



QbD1200+ Laboratory TOC Analyzer: Stability, Repeatability, Reproducibility

Introduction

Many pharmaceutical drugs are batch manufactured. Between each batch, the production process equipment should be thoroughly cleaned to ensure removal of Active Pharmaceutical Ingredients from the previous batch, as well as absence of contamination for the next batch. Cleaning validation is a rigorous test process that involves risk assessment and a detailed cleaning validation plan. As part of this plan, appropriate analytical methods to detect and quantify residual contaminants needs to be defined and validated; periodicity of the verification is established based on the risk assessment.

Total Organic Carbon (TOC) analysis is an acceptable method for detecting residues of contaminants to evaluate cleaning effectiveness (ASTM E3106). The QbD1200+ Laboratory TOC Analyzer is suitable for cleaning validation and cleaning verification purposes; as it directly measures TOC which ensures that it is below the acceptable limits defined during the validation process to ensure patient safety and product quality. This technical note outlines the performance of the QbD1200+ analyzer that can ensure stable, repeatable, and reproducible results.

Objective

The goal is to **evaluate stability, repeatability and reproducibility** using standard measurement parameters. For consistency between experiments, tests have been performed using the autosampler.

Procedure

- Set up the QbD1200+ analyzer for three replicate runs at each position, and reporting as PDF and .CSV files for record keeping, as seen in Figure 1.
- Place Flush in positions 1, 6 & 11 of the autosampler. Its role is to ensure there is no carryover.
- Place water blank and concentration standards following the blank positions on the autosampler at concentrations of 100, 500 and 1000 ppb respectively and click START.

QbD1200+

Measurement Settings

Default Settings

Number of Locations (Range: 0-64)

Number of Replicates (Range: 1-5)

Default Label Selection

Define ID Individually

Default View

☒ Tray View ☐ Table View

Fast Mode

☐ Fast Mode

Process Settings

Auto Ranging

☐ Enable Autorange

Conditioning

☒ Enable Conditioning

Process Options

☐ Homogenize Sample

☒ Backflush

☐ Enable Dilution Factor

☒ Enable Sample Detection

☐ Adjust Temperature

Temperature Target (C)

Background Measure Times

Results Display Settings

Measurement Units

☐ Use SI Units

☒ ppm ☐ ppb

Pressure Units

☒ Psi ☐ mbar

TIC Analysis

☐ Display TIC Values

Measurement Rejection

☐ Enable Rejection

☒ First Rep ☐ Outliers

Results Precision

Cancel Save

8/1/2024 12:52 PM

Figure 1. Instrument setup for multiple measurements with autosampler.

Position	Sample	Date	TOC ppb Avg	Std Dev	RSD (%)
1	Flush	2/25/2025	5.0	1.2	
2	Water Blank	2/25/2025	5.7	1.4	
3	100 ppb sol	2/25/2025	112	3	2.5
4	500 ppb sol	2/25/2025	524	5	1.0
5	1000 ppb sol	2/25/2025	1058	13	1.2
6	Flush	2/25/2025	4.6	0.2	
7	Water Blank	2/25/2025	4.0	1.1	
8	100 ppb sol	2/25/2025	118	1	1.2
9	500 ppb sol	2/25/2025	536	4	0.8
10	1000 ppb sol	2/25/2025	1062	9	0.9
11	Flush	2/26/2025	6.0	1.8	
12	Water Blank	2/26/2025	5.5	0.5	
13	100 ppb sol	2/26/2025	112	5	4.7
14	500 ppb sol	2/26/2025	528	7	1.3
15	1000 ppb sol	2/26/2025	1062	10	0.9

Table 1. Results from February 2025, using autosampler, flush, water blank, 100 ppb, 500 ppb, and 1000 ppb standards. The values correspond to the average of three replicate runs of each sample. The low RSD (%) values obtained on the three replicates demonstrate good repeatability of the measurements on the standard solutions.

