

Complex Chemistry for Antibody-Drug Conjugates and Beyond

Tailored Chemistry Solutions for Your Therapeutics

The development of antibody-drug conjugates (ADCs) and other bioconjugates require highly specialized chemistry, including the design and synthesis of complex molecules such as cytotoxins and other linker payloads. At Abzena, we excel in complex chemistry, providing end-to-end support for the entire ADC lifecycle from discovery and design to development and clinical manufacturing. With extensive experience in multi-step syntheses, chiral chemistry, and handling highly potent compounds, we deliver scalable, high-quality solutions for even the most challenging molecular constructs.

Expertise and Capabilities

Our team brings deep expertise in the following areas of complex chemistry:

- **Custom Synthesis and Route Optimization:** Abzena's chemists design multi-step, phase-appropriate synthetic routes optimized for scalability and chiral integrity. Our expertise spans small molecules, natural products, peptides, oligonucleotides, glycopeptides, carbohydrates, and highly potent active pharmaceutical ingredients (HPAPIs). We design, evaluate, and execute state-of-the-art synthetic strategies to deliver quality molecules. Our capabilities include:
 - C-C, C-N, C-O, and C-P bond formation reactions
 - Substitution, addition, and elimination reactions
 - Oxidations and reductions
 - Solid-phase synthesis
 - Stereoselective synthesis
- **Payload Development:** We have extensive experience handling cytotoxic payloads such as auristatins, maytansines, PBD dimers, calicheamicins, and more, offering payloads with high therapeutic potency.
- **ThioBridge™ Linker Payload Conjugation:** Our proprietary ThioBridge™ technology offers highly stable and specific conjugation, enhancing the drug-to-antibody ratio (DAR) and enabling a homogeneous ADC profile.

Advanced Chemistry Solutions

Abzena provides comprehensive support for complex molecule development, including:

- **Synthesis of Linkers, Payloads, and Linker-Payloads:** Our chemistry team specializes in the development of highly complex linkers and payloads for ADCs, utilizing advanced reaction types as well as stereoselective and solid-phase synthesis techniques.
- **Polymer Conjugate Formulation:** We design and deliver polymer-based nanoparticles tailored to your bioconjugation program needs. Our expertise includes addition polymerizations (free radical, cationic, anionic, and coordination) and condensation polymerization, as well as the conjugation of small molecules and proteins to polymers.



- **Formulation Chemistry:** We customize formulations, including stable liquid and lyophilized forms to match the specific needs of your development phase. Our team screens optimal buffer conditions and formulation options to inform successful manufacturing and long-term stability of your product.
- **Chiral Chemistry and Multi-Step Synthesis:** Our processes often involve many chemical steps, and we rigorously ensure chiral purity throughout the development process to meet the stringent requirements of bioconjugates.
- **Handling Highly Potent Materials:** We are equipped to handle compounds with strict occupational exposure limits (OELs) in the 1–10 ng/m³ range, ensuring safety and compliance in the synthesis of cytotoxic payloads and highly potent small molecules.

Scalable Manufacturing and GMP Production

At Abzena, we offer both research-grade and cGMP manufacturing, with the capability to produce up to 10 kilograms per batch of small molecule material. Our process development and GMP production facilities ensure seamless scale-up, supporting clients from preclinical tox batches through clinical and commercial production. We specialize in optimizing ADC components, including linkers, payloads, and antibodies, for high yields and purity.

Analytical and Bioassay Support

Abzena's state-of-the-art analytical capabilities ensure the purity, stability, and efficacy of complex molecules throughout their development lifecycle. We offer:

- **Analytical Method Development:** Method development is performed to generate methods that will determine the product purity using a range of in-house run techniques, including RP-HPLC, Chiral HPLC, NMR (1D and 2D), GC/FID, FTIR, high resolution MS.
- **Molecule Characterization:** Full characterization is performed for proof of structure.
- **Release and Stability Testing:** Abzena's in-house QC team perform full specification testing for intermediates and APIs and perform ICH compliant stability studies.

Summary

Abzena's complex chemistry expertise drives the rapid development and manufacture of highly potent compounds, linker payloads, and bioconjugates. Our innovative strategies, process development expertise and scalable manufacturing ensures that your ADC program progresses confidently from discovery to clinical and commercial stages. Whether developing novel payloads or optimizing existing routes, our integrated approach guarantees quality, efficiency, and success.



Reach out to us to discuss your project requirements and explore how our customized solutions can help streamline your development process and bring your product to market faster.

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