REF 925010–925019 **01.22** en

NANOCONTROL – System for Analytical Quality Control

Each ***NANOCONTROL*** unit consists of two components:

a) *NANOCONTROL* Multistandard

The standard solution is used for checking instruments, reagents and accessories as well as for control of proper handling.

Recommended frequency of application:

after every 10th sample for each parameter (referring to operator), at least 1x per month

b) *NANOCONTROL* 100+ Addition Solution

This is used for the examination of possible interferences from the sample, i. e. matrix effects (standard addition).

Recommended frequency of application:

at least 1x per quarter as well as a) when results are not plausible or b) when the composition of the sample has changed

Stability:

- *NANOCONTROL* Multistandard Sewage outflow 1 (REF 925011) and *NANOCONTROL* Multistandard Sewage outflow 2 (REF 925010): 6 months, when in use 6 weeks
- All other *NANOCONTROL* Multistandards: 1 year, when in use 6 weeks

1. *NANOCONTROL* Multistandard

Procedure:

Perform analysis with multistandard as described in the instructions. The concentrations of the multistandard are indicated on the evaluation table.

Use the multistandard for each test* instead of the sample.

*also for tests of other producers

Deviating procedures: see evaluation table

Evaluation:

A result within the confidence interval indicates proper functioning of all single components of the testing unit and proper handling. If the result is not within the confidence interval, possible errors have to be traced by checking the following points.

Sampling
– proper sample volume

Piston pipette
– technically o.k.
– properly handled
– not contaminated
– new pipette tips

Cuvettes
– proper size
– clean

Analysis
– correct procedure
– proper sequence or reagents
– thorough mixing after each addition of reagents
– proper reaction time
– proper reaction temperature
– zero adjustment with proper solution

Reagents / Standard
– expiry date not exceeded
– stored properly

Measurement
– proper filter
– proper factor
– proper dimension (e. g. NO_3-N or NO_3^-)

After replacement of the malfunctioning components or after correcting the procedure another analysis with the standard should yield a result within the confidence interval. If this is not the case, components such as the photometer or the reagent set may have to be replaced.

2. *NANOCONTROL* 100+ Addition Solution

The increase in concentration per addition of 100 µL 100+ solution [2] is indicated on the evaluation table. However, you should make sure that the addition does not exceed the measuring range of the corresponding test.

Required accessories:

NANOCOLOR® test tubes OD 16 mm (REF 91680)
NANOCOLOR® beaker, 50 mL (REF 916983)
NANOCOLOR® piston pipette 100 µL (REF 916914) [2]

Procedure:

1. Determine the concentrations of the respective parameters in the original water sample using the appropriate *NANOCOLOR*® tube test (evaluation table value 1):
If the values are already close to the upper limit of the measuring range, standard addition can only be performed **with a diluted sample (20–80 % range)**. In this case, you have to measure the concentration of the diluted sample. If the standard addition leads to a matrix-induced correction for the result, consequent measurements have to be performed with the same dilution as the standard addition.
2. Fill empty test tube or beaker with **10 mL** of sample [2] using a pipette.
3. **Standard addition:**
Add 100 µL ***NANOCONTROL* 100+** solution [2] using a pipette and mix thoroughly.
4. Determine the concentration of the spiked sample (10.1 mL [2]) with the appropriate *NANOCOLOR*® tube test. Perform analysis as per instruction or manual. value 4

Note: The spiking procedure can be simplified with tube tests requiring a sample volume of ≥ 2 mL. The 100+ solution can be added directly to the tube (≥ 20 µL). Further details can be found in the corresponding evaluation sheet.

Evaluation:

The concentration increase (value 2) per added 100 µL [2] is indicated on the evaluation table. If there is no interference, the result after addition must be the initial result plus this value. The differences of the result thus give the measurable increase in the sample.

If the concentration difference corresponds to the added value, there is no proportional interference of the analysis. If, however, the concentration difference deviates from the theoretically added concentration, there is a proportional interference of the analysis by third components of the sample. Please, ask for help MACHEREY-NAGEL or your distributor.

Example:

You can calculate a probable value from the measured result.

Measured value of the sample: value 1 = 1.5 mg/L
100+ addition (100 µL [2]): value 2 = 0.5 mg/L
Measured value after addition: value 4 = 1.9 mg/L

probable correct analytical result: $\frac{\text{value 1 x value 2}}{\text{value 4 - value 1}} = \frac{1.5 \times 0.5}{1.9 - 1.5} = 1.9$ mg/L

Perhaps the problem can be solved by a sample preparation step. Please note the following when working with standard addition: **Additive errors can not be recognized by this method!**

Examples:

Part of the substance to be determined is not covered by the analysis:
– condensed phosphates besides ortho-phosphate (low results)
– part of a metal to be analyzed is masked or present in another nonionic form (low results)
– turbidities simulate substances (high results)
Removal of such interferences requires other procedures such as decomposition, centrifugation or similar.

Note:

The concentration of the 100+ solution is calculated thus that the dilution caused by addition of the 100+ solution is compensated for. The remaining small error is eliminated by the rounding of the photometric display.

[2] Standard tests: 20 mL of sample + 200 µL 100+ solution.

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