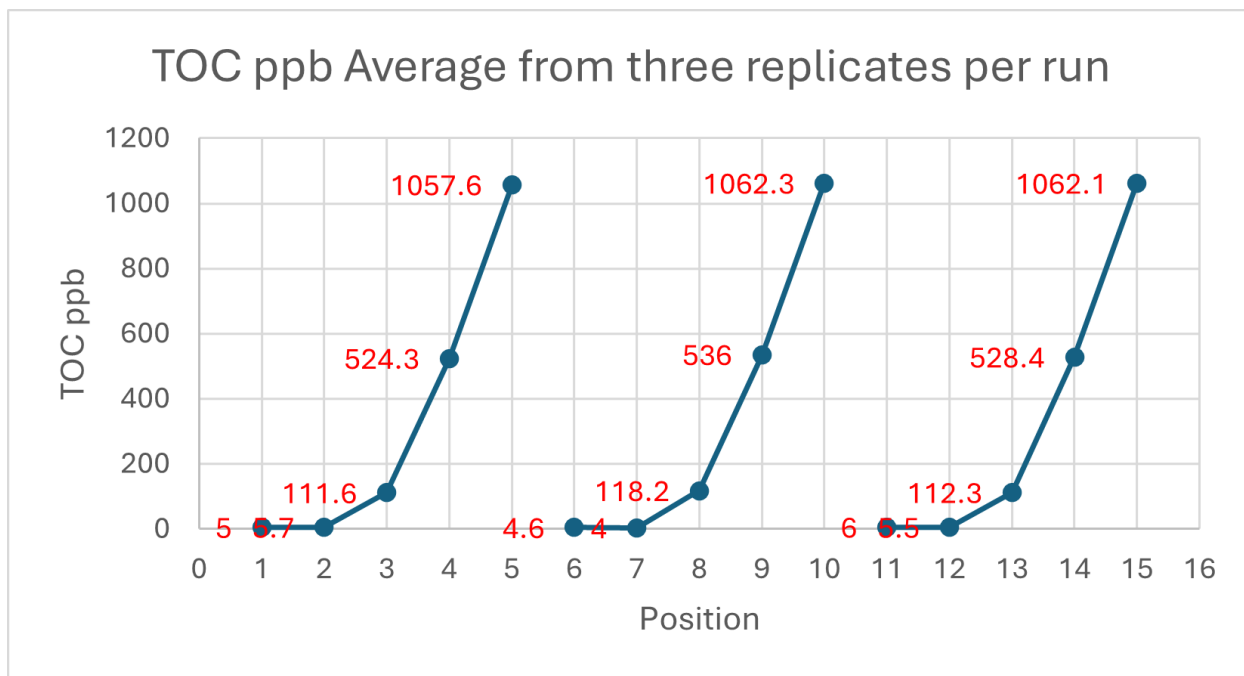


Chart 1, from Table 1. Low flush and blank water values demonstrate absence of carryover between samples. The repeated values measured for each concentration demonstrate good reproducibility for each concentration level.

Sample	TOC ppb Average Value		
	Run 1	Run 2	Run 3
Flush	5	4.6	6
Water Blank	5.7	4	5.5
100 ppb sol	111.6	118.2	112.3
500 ppb sol	524.3	536	528.4
1000 ppb sol	1057.6	1062.3	1062.1

Table 2. Rearranged results from Table 1 by sample vs run number as another way of visualization.

