

POOLTEST MINI-LAB

Instructions for using the Palintest Pooltest Mini-Laboratory

The Palintest Pooltest Mini-Lab is a compact 'mini laboratory' for testing pool water samples. The Mini-Lab comprises the Palintest Pooltest 25 Photometer together with the equipment and tablet reagents necessary for carrying out each water test. The Mini-Lab is specifically designed for use in pool shops and retail outlets, and for use in plant rooms at public and commercial pools.

Water Lab Design and Features

The Palintest Pooltest Mini-Lab is contained on a compact moulded plastic work-tray so that all the equipment is conveniently at hand.

The Palintest Pooltest 25 forms the heart of the mini-lab. The Pooltest 25 is an instrument for measuring colour intensity. It accurately assesses the colours produced in the test solutions and provides results in the form of a digital readout. See Pooltest 25 manual for full details and operating instructions. The lab work-tray allows the photometer to be set at a convenient angle for use with a computer system. This angled position does not affect the operation of the photometer.

Test tube racks are provided for the photometer test tubes. Keep the tubes in these racks when not in use and while carrying out the test procedures. The racks are designed so that after use the test tubes can be washed while still in the rack. Grip the ends of the rack firmly, invert to empty the tubes then wash thoroughly under running water.

The recesses at the back of the work-tray are designed to take plastic boxes of tablet reagents. A support stand is supplied to fit in each recess. For convenience in use it is suggested that a number of tablet strips are removed from each box. Please the strips standing in front of the boxes so that they are readily at hand. Spare recesses can be used for additional reagents or for extra component items.

Most tests can be carried out within the confines of the lab tray. A Palintest workplace mat is however included with the lab to provide additional working space for sample handling and manipulation.

Deionised water is required for dilution of the samples and rinsing of equipment. Deionised water can be prepared using the Di-ion Pack included with the lab. A nozzle-capped dispensing bottle is provided to hold a quantity of deionised water for use while carrying out the tests.

The total dissolved solids test does not use the photometer. This test is carried out using the TDS Sensor included in the lab.

USING THE MINI-LAB

Basic Principles

Tests are carried out on the pool water by adding the appropriate reagent tablet or tablets to a test tube containing a sample of the water. A distinctive test colour is formed and this is indicative of the concentration of the parameter being tested.

The Pooltest 25 is used to measure the colour formed in the test. Light from the photometer bulb is passed through the sample, then through an optical filter onto a photocell. The wavelength slide enables different filters to be selected depending on the colour of the test solution.

When a measurement is being carried out a 'BLANK' tube is first inserted into the photometer. The blank tube is a test tube containing pool water only. This tube is used to compensate for any inherent colour in the pool water and automatically sets the instrument for each test. It is important to understand the meaning of the term 'BLANK' tube.

Once the photometer has been set, the 'SAMPLE' tube is then inserted into the instrument. The sample tube is the test tube containing the coloured test solution prepared by adding the reagent tablets to the pool water sample in accordance with the test instructions. After the sample tube has been inserted, the photometer will display the test result in the form of a digital readout.

Different tests are carried out on the photometer by entering the appropriate program or 'Test' number. When used in conjunction with a computer system the test numbers can be selected automatically by the computer. The test instructions describe precisely how each of the tests should be carried out. Some of the instructions will indicate that the sample should be prepared in a certain way, or that the tablets should be added in a certain manner. It is important to observe these instructions in order to obtain accurate results.

Note that certain of the tests are based on turbidity methods. In these tests the photometer is used to measure the degree of cloudiness which forms in the test solution.

Getting the Best Results

To get the best results from the mini-lab follow these simple guidelines:-

1. Read the test instructions carefully and carry out the tests precisely as instructed. Become familiar with the instructions for each test.
2. Add the tablets to the sample in the manner described in the instructions. Crush or allow to disintegrate as indicated. Use a separate crushing rod for each tube. Do not shake the test tubes in order to dissolve the tablets.
3. Place cap on the test tube when the tablets have dissolved. For most tests it does not matter if a few small undissolved particles remain provided these have settled to the bottom of the tube.
4. Before taking photometer readings ensure that the outside of the tube is clean and dry. Use a tissue if necessary to wipe off any water drips or condensation.
5. Wash test tubes, caps and crushing rods thoroughly under a running tap after use. Brush off any stains or deposits. Dry on a clean cloth or rinse with deionised water before re-use.

