Temperature compensation for the LCK cuvette tests Ammonium (LCK303, LCK304 and LCK305)

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Introduction

The LCK cuvette tests for Ammonium are based on a reaction to form indophenol. Ammonium ions react at pH 12.6 with hypochlorite ions and salicylate ions in the presence of sodium nitroprusside as a catalyst to form indophenol. The amount of color formed is directly proportional to the amount of Ammonium Nitrogen present in the sample. The color development is measured at 694 nm and the results are expressed as mg/L NH_4^+-N or NH_4^+.

The LCK cuvette tests are calibrated by a ten point-calibration according to ISO 8466-1 at a defined temperature of 20°C. The reaction described above is temperature-sensitive, so the recommended sample and reagent temperature is 20°C. Incorrect results may be obtained if the test is not performed at the recommended temperature.

Hach has performed the tests at defined temperatures of 15°C-30°C and calculated the bias to the results obtained at 20°C. The results of this evaluation are shown in the following Application Note.

Material

- LCK cuvette tests for Ammonium - LCK303, LCK304, and LCK305
- Hach spectrophotometers DR3900 and DR6000
- JULABO water bath assembly to achieve defined temperatures from 15°C – 30°C
- Hach Ammonia Standard Solution - 1000 mg/L as NH_3-N Cat. 23541-53
- Hach calibrated pipettes (0.2-1.0 mL and 1.0–5.0 mL) and pipette tips

Results

The calibration results of the DR spectrophotometers DR3900 and DR6000 using the LCK cuvette tests LCK303, LCK304 and LCK305 at the different defined **ambient temperatures** are shown in the following tables.
Note:
- **Ambient Temperature (°C):** Ambient temperature = temperature during 15-minute reaction time (it is assumed that sample and reagent also had ambient temperature when reaction starts)

LCK303:

Ambient Temperature	15 °C	20 °C	25 °C	30 °C
Correction factor	1,13	1,00	0,955	0,938
Deviation %	-13	0	4,5	6,2

LCK304:

Ambient Temperature	15 °C	20 °C	25 °C	30 °C
Correction factor	1,20	1,00	0,940	0,920
Deviation %	-20	0	6,0	8,0

LCK305:

Ambient Temperature	15 °C	20 °C	25 °C	30 °C
Correction factor	1,15	1,00	0,954	0,926
Deviation %	-15	0	4,6	7,4

Solution

The Application **Ammonium Temperature Compensation** for DR3900 and DR6000 offers a special program for temperature compensation using LCK cuvette tests LCK303, LCK304 or LCK305.
When using DR3900 or DR6000 for the first time:
Download the additional evaluation Ammonium Temperature compensation as an application from the Internet: Go to www.hach.com and search by LCK304/LCK304/LCK305 and Documents and Software the application **Ammonium Temperature Compensation** and save it.
Open the zipped file with a double-click and save the folder used for your photometer to an USB stick:
- DR 3900   dbhlm
- DR 6000   dbhlh

Take the USB stick and upload the application to your photometer.
In the PDF file you will find the application note with a detailed description.
For further information, please see the operating instruction for your photometer.

After updating spectrophotometer performs as follows:
- After inserting the LCK cuvette (LCK303/LCK304/LCK305) a window opens with the option to choose the standard program (mg/L) or the program for additional temperature compensation (marked with **mg/L_T**).
- Updated Stored Program database screen after LCK304 cuvette has been inserted.
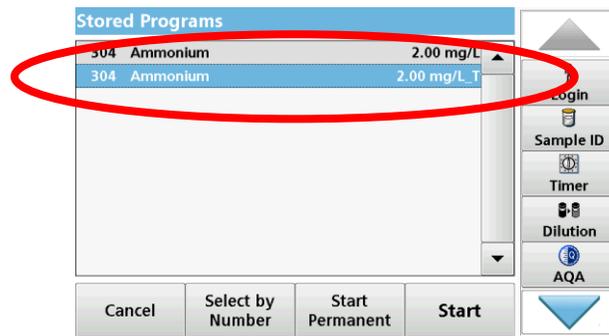
- Start the program with **Start** or **Start Permanent.** The cuvette is measured automatically
- After the measurement of the cuvette a new window opens where the ambient temperature (In this example 15°C) must be input.
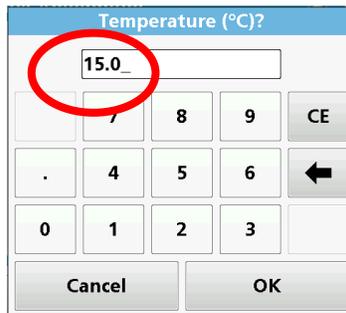
Note: Only one temperature can be entered. If the sample or reagent temperature differs significant from the ambient temperature the average temperature has to be inserted. For the next measurement, a different temperature can be inserted. The temperature compensation works from 15°C to 30°C.
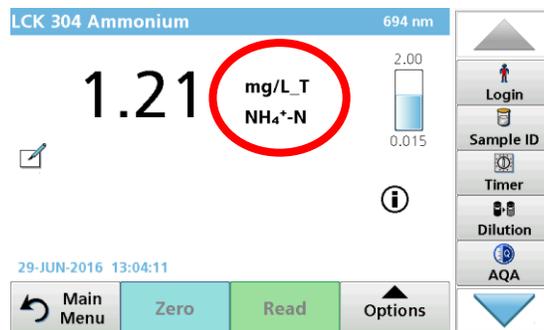
- The final result is calculated and the result is reported as **mg/L_T (using temperature compensation)** instead of mg/L.