BioReliance
Analytical Services

Biopharmaceutical Reference Standard Characterization and Product Stability Testing

BioReliance's Analytical Services offers clients a range of sensitive methods to test their monoclonal antibody or recombinant protein product. These methods are crucial for the analysis and characterization of both original biologics and biosimilars, and for testing the purity, identity and stability of biotherapeutics. The entire range of assays are offered for investigational purposes or to GMP standards.

Reference Standard Characterization

Cutting edge instrumentation allows us to offer a wide range of Reference Standard Characterization and Stability Assessment testing to our clients. Reference Standard Characterization Assays **(Table 1)** are used to determine a physicochemical product profile in order to establish a standard that is used for subsequent stages of product testing. Many of these characterization methods then become part of a product's lot release and stability testing program. These characterization assays can also be used for comparability testing to demonstrate that a biosimilar possesses a favorable physicochemical profile when compared to the original biologic.

Table 1: Reference Standard Characterization Assays

Reference Standard Characterization Assays			
Assay Name	Recombinant Protein	Monoclonal Antibody	Instrument
Molecular Weight	✓	✓	LC-MS, SDS-PAGE
Peptide Mapping	✓	✓	LC-MS, HPLC
Glycan Profiling	✓	✓	LC-MS, HPLC
N-Terminal Sequencing	✓	✓	LC-MS, Edman Degradation
Charge Profile	✓	✓	IEX, cIEF
Isoelectric Point	✓	✓	CE, IEF
Amino Acid Analysis	✓	✓	UHPLC
Extinction Coefficient	✓	✓	UV-vis, HPLC

Note: Inclusion of assays is specific to client needs. All assays may not be needed or more may be recommended depending on client sample.

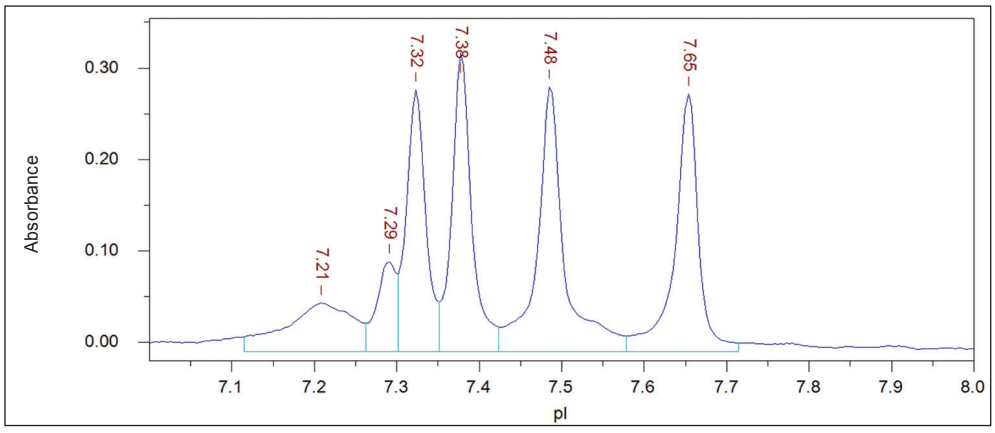

Figure 1: Charge-variant analysis of a protein standard using ProteinSimple iCE3

State-of-the-art instrumentation and cGMP capabilities provide results you can trust

Reliable service with fast turnaround delivers data on time

Analytical testing programs are designed by industry experienced scientists to suit your needs

BioReliance® by SAFC

BioReliance
Analytical Services

Stability Assessment

Stability assessment assays **(Table 2)** are used to determine a preliminary profile of drug substance stability for early stages of product development. Forced degradation studies can also be employed to screen material stability and validate existing testing methods **(Table 3)**. These studies are conducted under extreme environmental conditions to elucidate degradation pathways and characterize the resulting products. Stability assessment assays can be customized depending on a specific product's structure, clinical application, and development phase. All assays are performed in accordance with ICH guideline Q1 to ensure that a high level of quality and consistency is maintained.

Table 2: Stability Assessment Assays

Assay Name	Recombinant Protein	Monoclonal Antibody	Method	Purified Bulk	Finished Product
Charge Profile	✓	✓	CE	✓	✓
Molecular Weight	✓	✓	LC-MS, SDS-PAGE	✓	✓
Peptide Mapping	✓	✓	LC-MS, HPLC	✓	✓
SEC	✓*	✓*	UHPLC	✓*	✓*
RP	✓*	✓*	UHPLC	✓*	✓*
IEX	✓*	✓*	UHPLC	✓*	✓*
SDS-Page	✓	✓	SDS-Page	✓	✓
Appearance and Description	✓	✓	Visual	✓	✓
Moisture by Karl Fischer	✓	✓	KF	✓	✓
Osmolarity (liquid)	✓†	✓†	Osmometer	✓	✓†
pH (liquid)	✓†	✓†	pH	✓	✓†
Particle Counting	✓	✓	Light obscuration	✓	✓
Conductivity	✓	✓	Conductivity	✓	✓

** HPLC method depends on sample specification. † indicates liquid sample.*

Note: Inclusion of assays is specific to client needs. All assays may not be needed or more may be recommended depending on client sample.

Table 3: Forced Degradation Study Examples

Degradation Type	Experimental Conditions	Storage Conditions (°C)	Exposure Time	Degradation Pathways	Testing Methods
Hydrolysis	Acid	2–8	2–7 days	Cleavage products & aggregation	Size Exclusion, SDS-PAGE, Capillary SDS, Mass Spec, Peptide Mapping, Other
	Base	2–8	2–7 days	Deamidation	Isoelectric focusing, Ion Exchange Chromatography, Peptide mapping
Oxidation	Peroxide	2–8	1 day	Methionine oxidation	Peptide mapping, Mass Spec, Other
Thermal	Elevated temperatures	25, 40	2–4 weeks	Aggregation	Size Exclusion, SDS-PAGE, Mass Spec, Capillary SDS
Reduction	DTT	25	1–7 days	Disulfide reduction & Disufide scrambling	Size Exclusion, SDS-PAGE, Mass Spec
Freeze/thaw	Multiple cycles (storage)	-20, 2–8, 25	5–10 cycles	Aggregation insoluble matter	Appearance, Size Exclusion, SDS-PAGE, Sub Visible Particle Count

**Example methods shown. Actual selection of assay methods will be chosen based on client specific needs.*

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