6. Replace any test tubes which become scratched or permanently stained.

Carrying out the Tests Rapidly

When carrying out a number of tests you will want to work as quickly as possible. Once you are familiar with the individual test procedures it should be possible to carry out a series of tests at the same time. The following procedure should be adopted:-

1. Note the tests which are required to be carried out.
2. Prepare a sample tube for each of the tests according to the test instructions.
3. Add test tablets to each tube in the manner described. Crush or allow to disintegrate as instructed. Cap the tubes.
4. Ensure that the tablets have properly dissolved then take the photometer reading on each tube in turn.

Make sure that sufficient time has elapsed for those tests which require a standing period. The preferable test sequence is to have tests which require a standing period at the end of the series. In this way the standing period can be accounted for by the time taken to perform the other tests.

Diluting the Pool Water Sample

When the test result is outside the concentration range of the test, the photometer will display the '>' symbol. In such cases dilute the pool water and repeat the test:-

1. Take the Dilution Tube (PT 512) provided and fill to the x2 mark with pool water. Make up to the 'Deionised Water' mark with deionised water. Replace the tube cap and mix.
2. Carry out the test on the diluted sample in a 10 ml test tube as per the normal test instructions.
3. Switch the photometer into SYSTEM mode, then select key 8 'Dilution - Yes' option. Press ENTER key to switch back into PHOTOMETER mode.
4. Take the photometer reading in the normal manner. Photometer display sequence will ask for entry of dilution factor. Key in the factor '2'.
5. The test result displayed will represent the concentration in the original pool water sample.

Samples may be diluted to a greater extent if necessary. Enter the dilution factor appropriate to the dilution used. Note that it is not possible to dilute samples in the pH test.

Sample Collection

Take pool water samples from below the water surface. Collect in a clean plastic bottle and fill to the neck so as to avoid unnecessary airspace.

The free chlorine, bromine or ozone levels may drop during sample storage. Other parameters such as pH and alkalinity can also change. Samples should therefore be tested as soon as possible after sample

collection.

Test Instructions

The following sections give test procedures for tests included in the water lab and for those available as optional extras.

The test procedure headings show the photometer program number ('Test' number), the test name, the range of the test and the colour change which takes place over the test range. For additional technical information on tests and test methods see Palintest Photometer Test Instruction Manual (SI PHOT) available as an optional extra.

Test 1 FREE CHLORINE

Range 0 - 5.00 mg/l (ppm) Colourless - Red

1. Rinse test tube with sample leaving two or three drops in the tube.
2. Add one DPD No 1 tablet, crush tablet and then fill the test tube with sample to the 10 ml mark. Mix to dissolve tablet.
3. Take Photometer reading at 520 nm immediately.
4. Retain test solution if Total Chlorine test required.

Test 2 TOTAL CHLORINE

Range 0 - 5.00 mg/l (ppm) Colourless - Red

1. Carry out this test on the solution remaining from the Free Chlorine test.
2. Add one DPD No 3 tablet, crush and mix to dissolve.
3. Stand for two minutes.
4. Take Photometer reading at 520 nm.

To obtain COMBINED CHLORINE residual subtract Free Chlorine result from Total Chlorine result:
i.e. Combined Chlorine = Total Chlorine - Free Chlorine

Test 3 BROMINE

Range 0 - 6.00 mg/l (ppm) Colourless - Red

1. Rinse test tube with sample leaving two to three drops in the tube.
2. Add one DPD No 1 tablet, crush tablet and then fill the test tube with sample to the 10 ml mark. Mix to dissolve tablet.
3. Take Photometer reading at 520 nm.

Test 4 OZONE

Range 0 - 2.00 mg/l (ppm) Colourless - Red

1. Rinse test tube with sample leaving two to three drops in the tube.
2. Add one DPD No 4 tablet, crush tablet and then fill the test tube with sample to the 10 ml mark. Mix to dissolve tablet.
3. Take Photometer reading at 520 nm.

This test also responds to chlorine and bromine. Pools using 'ozone with chlorine' treatment systems, or other combined treatments, require a special testing procedure. See separate leaflet.

Test 5 PHMB (POLY-BIGUANIDE)

Range 0 - 100 mg/l (ppm) Yellow - Green - Blue

PHMB is the generic name for various polybiguanide-based swimming pool sanitisers. These compounds are normally sold under branded product names, for example Baquacil* (ICI), Softswim* (Biolab), Revacil* (Mareva) and Nicosil* (NICO Norge).

** All trade marks acknowledged.*

1. Fill test tube with sample to the 10 ml mark.
2. Add one PHMB tablet, crush and mix to dissolve.
3. Take Photometer reading at 640 nm immediately.

