

Supelco®

1.11160.0001

MQuant®

Chlorine and pH Test

Cl₂
pH

for the determination of free chlorine and pH

1. General

Swimming-pool water is disinfected by means of chlorine-releasing compounds or chlorine gas ("chlorination"). The chlorine content ("total chlorine") of swimming-pool water is made up of the sum of "free chlorine" and "combined chlorine". "Free chlorine" is understood as the sum of dissolved chlorine (Cl₂), hypochlorous acid (HOCl), and hypochlorite ions (ClO⁻). The disinfectant effect of free chlorine is essentially due to hypochlorous acid. "Combined chlorine" consists of chloramines which as oxidative substances similarly contribute to the disinfection. The swimming-pool water must contain **at least 0.3 mg/l of free chlorine** throughout the entire pool to immediately kill off the pathogens and bacteria imported by the bathers.

Chlorination may produce a drop or rise in the pH of the water. As a measure to guarantee an optimal degree of disinfection and to prevent health risks as well as corrosion and lime deposits, a pH in the range of 7.1 - 7.6 is recommended, in the case of very soft waters in the range of 7.0 - 7.5.

2. Method

Colorimetric determination with color card and sliding comparator
In weakly acidic solution **free chlorine** reacts with diethyl-p-phenylendiamine (DPD) to form a red-violet dye.

The **pH determination** takes place by means of chlorine-resistant phenol red indicator solution, which changes color from yellow to red-violet in the pH range of 6.5 - 8.2.

The chlorine concentration and the pH are each determined **semiquantitatively** by visual comparison of the color of the measurement solution with the color fields of a color card.

3. Measuring range and number of determinations

Measuring range / color-scale graduation	Number of determinations
0.10 - 0.20 - 0.30 - 0.60 - 1.0 - 1.5 mg/l Cl ₂	150
pH 6.5 - 6.8 - 7.0 - 7.2 - 7.4 - 7.6 - 7.9	150

4. Applications

Sample material:

Swimming-pool water

This test is **not suited** for seawater.

5. Reagents and auxiliaries

Please note the warnings on the packaging materials!

The test reagents are stable up to the date stated on the pack when stored closed at +15 to +25 °C.

Package contents:

- 1 bottle of reagent Cl₂-1
- 1 bottle of reagent Cl₂-2
- 1 bottle of reagent pH-1
- 1 graduated 5-ml plastic syringe
- 2 test tubes with screw caps
- 1 sliding comparator
- 1 chlorine color card
- 1 pH color card

Other reagents and accessories:

- MQuant® Chlorine Test, Cat. No. 117925, measuring range 0.5 - 20 mg/l Cl₂
- MQuant® Universal indicator strips pH 0 - 14, Cat. No. 109535
- Sodium hydroxide solution 1 mol/l Titripur®, Cat. No. 109137
- Sulfuric acid 0.5 mol/l Titripur®, Cat. No. 109072

MQuant® Flat-bottomed tubes with screw caps for titrimetric and colorimetric MQuant® tests (12 pcs), Cat. No. 114902

6. Preparation

- Analyze immediately after sampling!
- Check the chlorine content with the MQuant® Chlorine Test. Samples containing more than 1.5 mg/l Cl₂ must be diluted with distilled water.

7. Procedure

Sampling site: approx. 50 cm from the pool edge, at a water depth of approx. 20 cm

Determination of free chlorine:

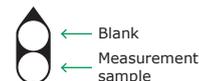
The pH must be within the range 4 - 8.

Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.

Rinse both test tubes several times with the sample.

	Measurement sample	Blank	
Reagent Cl ₂ -1	4 drops ¹⁾	-	Place into the test tube.
Reagent Cl ₂ -2	1 drop ¹⁾	-	Add and mix.
Sample (5 - 40 °C)	5 ml	5 ml	Add with the syringe and mix.

Insert the test tubes into the sliding comparator as shown in the diagram and place the comparator on the chlorine color card as indicated by the latter.



Slide the comparator along the color scale until the closest possible color match is achieved between the two open tubes when viewed from above.

Read off the result in mg/l Cl₂ from the color card indicated by the pointed end of the sliding comparator.

¹⁾ Hold the bottle vertically while adding the reagent!

Evaluation:

The content of free chlorine should be within the range 0.3 - 0.6 mg/l.

If the content of free chlorine is lower than 0.3 mg/l, more chlorinating agent must be added.

Note on the measurement:

If the color of the measurement solution is equal to or more intense than the darkest color on the scale, repeat the measurement using **fresh**, diluted samples until a value of less than 1.5 mg/l Cl₂ is obtained.

Concerning the result of the analysis, the dilution must be taken into account:

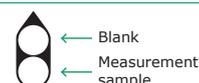
$$\text{Result of analysis} = \text{measurement value} \times \text{dilution factor}$$

Determination of the pH:

Rinse both test tubes several times with the sample.

	Measurement sample	Blank	
Sample (15 - 25 °C)	5 ml	5 ml	Inject into the test tube with the syringe.
Reagent pH-1	1 drop ¹⁾	-	Add and mix.

Insert the test tubes into the sliding comparator as shown in the diagram and place the comparator on the pH color card as indicated by the latter.



Slide the comparator along the colour scale until the closest possible color match is achieved between the two open tubes when viewed from above.

Read off the pH from the color card indicated by the pointed end of the sliding comparator.

¹⁾ Hold the bottle vertically while adding the reagent!

Evaluation:

If the pH is lower than 7.1, an alkalizing agent ("pH enhancer"; e.g. sodium hydroxide solution, sodium carbonate) must be added. If the pH is higher than 7.6, acid or a "pH reducer" (e.g. hydrochloric acid, sodium hydrogen sulfate) must be added.

Note on the measurement:

If the color of the measurement solution corresponds to the lowest or highest value on the scale, the actual pH value may lie outside the measuring range.

8. Notes

- Reclose the reagent bottles immediately after use.
- Rinse the test tubes and the syringe **with distilled water only**.
- Information on disposal can be obtained at www.disposal-test-kits.com.

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