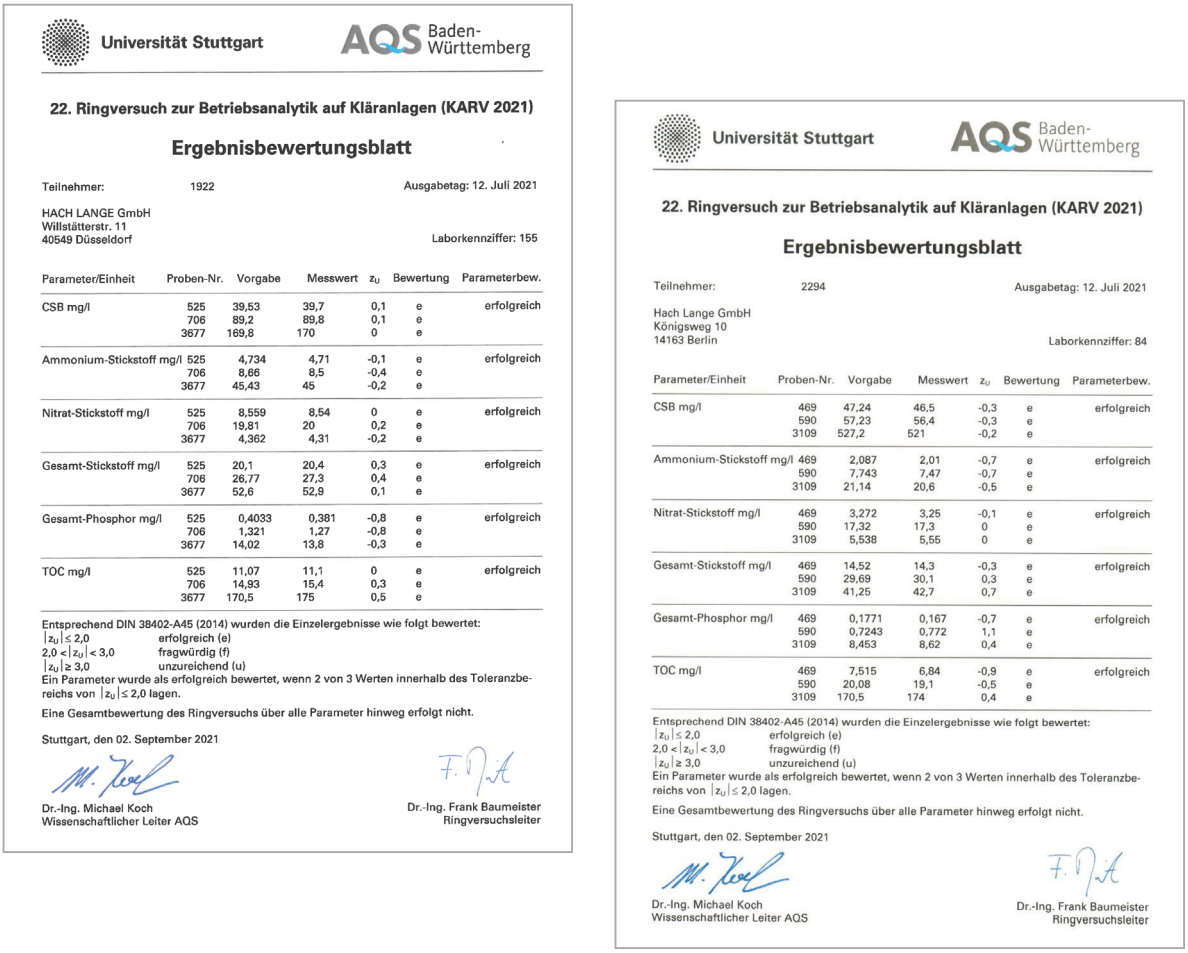
External Quality Assurance—
Round Robin Test for Sewage Treatment Plants

Repeatedly Correct Measurement Results Are No Coincidence

Introduction

As part of its external quality assurance measures, the Hach R&D laboratory in Düsseldorf and the Hach AQA laboratory in Berlin once again successfully took part in the round robin test for operational analytics in sewage treatment plants.



