1.14554.0001

Spectroquant®

Nickel Cell Test

Ni

1. Method

Nickel(II) ions are oxidized by iodine and then transformed with dimethylglyoxime in an ammoniacal solution into a red-brown complex that is determined photometrically.

2. Measuring range and number of determinations

Measuring range	Number of determinations
0.10 - 6.00 mg/l Ni	25

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

3. Applications

This test measures only nickel(II) ions. Samples must be decomposed by digestion before undissolved or complex-bound nickel can be measured (see section 6).

Sample material:
Groundwater and surface water
Drinking water
Industrial water
Wastewater and percolating water
This test is **not suited** for seawater.

4. Influence of foreign substances

This was checked in solutions containing 4 and 0 mg/l Ni. The determination is not yet interfered with up to the concentrations of foreign substances given in the table.

Concentrations of foreign substances in mg/l or %							
Al^{3+}	1000	**Cu^{2+}**	**10**	NO_2^-	1000	**EDTA**	**1**
Ca^{2+}	1000	F^-	1000	Pb^{2+}	1000	Surfactants[1]	5 %
Cd^{2+}	100	**Fe^{3+}**	**10**	PO_4^{3-}	1000	Na-acetate	10 %
CN^-	**10**	Hg^{2+}	100	**S^{2-}**	**10**	NaCl	20 %
CO_3^{2-}	100	Mg^{2+}	500	**SCN^-**	**10**	$NaNO_3$	20 %
Cr^{3+}	**1**	**Mn^{2+}**	**1**	SO_3^{2-}	1000	$Na_2B_4O_7$	5 %
$Cr_2O_7^{2-}$	**10**	NH_4^+	1000	Zn^{2+}	1000	Na_2SO_4	20 %

Reducing agents interfere with the determination.

[1] tested with nonionic, cationic, and anionic surfactants

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 Ni-1K
1 bottle of reagent Ni-2K
25 reaction cells
1 sheet of round stickers for numbering the cells

Other reagents and accessories:
Nitric acid 65 % for analysis EMSURE®, Cat. No. 100456
Spectroquant® Crack Set 10C, Cat. No. 114688
+ thermoreactor
or
Spectroquant® Crack Set 10, Cat. No. 114687
+ empty cells 16 mm with screw caps (25 pcs), Cat. No. 114724
+ thermoreactor
Charcoal activated GR for analysis, Cat. No. 102186
Ammonia solution 25 % for analysis EMSURE®, Cat. No. 105432
MQuant™ Nickel Test, Cat. No.110006,
measuring range 10 - 500 mg/l Ni^{2+}
MColorpHast™ 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
Spectroquant® CombiCheck 40, Cat. No. 114692

Pipette for a pipetting volume of 5.0 ml

6. Preparation

- Analyze immediately after sampling. Otherwise preserve with nitric acid 65 % (1 ml nitric acid per 1 l of sample solution).
- Undissolved or complex-bound nickel can be determined after pretreatment of the sample using one of the Spectroquant® Crack Sets.
- Decolorize any yellow stained samples by filtering through activated charcoal at pH 4. In the event that iron is the cause of the colouration, precipitate this with ammonia solution as iron hydroxide and separate from the solution.
- Check the nickel content with the MQuant™ Nickel Test.
  Samples containing more than 6.00 mg/l Ni must be diluted with distilled water **prior to** digestion.
- **The pH must be within the range 3 - 8.**
  Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.
- Filter turbid samples.

7. Procedure

Pretreated sample (**10 - 40 °C**)	5.0 ml	Pipette into a reaction cell, close the cell, and mix.
Leave to stand for 1 min (reaction time A).		
Reagent Ni-1K	2 drops[1]	Add, close the cell tightly, and mix.
Reagent Ni-2K	2 drops[1]	Add, close the cell tightly, and mix.
Leave to stand for 2 min (reaction time B), then measure the sample in the photometer.		

[1] **Hold the bottle vertically while adding the reagent!**

Notes on the measurement:

- 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 9.5 - 11.0.
- The color of the measurement solution remains stable for 30 min after the end of the reaction time B stated above. (After 60 min the measurement value would have diminished by 5 %.)
- A red precipitate forms when nickel concentrations are too high.

8. Analytical quality assurance

it is recommended prior to each measurement series
To check the photometric measurement system (test reagents, measurement device, handling) and the mode of working, Spectroquant® CombiCheck 40 can be used. Besides a **standard solution** with 2.00 mg/l Ni^{2+}, this article also contains an **addition solution** for determining sample-dependent interferences (matrix effects).
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:

Standard deviation of the method (mg/l Ni)	± 0.028
Coefficient of variation of the method (%)	± 0.91
Confidence interval (mg/l Ni)	± 0.07
Number of lots	25

Characteristic data of the procedure:

Sensitivity: Absorbance 0.010 A corresponds to (mg/l Ni)	0.04
Accuracy of a measurement value (mg/l Ni)	max. ± 0.11

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

9. Notes

- Reclose the reagent bottles immediately after use.
- **Information on disposal can be obtained at www.disposal-test-kits.com.**

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