



Analytical Ultracentrifugation

Macromolecule Characterization in Solution



BRILLIANCE
at every turn.

 **BECKMAN
COULTER**
Life Sciences

AUC TECH OVERVIEW

OPTIMA AUC

Analytical Ultracentrifugation

Beckman Coulter delivered the first AUC sample characterization tool to the scientific community powering discoveries. The tradition continues into the 21st century with the new Optima AUC system. This latest offering is the most robust technology for providing protein molecular weight in basic protein research and quantification of aggregation levels for academic and biopharma research.

Analytical ultracentrifugation is the most versatile, rigorous and accurate means for determining the molecular weight, hydrodynamic and thermodynamic properties of a protein or other macromolecule. Currently, there is no other technique capable of providing the same range of information with a comparable level of precision and accuracy.

AUC Applications

- Molecular Weight
- Stoichiometry
- Protein Aggregation
- Ligand Binding
- Conjugation efficiency
- Polydispersity

"For the first time, these advanced features enable revolutionary new multi-wavelength experiments, an entirely new class of experimental designs that can exploit the presence of multiple chromophores in complex mixtures through spectral decomposition."

*Borries Demeler
(University Texas Health Science Center)*



Advantages

- Sample recovery
- No dilution required
- Matrix free
- Minimal buffer constraints
- Detection at low concentrations
- Low sample volume (0.1 mL minimum)
- High throughput
- No standards required

The Optima AUC combines the power of a centrifuge to provide sedimentation of particles and the functionality of an optical module to detect the sedimentation over time. AUC technology provides insight into sample molecular weight, shape, conformation, and heterogeneity.

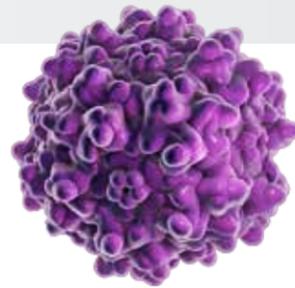
Even at 60k RPM, there was
room for one more revolution.
The Optima AUC

JOURNEY OF DRUG STAGES

BASIC RESEARCH

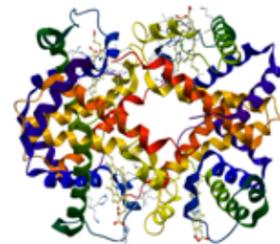
Viral Payload

AUC is a critical tool to researchers studying adeno-associated viruses and other vectors for drug delivery to determine genetic payload



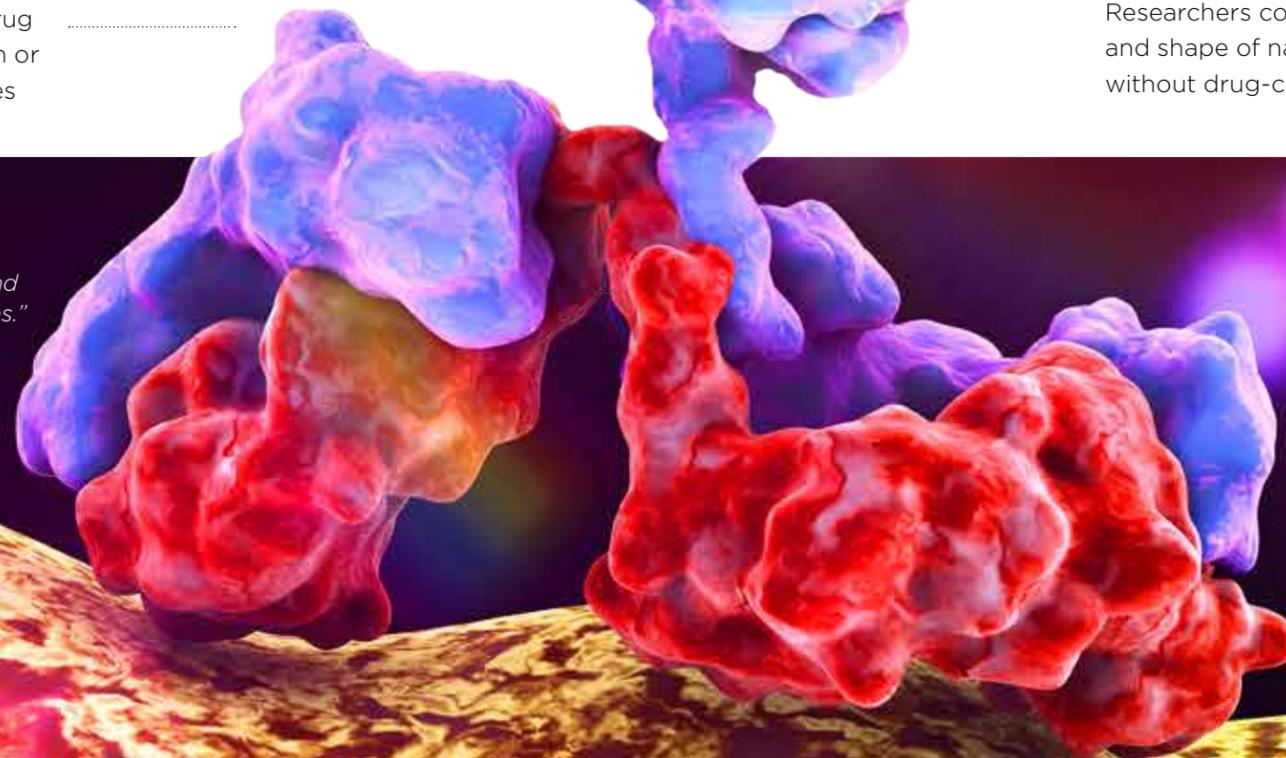
Protein Characterization

AUC is the gold standard for molecular weight and sample purity determination. Performed in a native state, AUC can characterize protein conformational changes, homogeneity, and shape.



