

Manufacturer Reduces Vitamin QC Analysis Times by Up to 90%

Client: DSM Nutritional Products

Technology: ACQUITY UPLC H-Class System and Empower Chromatography Software

BACKGROUND

DSM is a global science-based organization that is active in health, nutrition, and materials. The company, which is comprised of 11 different business units, delivers innovative solutions that improve performance in a broad range of global markets. DSM's Nutritional Products business is the world's premier nutritional ingredient manufacturer and supplier to producers of foods, beverages, and dietary supplements. Its product portfolio includes formulations for fat and water-soluble vitamins, carotenoids for coloration, and novel nutraceuticals.

The Nutritional Products business operates a manufacturing site in Belvidere, New Jersey. The facility produces dry vitamin and mineral premixes, along with liquid vitamin blends that are used in a variety of food and dietary supplement products. Among other duties, the site's Quality Control laboratory is responsible for verifying the composition of finished products and generating COAs (certificates of analysis) for customers prior to shipment. Although the laboratory utilizes a variety of analytical techniques for sample analyses, it relies principally on liquid chromatography.

BUSINESS BENEFITS

- Reduced costs of analyses.
- Increased customer satisfaction.
- Increased lab efficiencies.
- Supported "green" operations and sustainability efforts.



CHALLENGE

DSM operates within a highly competitive industry, where it is critical to deliver high quality products rapidly and cost effectively. Given the enormous production volume at the New Jersey site, the Quality Control laboratory must process thousands of multi-analyte samples annually to confirm that final product is within specifications. Once a customer order is placed, analyses and corresponding COAs must be completed as quickly as possible. Historically, laboratory workflow had involved running an analysis method for a single vitamin on one dedicated HPLC system – a process that was less than optimal.

In an effort to accelerate sample analysis turnaround time, reduce the cost of analyses, and increase overall efficiency, the laboratory sought to enhance its liquid chromatography-based capabilities. Of critical importance to the Quality Control group was that any technology implementation be in alignment with DSM's Quality vision.

THE SOLUTION

To meet their technological challenges and sustainability objectives, the Quality Control group purchased three of Waters™ ACQUITY™ UPLC™ H-Class systems with photodiode array (PDA) detectors and Empower™ Chromatography Data System (CDS). The ACQUITY UPLC H-Class System provides the flexibility of a quaternary-based HPLC with the performance advantages of UPLC. ACQUITY UPLC H-Class enables users to continue running existing HPLC methods or transition to UPLC separations using integrated system tools and column kits that simplify migration.

Since the implementation, the QC group has transferred finished product water and fat soluble vitamin assays from HPLC to the ACQUITY UPLC H-Class systems. All data acquisition and processing are performed with Empower CDS. This includes creation of a standard report format to facilitate internal review by QC analysts and the use of Empower's Custom Calculations functionality to generate customer-specific COA results.

BUSINESS BENEFITS

By replacing traditional HPLC with ACQUITY UPLC H-Class systems, the Quality Control laboratory at DSM's New Jersey site has realized several benefits in key areas, including:

- Laboratory productivity
 - Test procedures were consolidated from multiple HPLCs to a single ACQUITY UPLC H-Class System, creating a more efficient workflow.
 - The time to analyze seven water soluble vitamins in a single run has been reduced from 50 minutes to 5 minutes – a 90% decrease.
 - The time to analyze fat soluble vitamins (A Acetate, A Palmitate, and E Acetate) in a single run has been reduced from 30 minutes to 3 minutes – a 90% decrease.
 - The Custom Calculations and reporting capabilities of Empower help to streamline data processing and review.

"The 'Quality for Life' vision at DSM Nutritional Products focuses on developing products and partnerships where the essential values of Quality, Reliability, Traceability, and Sustainability are critical. Waters UPLC Technology and Support services align with our values, and give us the confidence that we will continue to provide the world 'Bright Science, Brighter Living,' and remain the leader in providing nutritional solutions. I have worked with Waters Corporation for decades and found that their personnel and 'green' technology consistently support these values and help protect our 'Quality for Life' promise to the world."

TIM WELLS

*Director of Quality,
North America*

- HPLC analysis methods can be rapidly transferred to UPLC.
- Lab personnel were able to master the use of ACQUITY UPLC H-Class and Empower Software quickly and easily. The group's senior scientist, who has used a variety of chromatography software packages, indicated that Empower was "the most intuitive software out there".
- Customer satisfaction
 - COAs can be generated more rapidly, ensuring that customers have the product information they need as quickly as possible.
- "Green" operations
 - Solvent use for liquid chromatography analyses has decreased by approximately 70 to 80%; this supports the company's sustainability mission, and helps reduce sample analysis costs.

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