

ACD/LABS [ADVANCED CHEMISTRY DEVELOPMENT, INC.]

# Corteva Expedites Method Development with AutoChrom®

Corteva, the agricultural division of Dow DuPont, was formed after their 2019 merger. Since their establishment, they have been on a journey to drive innovation in sustainable agriculture.

The need for sustainable crop protection has never been greater. With climate change stressing global agriculture, a growing population demanding more food, and decreasing arable land, farmers must produce more with fewer resources. Crop protection plays a critical role in enabling efficient, sustainable food production.

## Driving Efficiency and Innovation in Agricultural Chemistry

At Corteva, the focus is on developing technologies that help farmers increase yields while minimizing environmental impact. Bringing a new molecule to market takes roughly 10 years and \$250 million—making efficiency and sustainability key priorities. Jens Richards (Analytical Scientist) works alongside the Analytical R&D Team Separation Scientists and process chemists in pre- and early development to refine chemistry and scale up production for global field trials.

The analytical chemists at Corteva have many roles and responsibilities—developing methods, transferring them to colleagues with varying levels of training, and continuously refining them as routes and analogs evolve. The process chemists downstream rely on the early development team to adapt to new discoveries, such as unexpected impurities, while ensuring documentation remains clear for project teams and future researchers.

Juggling multiple projects and tight timelines is the norm, which is why it is important for the team to set clear goals for projects like SPEEDChrom.

### What is SPEEDChrom?

SPEEDChrom stands for *Software-assisted Process for Efficient and Expedited Development of Chromatographic Methods*—a workflow designed to accelerate and improve HPLC method development. It is an optimized strategy incorporating advanced instrumentation, dedicated analysts, and robust software designed for efficiency.

Traditionally at Corteva, analytical teams were structured around specific molecules or projects. Now, for the first time, there has been a strategic shift toward a technology-focused approach—centered specifically around ACD/Labs' method development software, AutoChrom®.

A key change has been the dedication of trained analysts to the SPEEDChrom workflow. Instead of spreading expertise across multiple projects, knowledge is now centralized. Analysts specialize in software, instrumentation, and strategy—driving faster, more efficient method development.

### *The Goals of SPEEDChrom*

Like many industries, Corteva faces pressure to work faster and generate high-quality data that meets regulatory demands. The key goals for the ARDT team include increasing expertise within the group and boosting productivity. By driving efficiency and expertise, the team aims to deliver better solutions for farmers and consumers. Refining their workflow and leveraging the right software tools helps streamline processes and enhance productivity.

*“This structured approach has significantly improved our ability to deliver high-quality chromatographic methods quickly—ensuring that our research supports the fast-paced demands of agricultural innovation.”*

*- Jens Richards, Corteva*

## Overcoming Challenges in Method Development

Developing chromatography methods comes with a steep learning curve. Analysts need expertise in chromatography fundamentals, mass spectrometry, workflow optimization, and a deep understanding of the final use case for their methods. To streamline this process, Corteva dedicated a team of specialized analysts to focus exclusively on method development—allowing them to master both the technical and business aspects efficiently.

### *Software Integration for Efficiency*

Corteva’s method development process is designed for flexibility and speed. AutoChrom plays a critical role in the workflow by integrating automated data collection, rapid iteration, and intelligent decision-making. Features in the software enable key elements of the workflow, including:

- **Data Organization**—With multiple projects, columns, mobile phases, and analytes, managing large volumes of data is essential. AutoChrom centralizes and structures this data for easy retrieval and analysis.
- **Instrument Control**—The software eliminates common setup errors (e.g., incorrect column or mobile phase selection) by automating instrument control, reducing human error, and improving efficiency.
- **Empirical Modeling**—AutoChrom allows the team to model chromatographic conditions based on real data from their analytes, enabling smarter decision-making and accelerating method optimization.

*“With different columns, mobile phases, analogs, projects—you can generate an incredible amount of data fast. It’s important in our current state of technology to iterate and deliver solutions faster, but you need a way to keep that data organized, and ACD/Labs is phenomenal at this.”*

*- Jens Richards, Corteva*

## Optimized Workflow for Chromatographic Method Development

The ARDT Separation Scientists have developed a structured workflow to efficiently implement chromatographic tools and methodologies. As a crucial step in their workflow, software is used for predictive modeling, strategic column selection, and mobile phase optimization to streamline method development and improve turnaround time.

### *Predictive Modeling for Efficient pH Selection*

At Corteva, the team focuses primarily on small molecules and leverages predictive tools like ACD/Labs' PhysChem Suite™ to accurately determine  $pK_a$  values before conducting experiments.

This approach helps them:

- Identify the optimal pH range for the mobile phase in minutes, ensuring they operate in an ion-suppressed region for better separations
- Develop mass-spectrometry-friendly methods, making it easier to transfer methods across different research labs and to colleagues in other departments, i.e., structure elucidation
- Standardize the starting point before adjusting based on compound-specific needs

By incorporating predictive modeling early in the workflow, the team minimizes unnecessary trial-and-error, accelerating method development.

*“The ability to predict pH and  $pK_a$  is just too powerful and too easy to not use at the front of our workflow. So, we predict it, decide on what pH range we want to operate in, and then move on to the next step in our workflow.”*

*– Jens Richards, Corteva*

### *Targeted Column Screening for Faster Decision-Making*

To maximize efficiency, the team employs a data-driven approach to column selection. Their instrumentation set-up combined with AutoChrom's advanced features and visualization tools, enables broad column screening and selection based on diverse chemistries—maximizing the likelihood of achieving optimal separations.

This strategy includes:

- Categorizing columns into primary, similar, intermediate, and orthogonal chemistries
- Prioritizing a standard C18 column as the first choice for method development, while selectively screening diverse chemistries when necessary
- Reducing unnecessary screening by identifying redundant columns, allowing analysts to quickly make decisions without getting bogged down in exhaustive testing

This structured approach simplifies column selection, ensuring they quickly arrive at a fit-for-purpose method.

### *Mobile Phase Optimization for Rapid Screening*

Corteva's mobile phase screening strategy balances turnaround time with comprehensive data collection. Their quad pump setup enables rapid method screening by allowing seamless mixing of different pH buffers and organic solvents. Their 12-solvent selection valve provides a wide range of mobile phase options for rapid iterations.

By integrating this with AutoChrom, they can:

- Use empirical modeling to predict optimal mobile phases, reducing unnecessary experimentation
- Rapidly iterate through conditions by leveraging automated instrumentation and software-driven analysis
- Integrate with column screening to refine conditions efficiently and minimize rework

By implementing this strategic workflow and using the tools and features in AutoChrom, the team has significantly improved the speed and accuracy of their method development, ensuring high-quality analytical solutions for their research teams.

*“What’s really nice about the mobile phase screen, particularly using AutoChrom, is that this can be modeled based on empirical data using a single mobile phase or a combination of model mobile phases. Combining this with the instrumentation we have, we can iterate through those very rapidly.*

*This is a huge advantage and played a role in our strategic decision to achieving the targeted turnaround time of 5 days for our process.”*

*- Jens Richards, Corteva*

### **The Impact of SPEEDChrom**

The team set very ambitious goals—obtaining method throughput of 75 methods per year and turnaround time target of 5 days—and have been steadily working towards them. Incorporating AutoChrom software into their SPEEDChrom process has delivered measurable improvements in workflow execution and enabled data-driven decision making. By combining specialized expertise, advanced instrumentation, and powerful software, the team has built a system that accelerates method development, improves accuracy, and enhances productivity. This initiative has transformed Corteva's method development processes, making workflows more efficient, strategic, and aligned with project goals.