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Spectroquant®

Phenol Test

1. Method

In buffered solution, in the presence of an oxidizing agent phenol and its ortho- and meta-substituted compounds react with 4-aminoantipyrine to form a red compound that is determined photometrically.

The method is analogous to EPA 420.1, APHA 5530 C+D, ISO 6439, and ASTM D1783-01.

2. Measuring range and number of determinations

Cell mm	Measuring range mg/l phenol	Number of determinations
20	0.002 - 0.100	50
50	0.025 - 1.000	250
20	0.05 - 2.50	
10	0.10 - 5.00	

For programming data for selected photometers / spectrophotometers see the www.service-test-kits.com.

3. Applications

This test measures phenol and its ortho- and meta-substituted compounds.

Sample material:

Surface water
Wastewater

4. Influence of foreign substances

In the determination of phenol according to section 7.1, only oxidizing and reducing agents interfere.

The determination of phenol according to section 7.2 is not yet interfered with by the concentrations of foreign substances given in the table. This was checked in solutions containing 2.5 and 0 mg/l phenol.

Concentrations of foreign substances in mg/l or %			
Al ³⁺	100	Pb ²⁺	100
Cu ²⁺	25	S ₂ O ₃ ²⁻	5
Fe ³⁺	100	Free chlorine	0.2
NO ₂ ⁻	100	NaCl	20 %
		NaNO ₃	20 %
		Na ₂ SO ₄	20 %

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 Ph-1
1 bottle of reagent Ph-2
1 bottle of reagent Ph-3
2 green microspoons
2 AutoSelectors

Other reagents and accessories:

MColorpHastTM 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
Water for on-line analysis, Cat. No. 101051
Chloroform for analysis EMSURE®, Cat. No. 102445
Phenol GR for analysis, Cat. No. 100206

for measuring range 0.002 - 0.100 mg/l phenol:

Pipettes for pipetting volumes of 5.0, 10, and 200 ml
Separating funnel 500 ml
Glass pipette (for withdrawing the organic phase)
Rectangular cells 20 mm (2 pcs), Cat. No. 114947

for measuring range 0.025 - 5.00 mg/l phenol:

Pipettes for pipetting volumes of 1.0 and 10 ml
Rectangular cells 10, 20, and 50 mm (2 of each), Cat. Nos. 114946, 114947, and 114944

6. Preparation

- Analyze immediately after sampling.
- The pH must be within the range 2 - 11.
Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.
- Filter turbid samples.

7. Procedure

7.1 Measuring range 0.002 - 0.100 mg/l phenol

Use the two enclosed green microspoons to dose the reagents Ph-2 and Ph-3. Do not confuse the spoons!

	Measurement sample	Blank (only 1x per series)	
Pretreated sample (15 - 40 °C)	200 ml	-	Pipette into a separating funnel.
Distilled water ¹⁾ (15 - 40 °C)	-	200 ml	Pipette into a separating funnel.
Reagent Ph-1	5.0 ml	5.0 ml	Add with pipette and mix.
Reagent Ph-2	1 level green microspoon	1 level green microspoon	Add and shake vigorously until the reagent is completely dissolved.
Reagent Ph-3	1 level green microspoon	1 level green microspoon	Add and shake vigorously until the reagent is completely dissolved.
Leave to stand, protected from light, for 30 min (reaction time).			
Chloroform	10 ml	10 ml	Add with pipette, close the separating funnel, and shake vigorously for 1 min.
Leave to stand for 5 - 10 min to allow the phases to separate. Withdraw the clear lower (organic) phase (yellow) with a glass pipette, fill into a 20-mm cell, and measure in the photometer.			

¹⁾ It is recommended to use water for on-line analysis, Cat. No. 101051.

7.2 Measuring range 0.025 - 5.00 mg/l phenol

Pretreated sample (15 - 40 °C)	10 ml	Pipette into a test tube.
Reagent Ph-1	1.0 ml	Add with pipette and mix.
Reagent Ph-2	1 level grey microspoon (in the cap of the Ph-2 bottle)	Add and shake vigorously until the reagent is completely dissolved.
Reagent Ph-3	1 level grey microspoon (in the cap of the Ph-3 bottle)	Add and shake vigorously until the reagent is completely dissolved.
Leave to stand for 10 min (reaction time), then fill the sample into the cell, and measure in the photometer.		

Notes on the measurement:

- 7.2: Certain photometers may require a blank (preparation as per measurement sample, but with distilled water instead of sample).
- For photometric measurement the cells must be clean.
Wipe, if necessary, with a clean dry cloth.
- Measurement of turbid solutions yields false-high readings.
- The pH of the measurement solution must be within the range 9.6 - 9.8.
- The color of the measurement solution remains stable for at least 60 min after the end of the times stated above.

8. Analytical quality assurance

recommended before each measurement series

To check the photometric measurement system (test reagents, measurement device, handling) and the mode of working, a freshly prepared phenol standard solution containing 2.50 mg/l phenol (application see the website) can be used.

Sample-dependent interferences (matrix effects) can be determined by means of standard addition.

Additional notes see under www.qa-test-kits.com.

Characteristic quality data:

In the production control, the following data were determined in accordance with ISO 8466-1 and DIN 38402 A51:

	Measuring range mg/l phenol	
	0.002 - 0.100	0.10 - 5.00
Standard deviation of the method (mg/l phenol)	± 0.0012	± 0.021
Coefficient of variation of the method (%)	± 2.2	± 0.80
Confidence interval (mg/l phenol)	± 0.003	± 0.05
Number of lots	14	14

Characteristic data of the procedure:

	Measuring range mg/l phenol		
	0.002 - 0.100	0.025 - 1.000	0.10 - 5.00
Sensitivity: Absorbance 0.010 A corresponds to (mg/l phenol)	0.001	0.017	0.08
Accuracy of a measurement value (mg/l phenol)	max. ± 0.004	max. ± 0.027	max. ± 0.13

For quality and batch certificates for Spectroquant® test kits see the website.

9. Notes

- Reclose the reagent bottles immediately after use.
- If the phenol determination is conducted according to section 7.1, the contents of the separating funnel and of the cells may not be allowed to enter the wastewater system!
Information on disposal can be obtained at www.disposal-test-kits.com.

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