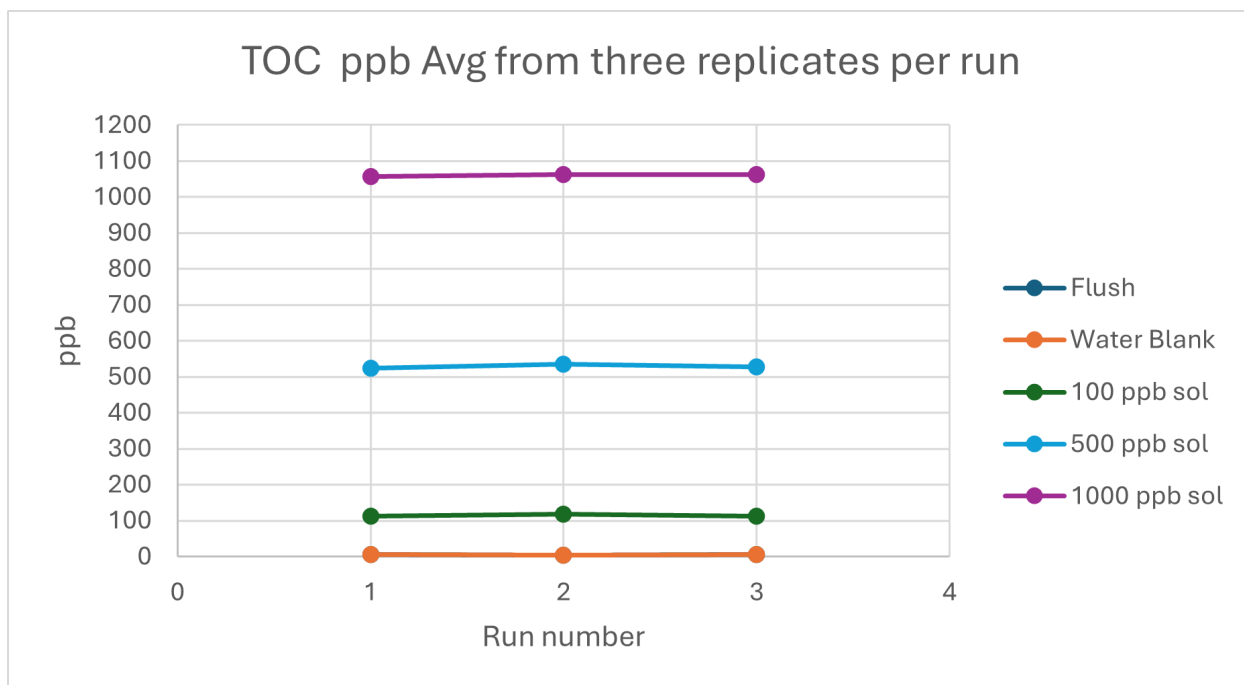


Chart 2, from Table 2. The horizontal curve for flush, water blank and each concentration level clearly illustrates reproducible results on standard solutions as well as near zero counts on flush and clean water blanks.

Conclusion

This simple procedure using standard measurement parameters enables evaluation of Stability, Repeatability and Reproducibility of the QbD1200+ Laboratory TOC analyzer, thus demonstrating its value for providing reliable results for cleaning validation/verification activities and Quality Control in pharmaceutical laboratories.

Beckman Coulter Life Sciences thanks Andrew Walsh, and the team from the Center for Pharmaceutical Cleaning Innovation (CPCI™) in New Jersey, for providing all the data used in this technical note.

© 2025 Beckman Coulter, Inc. All rights reserved. Beckman Coulter, the stylized logo, and the Beckman Coulter product and service marks mentioned herein are trademarks or registered trademarks of Beckman Coulter, Inc. in the United States and other countries. All other trademarks are the property of their respective owners.

This application note and the presented experiment data is for demonstration only, and is not validated by Beckman Coulter. Beckman Coulter makes no warranties express or implied with respect to this protocol, including warranties of fitness for a particular purpose or merchantability or that the protocol is non-infringing. The information presented in this document is only an estimate and no guarantee of any cost savings or increased production value is implied or given. All warranties are expressly disclaimed. Your use of the method is solely at your own risk, without recourse to Beckman Coulter Life Sciences.

For Beckman Coulter's worldwide office locations and phone numbers, please visit Contact Us at [beckman.com](https://www.beckman.com)
2025-GBL-EN-107994-V1