Drug Conjugates

AUC is routinely used for characterizing the conjugation efficiency of Antibody Drug Conjugates (ADCs) and encapsulation or fusion of nanoparticle-drug complexes



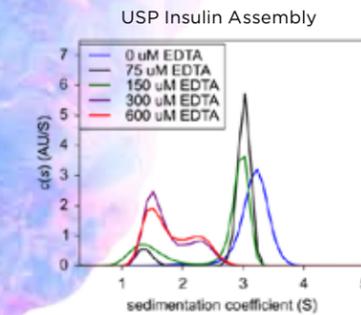
"The results of AUC are explicit, reliable, and reproducible. AUC is my method of choice to characterize macromolecules and precisely study protein-protein interactions."

Jia Ma, PhD Director Bioanalytical Core, Purdue University

DEVELOPMENT

Formulation

AUC is a solution-state method, allowing researchers a buffer of choice and is commonly used for titration and formulation studies



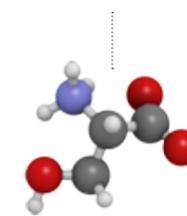
Nanoparticles

Researchers commonly study the size and shape of nanoparticles with and without drug-conjugates

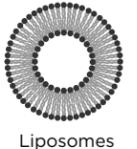
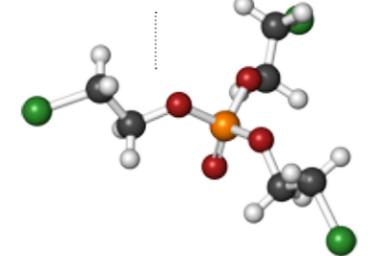
Aggregation

Peptides and polymers represent additional types of molecules that scientists will study with AUC, generally looking at structure and stability. AUC is a great tool for studying non-covalent aggregation under native conditions.

Peptides



Polymers



Pre-IND and Investigational New Drug

- Toxicology lot evaluation
- Formulation development
- API and drug formulation characterization, stability, and lot-release
- Accelerated stability API and drug product
- Stress testing for methods validation

"Due to the large size and conformational heterogeneity of our samples, sedimentation velocity experiments in the analytical ultracentrifuge have allowed us to make many seminal findings about chromatin condensation mechanisms that would not have been possible with any other technique."

Jeffrey C. Hansen, PhD, Colorado State University

QUALITY CONTROL

APPLICATIONS

- Active Pharmaceutical Ingredient (API)
- Drug Product formulation
- API and Drug Product release assays
- API and Drug Product Stability
- Reference standard evaluation



"Analytical ultracentrifugation is one of the most powerful and versatile techniques for analyzing proteins and other macromolecules in solution; it is an incredibly important part of my lab's workflow. We find that it is the best way to quickly characterize a new protein system, since one experiment can tell us whether our protein sample is monomeric or forming higher-order species, including aggregates. It is an ideal complementary technique for structural biologists, since we can validate structural data in solution and quantitatively characterize protein-ligand binding or protein assembly processes."

Andrew Herr, PhD; Cincinnati Children's Hospital Medical Center

INSTRUMENTS & COMPONENTS

Ordering Information	
Part No.	Description
B86436	Optima AUC ABS - Absorbance
B86437	Optima AUC ABS/INT Absorbance / Interference
361964	An-60 Ti Rotor, Analytical, 4-Place
363782	An-50 Ti Rotor, Analytical, 8-Place
392773	Individual assembled cell (sapphire windows)
392772	Individual assembled cell (quartz windows)
360219	Counterbalance, 1.3 cm
361318	Torque Stand
Training Course Information	
Course	Description
B87538	Join us at the Beckman Learning Center for the Optima AUC Training Course. The Optima AUC Customer Training Course is for those who are new to the AUC technique. The 2.5 day course covers the basic theory, sample preparation, instrument set-up and an introduction into basic sample analyses using SEDFIT. The analyses will concentrate on velocity sedimentation. Contact Dean Clodfelter at 1-317-410-1384 or dkclodfelter@Beckman.com





Providing over 65 years of global leadership in centrifugation, Beckman Coulter Life Sciences designs, manufactures, sells, and services a complete line of centrifuge systems. By offering unique rotors and innovative bottles, tubes and accessories, coupled with advanced centrifugation software, Beckman Coulter delivers intelligent centrifugation solutions to laboratory science.

Learn more at info.beckmancoulter.com/OptimaAUC



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