USING PALINTEST DROP COUNT TESTS FOR TESTING INDUSTRIAL WATERS

Palintest drop count tests provide a simple means of testing for a wide range of water parameters. They are particularly suitable for testing industrial water samples.

Drop count tests provide the simplest form of test procedure. An indicator tablet, or drop of indicator solution, is added to a sample of the water, then test reagent is added drop by drop until a colour change takes place. The test result is calculated from the number of drops of test reagent used.

The range of tests covered includes those needed for the testing and control of boiler water, cooling water and other industrial water systems. The tests may be combined in test kits with Palintest Diskette Comparator tests, or other Palintest methods, so as to provide a complete range of tests for industrial water monitoring and control.

Sample Collection and Preparation

Collect samples from a proper sampling point where available. Cool hot samples to room temperature before carrying out the test. Test as soon as possible after taking the sample.

It is not normally necessary to filter the sample unless it contains large amounts of suspended or particulate matter. Filtration equipment is included in certain kits or is available as an optional extra for use in such cases.

Test Instructions

Specific instructions for each test are given in the subsequent sections of this leaflet. The general procedure described below will help you get the best results from Palintest drop count tests.

1 Fill the screw-capped test tube with sample to the 10 ml mark.

2 Add an indicator tablet, or drops of indicator solution, as directed in the individual test instructions. Swirl the container, or shake gently, in order to mix.

3 Take the bottle of the test reagent and remove the cap. Hold the bottle, nozzle down, above the test tube and add a drop of reagent. Swirl the container gently to mix.

4 Continue adding drops one at a time in this manner until the colour change described in the individual test instructions takes place.

5 Note the number of drops of test reagent used. Work out the test result from the formula given in the individual test instructions. Certain test reagents are available in different strengths. Be sure to use the formula appropriate to the test reagent used.

6 After using the kit wash out the test container thoroughly and replace the cap securely on the dropper bottle.

The dropper bottles containing the test reagents are designed to give discrete drops of precise size. If uneven sized drops are obtained this may be due to static build-up on the dropper bottles. In this case wipe the bottle with a tissue in order to discharge the static.

DROP COUNT TEST INSTRUCTIONS

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ACIDITY TO pH 8.3

Colour change: Colourless - Pink

Acidity to pH 8.3 is a control test for source water and for general water testing

Range: 0 - 1200+ mg/l

1 Fill sample container to 10 ml mark.

2 **Add one drop** of AC-B and shake container to mix.

3 Add AC-D40 drop by drop until the colour changes from colourless to pink.

4 Note the number of drops of AC-D40 used (N) and calculate result from the formula below :-

$$\text{Acidity (mg/l } H_2SO_4) = N \times 40$$

ACIDITY TO pH 4.5

Colour change: Orange - Blue

Acidity to pH 4.5 is a control test for source water and for general water testing

Range: 0 - 1200+ mg/l

1 Fill sample container to 10 ml mark.

2 Add one drop of AC-A and shake container to mix.

3 Add AC-D40 drop by drop until the colour changes from orange to blue.

4 Note the number of drops of AC-D40 used (N) and calculate result from the formula below :-

$$\text{Acidity (mg/l } H_2SO_4) = N \times 40$$

ALKALINITY M

Colour change: Blue - Orange

Alkalinity M is a control test for source water, steam boilers and cooling systems

Range: 0 - 300+ mg/l (use AL-D10) or Range: 0 - 1200+ mg/l (use AL-D40)

1 Fill sample container to 10 ml mark.

2 Add one drop of AL-M and shake container to mix.

3 Add AL-D10 or AL-D40 drop by drop until the colour changes from blue to orange.

4 Note the number of drops of AL-D10 or AL-D40 used (N) and calculate result from the formula below :-

For AL-D10 :

Alkalinity M (mg/l $CaCO_3$) = N x 10

For AL-D40 :

