

# Perfect Dispensing for Perfect Analytical Results



**Reducing variability in samples and standards preparation is essential for tackling 50% of Out-of-Specification results in QA/QC. Accurate and precise concentrations make it easier to identify the statistical significance of an analytical result and identify trends before they cause OOS issues.**

Out-of-Specification (OOS) investigations in Analytical R&D and QA/QC laboratories are costly and time-consuming. Although analytical instrumentation has seen impressive innovations in speed and efficiency over the last 10 years, sample preparation techniques have remained virtually unchanged for the past 75 years. Sample preparation is now reported to be the most time-consuming, labor-intensive and error-prone part of the workflow, with some 50% of OOS errors attributed to either sample processing steps or human error. These errors could be prevented by automation.

#### **Consequences of Out-of-Specification results**

Based on OOS results, many groups too often find themselves consuming valuable testing and material resources conducting or supporting an Analytical Lab Investigation (ALI). This frequently leads to an uncomfortable Deviation Report (DR) and an even more expensive Corrective and Preventive Action (CAPA).

CAPAs can mount over time and full blown Root Cause Analysis along with follow up quality/compliance audits quickly exponentiate costs. Seasoned managers are valued for efficiently pulling together the right resources and groups including QA/QC, Method Development, R&D and Validation to determine the Root Cause and Laboratory related errors. Substantial literature exists that addresses the handling of these investigations; however, there remains a need for more theoretical and practical information related to prevention of such occurrences.

#### Accuracy of solutions

METTLER TOLEDO is changing the way that samples and standards are prepared in modern analytical laboratories. It is universally accepted that a gravimetric measurement is intrinsically more accurate than a volumetric measurement. Indeed, pipettes and volumetric measuring equipment are even calibrated using gravimetric methods. So why then do we still weigh our solids and powders on a weighing paper, transfer them into a volumetric flask, and subjectively read the meniscus to prepare an accurate concentration? Surely it makes more sense to also add the solvent gravimetrically to achieve pinpoint accuracy. In this way, the exact amount of substance dispensed by spatula or automated dosing head, is recorded and used to precisely

adjust the amount of liquid added. Any under or overshoot in powder weighing doesn't require you to waste time adding a tiny amount more or scooping material off the weighing paper with your spatula. The automated liquid dispensing compensates for this and calculates the exact amount of solvent that needs to be added. This allows you to achieve the perfect concentration every time.

#### Save substance and solvent

Automated solution preparation also allows you to significantly downscale your consumption of substance and solvent. You profit from two effects: Firstly, you are able to weigh out a smaller amount whilst still adhering to USP regulations due to the lower minimum weight achievable with automated dispensing, which saves material. Secondly, you can prepare the exact amount of solution that you need for further use, rather than being constrained by the volumetric glassware available. No need to round up the volume prepared to the nearest flask size. For example, preparing a 1mg/ml concentration to within  $\pm 10\%$  requires dosing between 90 and 110mg into a 100ml volumetric flask. With Quantos you can weigh in only 10mg substance and comply with USP. There is ample solution for a typical HPLC injection (10-20 $\mu$ l). You simply have 90% less to dispose of.

#### Gravimetric dispensing benefits

In summary, gravimetric solution preparation has a significant number of advantages:

- Automated dispensing reduces variability in the concentrations which helps you to draw the right conclusions from your analytical results.
- Using automation removes the contribution of human error to the overall process.
- Data transcription or labelling errors are eliminated as data is recorded and printed automatically.
- The amount of substance and solvent used can be reduced by up to 90%.
- Analyst exposure to the substances is greatly reduced.



Quantos Automated Powder and Liquid Dispensing System

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