Universität Stuttgart — AQS Baden-Württemberg

22. Ringversuch zur Betriebsanalytik auf Kläranlagen (KARV 2021)

Ergebnisbewertungsblatt

Teilnehmer: 1922 — Ausgabetag: 12. Juli 2021

HACH LANGE GmbH
Willstätterstr. 11
40549 Düsseldorf

Laborkennziffer: 155

Parameter/Einheit	Proben-Nr.	Vorgabe	Messwert	z_U	Bewertung	Parameterbew.
CSB mg/l	525	39,53	39,7	0,1	e	erfolgreich
	706	89,2	89,8	0,1	e	
	3677	169,8	170	0	e	
Ammonium-Stickstoff mg/l	525	4,734	4,71	-0,1	e	erfolgreich
	706	8,66	8,5	-0,4	e	
	3677	45,43	45	-0,2	e	
Nitrat-Stickstoff mg/l	525	8,559	8,54	0	e	erfolgreich
	706	19,81	20	0,2	e	
	3677	4,362	4,31	-0,2	e	
Gesamt-Stickstoff mg/l	525	20,1	20,4	0,3	e	erfolgreich
	706	26,77	27,3	0,4	e	
	3677	52,6	52,9	0,1	e	
Gesamt-Phosphor mg/l	525	0,4033	0,381	-0,8	e	erfolgreich
	706	1,321	1,27	-0,8	e	
	3677	14,02	13,8	-0,3	e	
TOC mg/l	525	11,07	11,1	0	e	erfolgreich
	706	14,93	15,4	0,3	e	
	3677	170,5	175	0,5	e	

Entsprechend DIN 38402-A45 (2014) wurden die Einzelergebnisse wie folgt bewertet:
$|z_U| \leq 2,0$ erfolgreich (e)
$2,0 < |z_U| < 3,0$ fragwürdig (f)
$|z_U| \geq 3,0$ unzureichend (u)
Ein Parameter wurde als erfolgreich bewertet, wenn 2 von 3 Werten innerhalb des Toleranzbereichs von $|z_U| \leq 2,0$ lagen.

Eine Gesamtbewertung des Ringversuchs über alle Parameter hinweg erfolgt nicht.

Stuttgart, den 02. September 2021

Dr.-Ing. Michael Koch
Wissenschaftlicher Leiter AQS

Dr.-Ing. Frank Baumeister
Ringversuchsleiter

Universität Stuttgart — AQS Baden-Württemberg

22. Ringversuch zur Betriebsanalytik auf Kläranlagen (KARV 2021)

Ergebnisbewertungsblatt

Teilnehmer: 2294 — Ausgabetag: 12. Juli 2021

Hach Lange GmbH
Königsweg 10
14163 Berlin

Laborkennziffer: 84

Parameter/Einheit	Proben-Nr.	Vorgabe	Messwert	z_U	Bewertung	Parameterbew.
CSB mg/l	469	47,24	46,5	-0,3	e	erfolgreich
	590	57,23	56,4	-0,3	e	
	3109	527,2	521	-0,2	e	
Ammonium-Stickstoff mg/l	469	2,087	2,01	-0,7	e	erfolgreich
	590	7,743	7,47	-0,7	e	
	3109	21,14	20,6	-0,5	e	
Nitrat-Stickstoff mg/l	469	3,272	3,25	-0,1	e	erfolgreich
	590	17,32	17,3	0	e	
	3109	5,538	5,55	0	e	
Gesamt-Stickstoff mg/l	469	14,52	14,3	-0,3	e	erfolgreich
	590	29,69	30,1	0,3	e	
	3109	41,25	42,7	0,7	e	
Gesamt-Phosphor mg/l	469	0,1771	0,167	-0,7	e	erfolgreich
	590	0,7243	0,772	1,1	e	
	3109	8,453	8,62	0,4	e	
TOC mg/l	469	7,515	6,84	-0,9	e	erfolgreich
	590	20,08	19,1	-0,5	e	
	3109	170,5	174	0,4	e	

Entsprechend DIN 38402-A45 (2014) wurden die Einzelergebnisse wie folgt bewertet:
$|z_U| \leq 2,0$ erfolgreich (e)
$2,0 < |z_U| < 3,0$ fragwürdig (f)
$|z_U| \geq 3,0$ unzureichend (u)
Ein Parameter wurde als erfolgreich bewertet, wenn 2 von 3 Werten innerhalb des Toleranzbereichs von $|z_U| \leq 2,0$ lagen.

