# Water Analysis

MIN

# NANOCOLOR®

Automatic turbidity check for tube tests







MACHEREY-NAGEL

www.mn-net.com

# Automatic turbidity check

## Turbidity – a source of error in photometry

As a source of error in photometry, turbidity is often underestimated. It influences the result and is often not easy to spot visually. Even small amounts, which the human eye cannot detect, may significantly interfere with the analytical result.

If the changes in results caused by turbidity are too high or too low depends on the tube test used. The significance of the deviation from the actual result however is based on multiple factors, such as wavelength, test factor, particle size, etc.





2 tubes (A/B) with the same COD concentration

A: Sample without turbidity	B: Sample with slight turbidity (25 NTU)	
Determination with COD 1500 test		
Result sample A: 330 mg/L	Result sample B: 365 mg/L	
Difference between results: 35 mg/L (10 %) Deviations up to 30 % are possible		

## Automatic turbidity check – maximum safety

- Direct display of turbidity in NTU according to EN ISO 7027
- · Warning in case of potential interferences
- · Innovative solution for turbidity problems
- Maximum result safety
- · Complete documentation; result and turbidity are saved at the same time

X Esc	Methods	🗍 Options	🚹 Info		
0051					
<b>Ammonlum 50</b> 690 nm Abs= 0,148A		Zero			
<b>3.8</b> mg / L NH₄-N ⁰/30		Measure			
117 NTU					
0001	Dueren	Pollmeier	1+0		
01.08.20	12 12:15	上 🊠	🗎 📢		



# Automatic turbidity check NTU check – recognize deceptive results

The innovative turbidity check of the *NANOCOLOR*<sup>®</sup> spectrophotometers supports you during your lab work as an additional tool in quality control and thus increases measurement safety without any additional effort. Once the NTU check is activated, the nephelometric turbidity is measured automatically when running tube tests. According to EN ISO 7027, the result is displayed and documented in NTU right away. In case of overly high turbidity, the instrument warns the user as results may be flawed. Thus, the *NANOCOLOR*<sup>®</sup> analytical system offers additional safety for all measurements performed on *NANOCOLOR*<sup>®</sup> spectrophotometers.



In case the NTU check finds a significant turbidity within the sample (>10 NTU), it is necessary to validate the measured value. Mathematically, the turbidity influence cannot be compensated for. If NTU values are <10 NTU, experience shows that no significant influence on the result is to be expected.

In case turbidity has been found, users have multiple options to generate correct results, depending on the  $NANOCOLOR^{\textcircled{B}}$  tube test used.

# What to do in case of turbid samples

### Methods

- **Dilutions** are an appropriate tool for any water sample and test kit to lessen the influence of interfering substances and turbidity.
- Filtration is an option when analyzing single-parameters. In case of sum parameters (e.g. COD, total-N and total-P), filtration is generally not an accepted method.
- A correction value is necessary if the turbidity is caused due to the reagents during the analysis, or if samples cannot be pre-treated (e.g. sumparameters).



# What to do in case of turbid samples 1. Dilution

In principle, dilution should always be considered as an option. To dilute a sample, distilled water is the liquid of choice. COD determinations are an exception, as in this case for dilutions COD-free water needs to be used. Dilutions allow decreasing the concentration of possibly interfering substances and as such of turbidity, so that the measurement value is not influenced anymore.

It is important to stay within the actual measuring range of the test kit when diluting a sample. As a supporting tool, all *NANOCOLOR*<sup>®</sup> photometers feature an inbuilt dilution function.



Principle of dilution

## 2. Filtration

If only substances that are already in solution need to be determined, pre-filtration of the sample is an appealing method in case of turbidity. In such a case, it is necessary to differentiate between the amount of turbidity and the particle size.

#### Finely dispersed turbidity:

- Use membrane filtration kit 0.45 μm
- Use membrane filtration kit GF/PET 0.45 μm

#### Medium fine dispersed turbidity:

- Use glass fiber filters, e.g. MN 85/90 BF
- Use membrane filtration kit GF/PET 0.45 μm

#### Coarsely dispersed turbidity:

Use qualitative filter papers, e.g. MN 615

## 3. Correction value

In case of samples that may not be pre-filtered (e.g. sum parameters) or if the turbidity is caused during the analysis due to addition of reagents, it is necessary to determine a test specific correction value. The determination of correction values is integrated into the *NANOCOLOR*<sup>®</sup> spectrophotometers. The respective instructions can be found in the respective photometer manual (*NANOCOLOR*<sup>®</sup> *UVIVIS* & *VIS*: Chapter 7).

**Notice:** Some parameters, such as COD (chemical oxygen demand) or AOX (adsorbable organically bound halogens), include a color creating reagent within the reagent tube already. Hence, for these tests, you cannot determine a correction value. However, almost all colorations and all turbidity is destroyed when analyzing sum parameters (digestion process). Persistent colorations and turbidity can be dealt with via dilution.



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# **Turbidity measurement according to EN ISO 7027** What is turbidity?

Turbidity is caused due to small, undissolved particles. These particles absorb, scatter and reflect light.



The way light takes through clear and turbid water samples

Turbidity is determined either via an absorption measurement (180 ° angle) or via a stray light measurement (90 ° angle).

### Turbidity measurement according to EN ISO 7027

The globally approved nephelometric turbidity measurement is based on a  $90^{\circ}$  stray light measurement at 860 nm. This measurement is also the principle of commercial available turbidity meters. The international unit is NTU (nephelometric turbidity unit).



Nephelometry: 90 ° stray light measurement

#### Integrated turbidity check

To facilitate our customers' daily work and to prevent the need for purchasing a separate turbidity measurement device, MACHEREY-NAGEL has integrated both turbidity measurements in one single spectrophotometer.



NANOCOLOR® VIS



NANOCOLOR® UV/vis



Ordering information		
Photometer		
<b>Spectrophotometer NANOCOLOR® VIS</b> Incl. PC software for <i>NANOCOLOR®</i> spectrophotometers, quick reference guide, manual, dust cover, mains adaptor, USB cable, USB stick, calibration cuvette and certificate	REF	919 150
<b>Spectrophotometer NANOCOLOR</b> <sup>®</sup> <i>uv/vis</i> Incl. PC software for <i>NANOCOLOR</i> <sup>®</sup> spectrophotometers, quick reference guide, manual, dust cover, mains adaptor, USB cable, USB stick, serial cable, calibration cuvette and certificate	REF	919 100
Accessories		
NANOCONTROL NANOTURB Turbidity standard for turbidity calibration	REF	925 702
Distilled water	REF	918 932
COD-free water	REF	918 993
Qualitative filter paper MN 615 (e.g. Ø 55 mm)	REF	431 005
Glass fiber filter MN 85/90 BF (e.g. Ø 55 mm)	REF	406 005
Membrane filtration kit GF/PET 0.45 μm 2 syringes 20 mL, 25 CHROMAFIL membrane filter GF/PET 0.45 μm	REF	916 01
Membrane filtration kit 0.45 μm 2 syringes 20 mL, 25 CHROMAFIL membrane filter 0.45 μm	REF	916 50

# Personal customer service

### No answering machines: talk directly to a service technician

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For more information on turbidity and photometry, please visit our website at

www.mn-net.com

