

### Principle

Inorganically and organically bonded nitrogen is oxidized to nitrate by digestion with peroxodisulphate. The nitrate ions react with 2.6-dimethylphenol in a solution of sulphuric and phosphoric acid to form a nitrophenol.

### Range of Application

Water, waste water

### Interferences

T1

1000 mg/l: OZV / COD

2000 mg/l: Cl<sup>-</sup>

The ions listed in T1 have been individually checked up to the given concentrations and do not cause interference. We have not determined cumulative effects and the influence of other ions.

Low-bias results are to be expected if the samples contain larger amounts of reducing agents. The measurement results must be subjected to plausibility checks (dilute and/or spike the sample).

<b>Sample Volume</b>	<b>0,5 mL</b>
<b>Reagent A Volume</b>	<b>2,0 mL</b>
<b>Reagent D Volume</b>	<b>0,2 mL</b>
<b>Reagent A Filling</b>	<b>60 mL</b>
<b>Reagent D Filling</b>	<b>35 mL</b>
<b>Temperature Sample/sample cuvette</b>	<b>15 – 25°C</b>
<b>pH sample</b>	<b>3 – 12</b>
<b>Digestion Temperature/Time</b>	<b>120°C/30 min. or 110°C/60 min.</b>

AP3900 multi with HT-Module can also use:

**Digestion Temperature/Time**                      **170°C/15 min.**

### Please note:

With AP3900 Software Version 1.0.7.5 or higher a digestion temperature of 120°C is possible to be chosen.

So the tests for TN (APC138 / APC238 / APC338) can be run at 120°C/30 min. to save time and to have identical time and temperature as manual handling with LCK138 / LCK238 / LCK338.

There is no change in the quality of the results by switching from 110°C/60 min. to 120°C/30min. procedure. There is no calibration update needed.

## Method Library:

APC238 is pre-programmed in the method library. Please check under Settings/Software/Application/Methods **TNb** and Tests **APC238**.

Settings

General Methods/Tests QC/Blanks Reagents trays Colors Remote messaging Other parameters

Sample profiles Methods Tests Other parameters

Methods definitions:

- Ammonium Chloride
- COD
- COD high
- Formaldehyde
- ISO-COD
- LCA722
- LCA722\_Reagent
- LCK Ammonium Nitrate
- Nitrite
- Orthophosphate
- Phenol
- Phosphate
- Reagent Volume
- Sample Volume
- TNb**

Add Method

Delete Method

Reading 1 (Concentration):

Low-range test: APC138 Underrange: 1.000 Overrange: 16.000

Middle-range test: APC238 Underrange: 5.000 Overrange: 40.000

High range test: APC338 Underrange: 20.000 Overrange: 100.000

Redo samples with underrange error if possible.

Redo samples with overrange error if possible.

-> High-range cuvette overrange dilution factor: 2

Use default samplevolume if sample is diluted for the test before using lower range test.

Redo samples with other error (barcode/absorbion error).

Method priority level: 8

Stir sample in samplecup by default.

Always clean/flush needle after aspirating/dispensing sample.

Waiting time after start processing cuvet before starting processing next cuvet of test: 0 sec.

OK

Cancel

## Example: Setting 120°C / 30 min.

Settings

General Methods/Tests QC/Blanks/Second-IDs Reagents trays Colors Remote messaging Other parameters

Sample profiles Methods Tests Other parameters

Tests definitions:

- APC114
- APC138
- APC238**
- APC303
- APC304
- APC304B
- APC314
- APC338
- APC339
- APC340
- APC341
- APC342
- APC345 I
- APC345 II
- APC348
- APC348o
- APC349
- APC349o
- APC350
- APC350o
- APC394
- APC400
- APC500
- APC814
- LCA722\_0.5
- LCA722\_2.0
- LCA722\_R\_0.5
- LCA722\_R\_2.0
- LCK014
- LCK049
- LCK1014
- LCK1414
- LCK1714
- LCK1814
- LCK1914

Add test

Delete test

1. Add sample to cuvette Volume (µl): 500 Speed (µl/s): 500 500 Sampling Z-offset (mm): -1

2. Add reagent to cuvette Volume (µl): 2000 Speed (µl/s): 500 500 Reagent: A 238

3. Heat cuvette in heater Time (min): 30 Temperature: 120 °C Priority: Normal

4. (Cooling) delay cuvette Time (min): 30 Priority: Normal

5. Add solution to other cuvette Volume (µl): 500 Speed (µl/s): 400 400

6. Add reagent to cuvette Volume (µl): 200 Speed (µl/s): 200 200 Reagent: D 138/238/338

7. Shake cuvette by inversion Time (sec): 10 Speed inv. (%): 50 Speed rot. (%): 50

8. (Cooling) delay cuvette Time (min): 15 Priority: High

9. Measure cuvette

10. None

11. None

12. None

13. None

14. None

15. None

Blank measurement needed for test.  Only measure blank.

Re-create blank if re-measurement is needed for test.

Final capping overload (0-99%): 35

Use reaction-cuvette: TN2

Blank extinction: 0 mE.  Use nominal blank absorbance if out of range.