Eine Gesamtbewertung des Ringversuchs über alle Parameter hinweg erfolgt nicht.

Stuttgart, den 02. September 2021

Dr.-Ing. Michael Koch
Wissenschaftlicher Leiter AQS

Dr.-Ing. Frank Baumeister
Ringversuchsleiter

Fig. 1: Certificates from the Hach Laboratories in Düsseldorf and Berlin for successful participation in the 22nd round robin test for operational analytics in sewage treatment plants.

With knowledge and experience to accurate results

The round robin test is organized and carried out annually by the AQS Baden-Württemberg at the Institute for Sanitary Engineering, Water Quality and Waste Management at the University of Stuttgart. Regular participation in this round robin test offers all users of cuvette tests the option of checking the working methods of their own laboratory and, if necessary, identifying further opportunities for improvement for the analytical quality.

In the evaluation of the round robin test, accuracy and precision in the photometric water analysis are reflected by small deviations from the target value. The results are dependent on the quality of the reagents and instruments used and the competence of the user, which largely reflects the training of the staff.

Repeatedly correct measurement results are therefore no coincidence. We asked our chemists and laboratory technicians to share their advice for successful participation in round robin tests. Of course, their recommendations below are also helpful in daily routine analysis.

Tips for getting accurate measurement results

Select the correct measuring range

The best results are obtained in the middle of a measuring range. Scattering is greatest at the extremes of a measuring range, which can lead to less accurate results. If your results are in the lower or upper limits of the measuring range, use a Hach cuvette test with a more appropriate range instead.

Pay attention to the temperature of the sample and reagents

For the most accurate results, both the sample and the reagents of the cuvette test should be at the same temperature of approx. 20 °C. Low temperatures (e.g. samples or cuvette tests used directly from the refrigerator) often lead to low results. High temperatures can also lead to inconsistent results, e.g. when having high ambient temperatures in the summer or cuvettes measured too soon after digestion.

Check the shelf life of the reagents

Use unexpired and properly stored reagents only. Cuvette tests have a finite shelf life, so always check before use. Alternatively, use your DR3900 and DR6000, which automatically alert you when your Hach cuvette test has expired. Always store your cuvette tests according to storage directions, long periods of improper storage can cause inaccurate results. If you are unsure whether your cuvette tests were stored properly, it is advisable to use ‘fresh goods’.

Use the Truecal function

Truecal batch-specific calibration reduces the minor fluctuations between cuvette test batches. Even with the highest levels of quality control, minor differences in the raw materials used to produce reagents can result in inconsistent results. Hach’s lot specific calibration data is stored on the cuvette test’s 2D barcode. Use your DR3900 or DR6000 to apply Truecal for the highest level of confidence.

Determine a standard solution with a known concentration

Confirm that your measurements are accurate using a standard solution. If the measurement of the standard solutions yields the target concentration, you can be confident in your reagents, devices, and handling.

Check the result by diluting or spiking the sample

Use these quality assurance measures to detect matrix-related interferences (e.g. high concentration of interfering ions). If your results in the diluted or spiked sample are significantly different from those in the original sample, there may be an interference matrix. If so, measure in different dilutions until the results obtained are consistent.

Check the pH of your sample

A pH that is too acidic or too alkaline can prevent the complete color reaction in the cuvette. The pH range in which the reaction takes place without errors is specified in the working instructions for the cuvette test. It is therefore advisable to determine the pH of the sample and correct it if necessary.

Check the pipettes, maintain your instruments, and continue your training

At the latest before ‘important measurements’, it is advisable to check the accuracy of the pipettes gravimetrically or have them serviced by the Hach Pipette Service. It is also advisable to always comply with the service intervals for the photometers and thermostats. Regular participation in seminars (e.g. laboratory course) also helps to apply the above analytical tips in practice.

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