Alkalinity M (mg/l $CaCO_3$) = N x 40

ALKALINITY P Colour change: Pink - Colourless

Alkalinity P is a control test for steam boilers

Range: 0 - 300+ mg/l (use AL-D10) or Range: 0 -1200+ mg/l (use AL-D40)

1 Fill sample container to 10 ml mark.

2 Add one drop of AL-P and shake container to mix.

3 Add AL-D10 or AL-D40 drop by drop until the colour changes from pink to colourless.

4 Note the number of drops of AL-D10 or AL-D40 used (N) and calculate result from the formula below :-

For AL-D10 :

Alkalinity P (mg/l $CaCO_3$) = N x 10

For AL-D40 :

Alkalinity P (mg/l $CaCO_3$) = N x 40

ALKALINITY OH Colour change: Pink - Colourless

Alkalinity OH (caustic alkalinity, hydroxide alkalinity) is a control test for steam boilers

Range: 0 - 300+ mg/l (use AL-D10) or Range: 0 - 1200+ mg/l (use AL-D40)

1 Fill sample container to 10 ml mark.

2 Add one AP-S tablet and shake container until tablet disintegrates.

3 Add one drop of AL-P and shake container to mix. A pink colour indicates the presence of Alkalinity OH.

4 Add AL-D10 or AL-D40 drop by drop until the colour changes from pink to colourless.

5 Note the number of drops of AL-D10 or AL-D40 used (N) and calculate result from the formula below :-

For AL-D10 :

Alkalinity OH (mg/l $CaCO_3$) = N x 10

For AL-D40 :

Alkalinity OH (mg/l $CaCO_3$) = N x 40

CALCIUM HARDNESS Colour Change: Pink - Violet

Calcium Hardness is used as an indicator of scaling potential in cooling systems

Range: 0 - 300+ mg/l (use CH-D10) or Range: 0 - 600+ mg/l (use CH-D20)

1 Fill sample container to 10 ml mark.

2 Add one CH-A tablet and shake container until tablet disintegrates.

3 Add one drop of CH-D10 or CH-D20 drop by drop until the colour changes from pink to violet.

4 Note the number of drops of CH-D10 or CH-D20 used (N) and calculate result from the formula below :-

For CH-D10 :

Calcium Hardness (mg/l $CaCO_3$) = N x 10

For CH-D20 :

Calcium Hardness (mg/l $CaCO_3$) = N x 20

CARBON DIOXIDE (FREE) Colour Change: Colourless - Pink

Free carbon dioxide is an indicator of corrosion potential for steam condensate and softened feed waters

Range: 0 - 100+ mg/l

1 Fill sample container to 10 ml mark.

2 Add one drop of CO-A and shake container to mix. If the solution turns pink, no carbon dioxide is present. If the solution is colourless continue the test as per the instructions.

3 Add CO-D5 drop by drop until the solution changes from colourless to pink. The colour must persist for at least 30 seconds.

4 Note the number of drops of CO-D5 used (N) and calculate result from the formula below :-

Carbon Dioxide (mg/l CO_2) = N x 5

CHLORIDE Colour Change: Yellow - Deep Orange

Chloride is a control test for source water, steam boiler water, condensate and cooling systems

Range: 0 - 150+ mg/l (use CL-D5) or Range: 0 - 600+ mg/l (use CL-D20)

1 Fill sample container to 10 ml mark.

2 Add one CL-A tablet and shake container until tablet disintegrates

3 Add CL-D5 or CL-D20 drop by drop until the colour changes from yellow to deep orange.

4 Note the number of drops of CL-D5 or CL-D20 used (N) and calculate result from the formula below : -

For CL-D5 :

Chloride (mg/l Cl) = (N - 1) x 5

For CL-D20 :

Chloride (mg/l Cl) = (N - 1) x 20

HARDNESS – TOTAL Colour Change: Plum Red - Blue

Hardness is a control test for pre-treatment plant, steam boilers and cooling systems

Range: 0 - 30+ mg/l (use HA-D1), Range: 0 - 300+ mg/l (use HA-D10) or Range: 0 - 600+ mg/l (use HA-D20)