Test 6 pH VALUE

Range 6.8 - 8.4 Yellow - Red

1. Fill test tube with sample to the 10 ml mark.
2. Add one PHENOL RED tablet, crush and mix to dissolve.
3. Take Photometer reading at 520 nm.

Test 7 ALKALINITY (TOTAL ALKALINITY)

Range 0 - 500 mg/l (ppm) Yellow - Green - Blue

1. Fill test tube with sample to the 10 ml mark.
2. Add one ALKAPHOT tablet, crush and mix. Ensure all of the particles have dissolved.
3. Take Photometer reading at 570 nm.

Test 8 CALCIUM HARDNESS

Range 0 - 500 mg/l (ppm) Violet - Orange

1. Fill test tube with sample to the 10 ml mark.
2. Add one CALICOL No 1 tablet, crush and mix to dissolve.
3. Add one CALICOL No 2 tablet, crush and mix to dissolve.
4. Stand for two minutes.
5. Take Photometer reading at 570 nm.

Test 9 CYANURIC ACID

Range 0 - 200 mg/l (ppm) Clear - Cloudy

Use this test for chlorine-treated pools stabilized with cyanuric acid or using 'stabilized chlorine' donors.

Cyanuric acid is commonly referred to as 'Chlorine Stabiliser' or 'Pool Conditioner'.

1. Fill test tube with sample to the 10 ml mark.
2. Add one CYANURIC ACID tablet and allow to disintegrate for at least two minutes. A cloudy solution indicates the presence of cyanuric acid.
3. Crush any remaining undissolved tablet, mix and then take Photometer reading at 520 nm. Use the light shield while taking reading.

Test 10 IRON

Range 0 - 1.00 mg/l (ppm) Colourless - Pink

1. Fill test tube with sample to the 10 ml mark.
2. Add one IRON LR tablet, crush and mix to dissolve.
3. Stand for one minute.
4. Take Photometer reading at 520 nm.

Test 11  FREE COPPER

Range 0 - 5.00 mg/l (ppm) Colourless - Purple

Use this test for pools treated by copper silver ion generators or treated with uncomplexed form of copper such as copper sulphate.

1. Fill test tube with sample to the 10 ml mark.
2. Add one COPPERCOL No 1 tablet, crush and mix to dissolve.
3. Take Photometer reading at 520 nm.

Test 12  TOTAL COPPER

Range 0 - 5.00 mg/l (ppm) Colourless - Purple

Use this test for pools treated with chelated or complex forms of copper. Typically these compounds are used as algicides or winterising treatments.

1. Fill test tube with sample to the 10 ml mark.
2. Add one COPPERCOL No 1 tablet and one COPPERCOL No 2 tablet, crush and mix to dissolve.
3. Take Photometer reading at 520 nm.

Test 13  SALT

Range 0 - 10,000 mg/l (ppm) Clear - Cloudy

This test is used for testing the salt content of pools treated by 'salt chlorinators'.

1. Take a clean Sample Container (PT 510). Using the Measuring Syringe (PT 361) add 0.5 ml of pool water. Fill to the 100 ml mark with deionised water, cap and mix.
2. Fill test tube to the 10 ml mark with solution from the sample container.
3. Add one CHLORIDOL tablet, and allow to disintegrate for at least two minutes. A cloudy solution indicates the presence of salt.
4. Crush any remaining undissolved tablet, mix and then take Photometer reading at 520 nm. Use the light shield while taking reading.

Test 14  **SULPHATE**

Range 0 - 200 mg/l (ppm) Clear - Cloudy

1. Fill test tube with sample to the 10 ml mark.
2. Add one SULPHATE TURB tablet, crush and mix to dissolve. A cloudy solution indicates the presence of sulphate.
3. Stand for five minutes then mix again.
4. Take Photometer reading at 520 nm. Use the light shield while taking reading.

Test 15  **CHLORIDE**

Range 0 - 500 mg/l (ppm) Clear - Cloudy

1. Take a clean test tube. Using the Measuring syringe (PT 361) add 1 ml of pool water. Fill test tube to the 10 ml mark with deionised water.
2. Add one CHLORIDOL tablet and allow to disintegrate for at least two minutes. A cloudy solution indicates the presence of chloride.
3. Crush any remaining undissolved tablet, mix and then take Photometer reading at 520 nm. Use the light shield while taking reading.

Test 16  **TOTAL HARDNESS**


Range 0 - 500 mg/l (ppm) Pale Purple - Purple

1. Fill test tube with sample to the 10 ml mark.
2. Add one HARDICOL No 1 tablet, crush and mix to dissolve.
3. Add one HARDICOL No 2 tablet, crush and mix. Ensure all particles are dissolved.
4. Stand for two minutes.
5. Take Photometer reading at 570 nm.