Blank tolerance: 0 mE. Nominal absorbance factor: 0.00

OK

Cancel

## Alternative with AP3900 Multi with HT-Module:

Settings

General Methods/Tests QC/Blanks/Second-IDs Reagents trays Colors Remote messaging Other parameters

Sample profiles Methods Tests Other parameters

Tests definitions:

1. Add sample to cuvette	Volume (µl): 500	Speed (µl/s): 500 500	Sampling Z-offset (mm): -1
2. Add reagent to cuvette	Volume (µl): 2000	Speed (µl/s): 500 500	Reagent: A 238
3. Heat cuvette in HT-Unit	Time (min): 15	HT Temperature: 170	Priority: Normal
4. (Cooling) delay cuvette	Time (min): 30		Priority: Normal
5. Add solution to other cuvette	Volume (µl): 500	Speed (µl/s): 400 400	
6. Add reagent to cuvette	Volume (µl): 200	Speed (µl/s): 200 200	Reagent: D 138/238/338
7. Shake cuvette by inversion	Time (sec): 10	Speed inv. (%): 50	Speed rot. (%): 50
8. (Cooling) delay cuvette	Time (min): 15		Priority: High
9. Measure cuvette			
10. None			
11. None			
12. None			
13. None			
14. None			
15. None			

Blank measurement needed for test.
  Only measure blank.
 Final capping overload (0-99%): 35

Re-create blank if re-measurement is needed for test.
  Use reaction-cuvette: TN2

Blank extinction: 0 mE.  Use nominal blank absorbance if out of range.

Blank tolerance: 0 mE. Nominal absorbance factor: 0.00

## Run the APC 238 total Nitrogen method

Create a Run like described in the QUICK GUIDE

- Place the APC238 digestion (TN2; APC938-25) and reaction cuvettes (APC238-25) according to the settings in the Software in the cuvette racks.

AP3900 Multi - MainMenu [C:\Program Files\Hach\AP3900\Program\_20\Active Tables\2010.04.19-a.ats]

File View Settings Process Table Tools Window Help

RTB 1 temperature: -°C RTB 2 temperature: -°C

Sample No.	Identification	Sample Tray	Positi	Method	Test	PreDilution	Volume	Dilution	FinalResult	Unit	Dilution	ResultError	Extinction	CuvetteFolder	Cuvett
1	Sample 1	1	1	TNB	APC238	1	500	1						2	
2	Sample 2	1	2	TNB	APC238	1	500	1						2	
3	Sample 3	1	3	TNB	APC238	1	500	1						2	
4	Sample 4	1	4	TNB	APC238	1	500	1						2	

Filtration: Phosphat TNb Nitro Ammonia CO2 SO4-DIO Chloroalk Chloroalk  
 Heater 1: Heater 2:

Tray holder 1: Tray holder 2: Tray holder 3: Tray holder 4:  
 Tray: [None] Next: [None] Next: [None] Next: [None] Next: [None]

State:

Operator: HachLang, Access-Level: 4 AP3900: Simulation Dispenser: Simulation DR2000: Simulation RTB 1: Simulation RTB 2: Simulation

- Place the samples according to the settings in the Software in the sample racks
- Place the Reagent A and D according to the settings in the Reagent trays

The screenshot shows the 'Settings' dialog box with the 'Reagents trays' tab selected. It contains two main sections for tray configuration: 'Tray 1 (Left)' and 'Tray 2 (Right)'. Each section has a table with columns for 'Name', 'Volume', and 'Re-filled'. Below these are sections for 'Other liquid level settings' and 'Volume in reagents cup'.

Reagents list:			
A 138			
A 238			
A 338			
B 348/349/350			
C 348/349/350			
A 339			
A 340			
D 138/238/338			
A 325			

  

Tray 1 (Left):			
	Name:	Volume:	Re-filled:
Position 1:	A 138	30.70	<input type="checkbox"/>
Position 2:	A 238	18.20	<input type="checkbox"/>
Position 3:	A 338	49.60	<input type="checkbox"/>
Position 4:	A 325	14.00	<input type="checkbox"/>
Position 5:	B 348/349/350	22.80	<input type="checkbox"/>
Position 6:	C 348/349/350	30.10	<input type="checkbox"/>

  

Tray 2 (Right):			
	Name:	Volume:	Re-filled:
Position 1:	A 339	10.80	<input type="checkbox"/>
Position 2:	A 340	21.40	<input type="checkbox"/>
Position 3:	D 138/238/338	16.20	<input type="checkbox"/>
Position 4:	None	0.00	<input type="checkbox"/>
Position 5:	None	0.00	<input type="checkbox"/>
Position 6:	None	0.00	<input type="checkbox"/>

  

Other liquid level settings:	
dZ Tray definition -> Max. Liquid level:	400
dZ 10th of mm -> ml:	12

  

Volume in reagents cup:	
Volume in filled reagents cup:	50 ml
Warning level reagents cup:	5 ml

- Check if fresh and enough pipette tips are available
- Check if enough Rinsing/Dilution water is available
- Initialize the AP 3900 multi and the Dispenser



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