

REF 918 16

en

Test 1-16

04.16

NANOCOLOR® Chlorine

**Method:**Photometric determination of free and total chlorine with *N,N*-diethyl-1,4-phenylene diamine (DPD)

Cuvette:	50 mm	20 mm	10 mm
Range (mg/L Cl <sub>2</sub> ):	0.02–2.00	0.05–5.00	0.1–10.0
Wavelength (HW = 5–12 nm):	540 nm		
Reaction time (free/total):	30 s/3 min (180 s)		
Reaction temperature:	20–25 °C		

**Contents of reagent set:**

- 100 mL Chlorine R1
- 20 g Chlorine R2
- 20 mL Chlorine R3
- 1 measuring spoon 85 mm

**Hazard warning:**

This test does not contain any harmful substances which must be specially labelled as hazardous.

**Preliminary tests:**

If the order of magnitude of the concentration in a sample is not known, a preliminary test with QUANTOFIX® Chlorine (1–100 mg/L Cl<sub>2</sub>, REF 913 17) rapidly gives this information. From the order of magnitude the required dilution can be calculated and prepared directly.

**Interferences:**

The determination of free chlorine measures bromine, bromoamines, chloramines, iodine and, in part, chlorine dioxide as well (1.0 mg/L Cl<sub>2</sub>  $\triangleq$  2.3 mg/L Br<sub>2</sub>  $\triangleq$  3.6 mg/L I<sub>2</sub>). Oxidizing manganese compounds simulate free chlorine. For chlorine determinations lower than 0.1 mg/L measurement must be performed against a true blank value, which consists of distilled water with R1 to R3. Turbidity caused by suspended matter can be removed by centrifuging the test sample. When the chlorine concentration is > 20 mg/L, the red coloring may become bleached (inferior test results). The addition of more R2 will clearly intensify the color. Only repeatedly and thoroughly rinsed glassware should be used. Deposits of R3 will cause falsely increased values of free chlorine.

The method can be applied also for the analysis of sea water.

**Note:**

Determination of bromine besides chlorine: If chlorine is present in the sample, it can be destroyed by adding a spatula of glycine (approx. 20 mg) to 25 mL sample. The sample for the bromine determination is taken from this solution. Result in mg/L Cl<sub>2</sub> x 2.25 = mg/L Br<sub>2</sub>.

Please contact MACHEREY-NAGEL for special working instructions concerning a simplified procedure in a beaker (without filling up) and evaluation in 50 mm cuvette.

**Procedure:**

Requisite accessories: 25 mL volumetric flasks, piston pipette with tips

Pour into two separate volumetric flasks:

**Free chlorine:**

Test sample	Blank value
20 mL test sample (the pH value of the sample must be between pH 4 and 7),	20 mL test sample (the pH value of the sample must be between pH 4 and 7)
1 mL R1, mix.	–
1 spoon R2, mix.	–

Fill up test sample and blank value to 25 mL mark with distilled water and mix again. After 30 s pour into cuvettes and measure the free chlorine.

**Total chlorine:**

Test sample	Blank value
20 mL test sample (the pH value of the sample must be between pH 4 and 7),	20 mL test sample (the pH value of the sample must be between pH 4 and 7)
1 mL R1, mix.	–
1 spoon R2, mix.	–
5 drops R3, mix.	–

Fill up test sample and blank value to 25 mL mark with distilled water and mix again. After 3 min pour into cuvettes and measure the total chlorine.

**Please note:**

The total chlorine can be determined directly after the determination of the free chlorine by adding 5 drops of R3 to the same flask (mix and measure after 3 min). Combined (bound) chlorine can be calculated as the difference between total chlorine and free chlorine.

**Measurement:**

For NANOCOLOR® photometers see manual, test 1-16.

**Measurement when samples are colored or turbid:**

For all NANOCOLOR® photometers see manual, use key for correction value.

**Photometers of other manufacturers:**

Verify factor for each type of instrument by measuring standard solutions.

**Analytical quality control:**

NANOCONTROL Chlorine (REF 925 17); please notice the special procedure!

**Decreasing volume of analytical preparation:**

In order to increase the number of determinations, you can work with volumetric flasks of 10 mL: 8 mL test sample + 0.4 mL R1 + ½ spoon R2 (+ 3 drops R3), semi-micro cuvette (REF 919 50).

**Disposal:**

The contents of cuvettes and flasks can be washed into drain with plenty of water.