Test 17  **ALUMINUM**

Range 0 - 0.50 mg/l (ppm) Yellow - Pink

1. Fill test tube with sample to the 10 ml mark.
2. Add one ALUMINUM No 1 tablet, crush and mix to dissolve.
3. Add one ALUMINUM No 2 tablet, crush and mix gently to dissolve. Avoid vigorous agitation.
4. Stand for five minutes.
5. Take photometer reading at 570 nm.

Test 18  NITRATE

Range 0 - 100 mg/l (ppm) Colourless - Red

1. Take a clean Nitratest Tube (PT 508). Using the Measuring Syringe (PT 361) add 1 ml of sample. Fill the Nitratest Tube to the 20 ml mark with deionised water.
2. Add one level spoonful of NITRATEST POWDER and one NITRATEST TABLET. Do not crush the tablet. Replace screw cap and shake tube well for exactly one minute then allow contents to settle.
3. Then either -

Invert tube gently 2 or 3 times and then allow to stand for at least two minutes to ensure complete settlement. Remove screw cap and wipe around top with a clean tissue. Decant clear solution into test tube, filling to the 10 ml mark.
Or

Using the Palintest Filtration Set (PT 600) filter a portion of the solution through a GF/B Filter paper into a test tube filling to the 10 ml mark.
4. Add one NITRICOL tablet, crush and mix to dissolve.
5. Stand for 10 minutes.
6. Take Photometer reading at 570 nm.

Test 19  AMMONIUM

Range 0 - 1.00 mg/l (ppm) Yellow - Green

1. Fill test tube with sample to the 10 ml mark.
2. Add one AMMONIA No 1 tablet and one AMMONIA No 2 tablet, crush and mix to dissolve.
3. Stand for 10 minutes
4. Take Photometer reading at 640 nm.

Test 20  PHOSPHATE

Range 0 - 4.00 mg/l (ppm) Colourless - Blue

1. Fill test tube with sample to the 10 ml mark.
2. Add one PHOSPHATE No 1 tablet, crush and mix to dissolve.
3. Add one PHOSPHATE No 2 tablet, crush and mix to dissolve.
4. Stand for 10 minutes.
5. Take Photometer reading at 640 nm.

Test 21  **MANGANESE**

Range 0 - 0.30 mg/l (ppm) Colourless Blue

This test should be carried out at 68°F +/- 2°F (20°C +/- 1°C).

1. Fill test tube with sample to the 10 ml mark.
2. Add one MANGANESE No 1 tablet, crush and mix to dissolve.
3. Add one MANGANESE No 2 tablet, crush and mix to dissolve.
4. Stand for exactly 20 minutes.
5. Take Photometer reading at 640 nm.

TDS Test  **TOTAL DISSOLVED SOLIDS**

Range 0 - 10,000 mg/l TDS Sensor

The total dissolved solids reading is taken using the TDS Sensor (PT 153/S). This model is specially calibrated for swimming pool water.

1. Pour about 20 ml of pool water into the Sample Container (PT 510).
2. Remove protective cap from the end of the TDS Sensor. Turn on the sensor using the ON/OFF switch located on the top.
3. Dip the sensor into the water in the container.
4. Note the reading on the sensor display. Multiply this result by 100. The result obtained represents the TDS content of the pool water in mg/l (ppm).
5. Remove the sensor, rinse probe in clean water. Switch off and replace cap.

Care and Maintenance

The Pooltest Mini-Lab is designed to give long service and requires very little maintenance. The main requirement is to keep the work-tray and components in a clean condition. Spillages of test solutions should be wiped up immediately with a damp cloth. In addition to routine cleaning, the test tubes, sample container and work-tray should be washed periodically in warm soapy water. On no account should solvents or abrasive materials be used.

For care and maintenance of the 25 - see Photometer Instruction Manual.

RE-ORDER CODES

Re-order codes for equipment included in the Pooltest Mini-Lab are as follows:-

PT 153/S	TDS Sensor
PT 297	Lab Work-Tray
PT 361	Measuring syringe, 1 ml
PT 500	De-Ion Pack Deionised Water Maker
PT 501	Test Tube Rack
PT 502	Crushing/Stirring Rods (Pack of 10)
PT 510	Sample Container, 10/50/100 ml plastic
PT 512	Dilution Tube
PT 515/5	Round Test Tubes, 10 ml glass (Pack of 5)
PT 518	Wash Bottle (for Deionised Water)
PT 619	Packet Glassware Wipes
PT 663	Test Tube Brush