1 Fill sample container to 10 ml mark.

2 Add one HA-A tablet and shake container until tablet disintegrates

3 Add HA-D1, HA-D10 or HA-D20 drop by drop until the colour changes from plum-red to blue.

4 Note the number of drops of HA-D1, HA-D10 or HA-D20 used (N) and calculate result from the formula below :-

For HA-D1 :

Hardness (mg/l $CaCO_3$) = N x 1

For HA-D10 :

Hardness (mg/l $CaCO_3$) = N x 10

For HA-D20 :

Hardness (mg/l $CaCO_3$) = N x 20

ORGANOPHOSPHONATE Colour Change: Green - Purple

Organophosphonates are used as inhibitors in cooling systems

Range: 0 - 30+ mg/l

1 Fill sample container to 10 ml mark.

2 Add one OR-A tablet, crush and mix to dissolve.

3 Add OR-D1* drop by drop until the colour changes from green to purple.

4 Note the number of drops of OR-D1 used (N) and calculate result from the formula below :-

Organophosphonate (mg/l) = N - 2

For most accurate results a blank should be carried out on the water without Organophosphonate, or on the make-up water to the system, and the result subtracted from the test result.

* The OR-D1 solution contains thorium nitrate. Thorium is a naturally occurring element** which is carcinogenic. However, the Organophosphonate No 2 solution is very dilute (contains less than 0.1% thorium nitrate) and is not hazardous when used as instructed. Contact with bare skin should be avoided. If skin contact occurs, wash thoroughly. Mop up spills as soon as possible and dispose of wipes to waste. The contents of the test tubes and any unused solution must be disposed of via a waste water system (not into the body of water being tested). **Naturally occurring thorium is weakly radioactive.

NITRITE Colour Change: To Persistent Pink

Nitrite is used as a corrosion inhibitor in chilled water and cooling systems

Range: 0 - 300+ mg/l (use NI-D1) or Range: 0 - 1500+ mg/l (use NI-D50)

1 Fill sample container to 10 ml mark.

2 Add two NI-A tablets and shake container until tablet disintegrates.

3 Add NI-D10 or NI-D50 drop by drop until pink colour persists for one minute.

4 Note the number of drops of NI-D10 or NI-D50 used (N) and calculate result from the formula below :-

For NI-D10 :

Nitrite (mg/l $NaNO_2$) = N x 10

For NI-D50 :

Nitrite (mg/l $NaNO_2$) = N x 50

SULPHITE Colour Change: To Permanent Blue

Sulphite is used as an oxygen scavenger for steam boilers

Range: 0 - 150+ mg/l (use SI-D5) or Range: 0 - 600+ mg/l (use SI-D20)

1 Fill sample container to 10 ml mark.

2 Add one SI-A tablet and shake container and swirl gently until the tablet disintegrates.

3 Add SI-D5 or SI-D20 drop by drop until permanent blue coloration appears.

4 Note the number of drops of SI-D5 or SI-D20 used (N) and calculate result from the formula below :-

For SI-D5 :

Sulphite (mg/l Na_2SO_3) = N x 5

For SI-D20 :

Sulphite (mg/l Na_2SO_3) = N x 20

TANNIN Colour Change: To Permanent Blue

Tannin is used as an oxygen scavenger for steam boilers

Range: 0 - 300+ mg/l

1 Fill sample container to 10 ml mark.

2 Add one TN-A tablet and shake container until the tablet disintegrates.

3 Add TN-D10 drop by drop until pink colour persists for one minute.

4 Note the number of drops of TN-10 (N) and calculate result from the formula below :-

Tannin (mg/l) = N x 10

Tannin Index = N

Commercial Treatment Products

Commercial water treatment products may be supplied under the manufacturers brand name and in formulations with other ingredients. When using the results from drop count tests to make treatment recommendations it may be necessary to take into account the percentage of active compound contained in the product being used. In case of difficulty consult the manufacturer or supplier of the water treatment product being used.