

RPMI 1640 Medium Analysis with the REBEL – Accuracy and Reproducibility Across Multiple Devices

Background

Classical Roswell Park Memorial Institute (RPMI) 1640 cell culture medium (CCM) is well-established for mammalian cell cultures. CCM component analysis provides actionable information on fresh media, as well as on nutrient depletion and metabolite accumulation in spent media. It is important to base process development decisions on comprehensive and frequent measurements. The REBEL™ at-line analyzer is designed to deliver nutrient measurements at the point-of-need in the bioprocess development laboratory. With the REBEL, quantitative measurement and data processing for a panel of analytes is automated and takes ~10 min per sample. Spent media sample preparation includes the simple steps of cell removal, and dilution with the REBEL diluent.

The Experiment

This extensive fresh media analysis experiment provides an example of the accuracy and reproducibility of the REBEL device obtained with RPMI media: 20 replicate analyses per system were run on three REBEL devices (total n=60; each device with unique Spent Media Analysis (SMA) kits). The measured amino acid concentrations were compared to the published values for RPMI 1640. Media samples were diluted 10X with REBEL diluent prior to analysis.

Discussion

Analyte recovery (Figure 1) was calculated by comparing the measured analyte concentration to the published RPMI formulation concentration. The grey background indicates $\pm 20\%$ accuracy of recovery for the measured

average concentration. The error bars represent the standard deviation between the replicates. The RSD values are provided as a percentage at the base of the column for each analyte and device.

Most analytes (15 of 19) are well within the highlighted $\pm 20\%$ accuracy, and seven analytes, including Asp, Cys, His, Ile, Leu, Phe, and Pro, within $\pm 10\%$ accuracy. However, three analytes (Arg, Lys, Thr) are overestimated above the $\pm 20\%$ accuracy interval at least in one system. These analytes are known to have interferences that may cause the overestimation in certain conditions or CCMs. Serine was detected at below $\pm 20\%$ accuracy interval in one system.

Across the three devices, nine of the 19 analytes were measured with $\leq 10\%$ RSD intra-device and an additional five within 15% RSD.

Overall, the REBEL provided rapid, accurate, and reproducible amino acid analysis for RPMI 1640 CCM across the three devices tested.



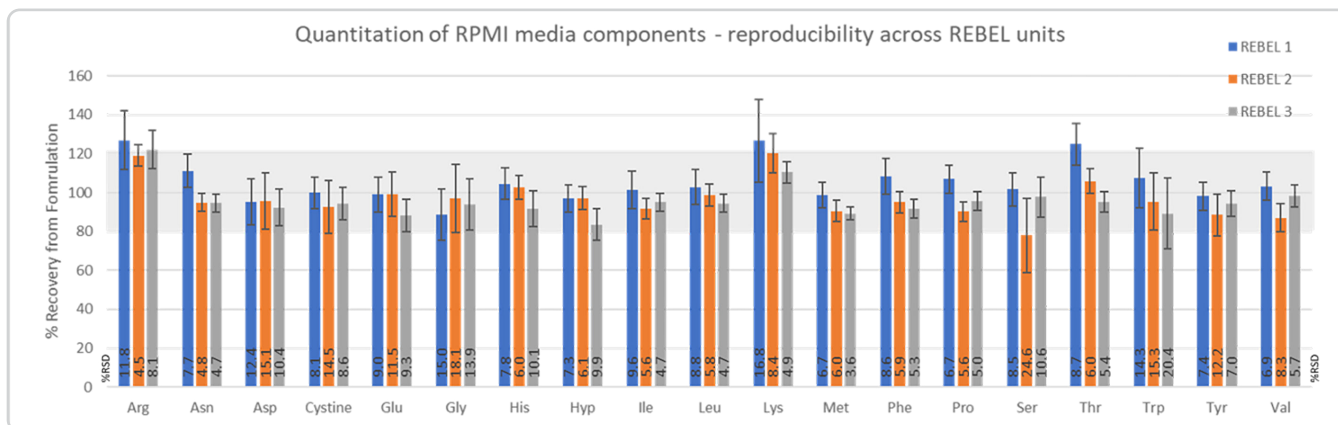


Figure 1. CCM RPMI 1640 analysis on three REBEL devices with 20 replicate measurements per device. Analyte recovery was calculated by comparing the measured amino acid concentration to the published classical RPMI 1640 formulation concentration. This graph shows measurement accuracy with $\pm 20\%$ analyte recovery highlighted with grey background, and reproducibility as error bars with %RSD values at the base of the column.