

Custom Solutions for Efficient Buffer Management: A Compendium of Four Case Studies



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Buffers play a significant role in biopharmaceutical manufacturing, particularly as the industry moves toward continuous bioprocessing and increased titers. They represent the major component used in biopharma downstream processing steps, both by number and overall volume. Though in-house buffer preparation has been the norm for years, outsourcing is becoming more widespread as the pressure to improve recovery and reduce production costs mounts.

Buffer preparation consumes a substantial portion of a manufacturer's facility footprint and overall cost, labor requirements and equipment. Outsourcing buffer management often comes with the added benefit that the burden of ensuring quality and consistency in buffer materials is shifted to the supplier. Thoughtful collaboration between manufacturers and their suppliers can refine and enhance the buffer workflow with fewer operational and contamination risks.

The four case studies outlined below show how Avantor helped customers resolve their buffer management challenges to reduce manufacturing floor space and save time and expenses. Customized and responsive outsourcing solutions help avoid the risk of bottlenecks and supply interruptions, and provide the resources, quality and process efficiencies to put our customers' minds at ease.

CASE STUDY 1: FULL HYDRATION OUTSOURCING FOR LEADING INTERNATIONAL MANUFACTURER OF PLASMA-DERIVED BIOPHARMACEUTICAL PRODUCTS

CHALLENGE:

The customer's new manufacturing facility was not designed to produce buffer solutions in-house — they needed a source for ready-to-use buffer solutions for pH adjustment in column chromatography that could meet their unique requirements. These included custom-size containers for pre-equilibration and elution buffers, with a tailored connector that adapted to the manufacturer's production tool. In addition, buffer solutions had to meet standard quality and good distribution practices (GDP) requirements, such as preparation in ISO Class 8 cleanrooms and delivery in controlled temperatures. Each drum had to be supplied with a side sample to meet local regulations.

SOLUTION:

Instead of just fulfilling the customer's order, Avantor reviewed their needs and developed a plan to offer buffer solutions in a higher concentration to reduce the quantity needed in each batch. This allows Avantor to supply the buffer solutions in standard drums and containers with approved material compatibility. To meet local regulatory requirements, each drum/container is sampled, with packaging and sample being supplied as one unit. Avantor also supplies validation batches for the customer's engineering runs to expedite the process.

RESULTS:

This process allowed Avantor to provide a full outsourcing option — exceeding customer expectations for the timely delivery of ready-to-use buffer solutions, as well as specific product and packaging requirements. Other benefits included:

- Custom solution to meet local regulations
- Reduced costs from lower quantities per batch of solutions
- Less time spent on quality control testing through supply of side samples
- Cost and time savings by supplying validation batches for customer's engineering run
- Supply chain security through multiple, redundant Avantor manufacturing sites

CASE STUDY 2: CUSTOM MULTICOMPONENT BUFFER SOLUTIONS FOR LEADING VIROTHERAPY CONTRACT DEVELOPMENT AND MANUFACTURING ORGANIZATION (CDMO)

CHALLENGE:

Custom was the name of the game for this customer. Not only did they need a new supplier of three different multi-component buffer solutions, but they also required one capable of developing new, custom buffer compositions and recipes. The new buffers must have low volume of each buffer solution, and be manufactured in animal-origin-free facilities. Specific packaging requirements included different types

of primary, single-use packaging in 0.5-litre, 20-litre and 200-litre sizes, along with custom fill weights, custom labeling, and aseptic connections.

SOLUTION:

Avantor provided the flexibility needed during development to accommodate different compositions, testing, labeling, and packaging. Using a custom-developed test method, buffer solutions were manufactured according to the customer's specifications for use in engineering runs, and validation batches expedited the development process.

RESULT:

The customer received ready-to-use, multi-component buffer solutions in multiple single-use bags tailored to their specifications and within the desired time frame. Additional benefits included:

- Aseptic connections provided using open architecture approach
- Regulatory documentation ensured compliance and provided time savings
- Side samples per unit reduced time and costs of quality control testing
- Additional time savings realized with validation batches
- Totally custom solutions including fill weights, labeling and development of test method

CASE STUDY 3: OUTSOURCING MANUFACTURING OF ACETIC ACID AND BENZYL ALCOHOL SOLUTIONS FOR MULTINATIONAL BIOPHARMACEUTICAL COMPANY

CHALLENGE:

The company did not have the processing capacity to manufacture buffer solutions, specifically excipient-grade 2M and 6M acetic acid and 3% benzyl solutions, in the high volumes needed in-house. The solutions needed to be custom-made for downstream column chromatography and formulation. Buffer solutions had to be supplied in several volumes and packing options, such as glass bottles and intermediate bulk containers (IBC). In addition, the project needed to be completed within six months to meet the customer's plans.

SOLUTION:

The custom set-up required multiple-stage processing, so Avantor engaged the customer's manufacturing, quality and EHS department to ensure all product and regulatory requirements were met. A unique product sampling procedure

was developed specifically for the customer, and Avantor guaranteed traceability of all pack sizes to the same mixture batch. To expedite the testing process, Avantor supplied validation batches to the customer, while samples of the validation batches were put on stability test to initiate stability studies. With processing, sampling, and testing methods in place, Avantor was able to commit to meeting the company's volume needs for three years.

RESULTS:

Avantor manufactured buffer solutions that met the customer's requirements for product quality and long-term availability, in addition to other outsourcing benefits:

- Significant time savings from validation batches for engineering runs concurrent with stability studies
- Custom product sample procedure streamlined process and minimized risk
- Guaranteed traceability of all pack sizes to same mixture batch
- Guaranteed long-term availability with global network of hydration facilities
- Regulatory documents available from early development (RL) to GMP manufacturing (R)

CASE STUDY 4: CUSTOM FORMULATION SOLUTION INCLUDING AN ANIMAL-ORIGIN ELEMENT FOR LEADING VACCINE DEVELOPMENT AND MANUFACTURING COMPANY

CHALLENGE:

The customer wanted to outsource a multi-component solution that had several challenges; not least of which is the stability of the formulation was unknown. One component of the solution is not compendial, so a specific agreement for its use was needed. Other components in the solution contain a certain percentage of animal-origin substances.

The buffer also required custom packaging, including ports and aseptic connectors, and transportation in temperature-controlled conditions in a dedicated truck with a single-use temperature data logging device.

SOLUTION:

Avantor manufactured the solution in a closed process at a cGMP site, using customer-approved raw materials and Water For Injection (WFI) quality water, and created the agreement for the non-compendial material. Custom packaging was provided to specification, as well as samples of validation batches that met the requested quality requirements. Development studies showed a longer starting product shelf life could be provided.

RESULTS:

The biotech company received a custom solution that met its specification, testing, packaging, and regulatory requirements. Other benefits included:

- A customer-designed process and packaging through close collaboration
- Samples of validation batches provided time and cost savings
- Delivery within the requested timeline for customer's commercialization
- The longer shelf life enables larger volume orders, and a long-term supply agreement ensures availability

Customized buffer management options are poised to improve recovery and reduce production costs. Avantor offers streamlined processes with fewer operational and contamination risks — eliminating extra tasks and steps, particularly quality control testing. Our customers reclaim more manufacturing space and more time to focus on core manufacturing activities.

[Read more about our buffer management solutions](#)

