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Static light scattering

Static light scattering, or SLS, is a biophysical characterization technique used for assessing the colloidal stability of a biological sample.

It looks at the intensity of light scattered by particles in solution.

This information is used to assess colloidal stability of the protein, its suitability for dynamic light scattering (DLS) measurements, and to find the molecular weight and second virial coefficient (B_{22}) of a sample.

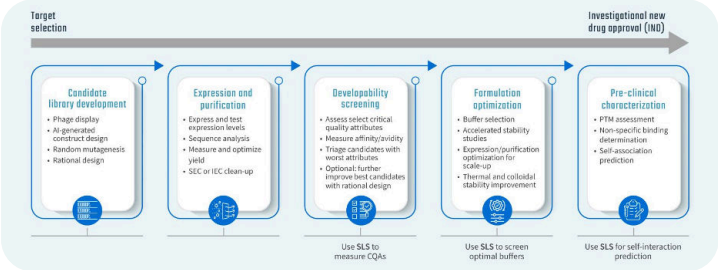
SLS is a valuable tool for many researchers in therapeutic spaces

SLS is a useful tool for anyone developing biologics or gene therapies. Complex biological samples such as enzymes, monoclonal antibodies, or AAVs that will be used for treatments are thoroughly characterized ahead of storage, transport, and clinical administration.

SLS enables you to monitor the colloidal stability of your sample. This information helps you optimize your sample by making changes to the sequence or buffer environment, and measuring how those changes impact stability. Stability parameters are used to rank candidates for therapies and select those with greater stability for further characterization and development.

Information from SLS helps you pre-screen your samples ahead of other experiments, and tells you some other important information about your protein sample, including:

- Average molecular weight of particles in your sample
- Self-association propensity from second virial coefficient
- Whether the sample is of high enough quality for DLS measurements



SLS provides insight about the quality of your samples

The amount of light a sample scatters, as measured from SLS, is indicative of the size of particles in solution. While DLS is required to make assessments about individual populations of particles within your sample, SLS tells you about the overall quality of the sample.

There must be enough scattered light to make a measurement; if the sample concentration is too low, not enough light is scattered to make meaningful conclusions about your protein. However, when there is a lot of aggregation in the sample, these large, amorphous clumps of protein scatter a lot of light, and indicate poor quality protein that is not ideal for DLS measurements.

SLS provides a few unique measurement parameters that are used to characterize protein-based samples. These are used either as quality attributes of a candidate therapeutic, or as baseline parameters to optimize with buffer formulation or protein engineering.

Initial scattering value

Initial scattering value is a quick quality indicator about your sample. When developing well-folded, uniform proteins for therapeutics, it is important to avoid aggregation or large particle contaminations. If the scattering value is very high, it is an indicator that large particles are contaminating your protein sample. If it is very low, your sample's concentration may not be

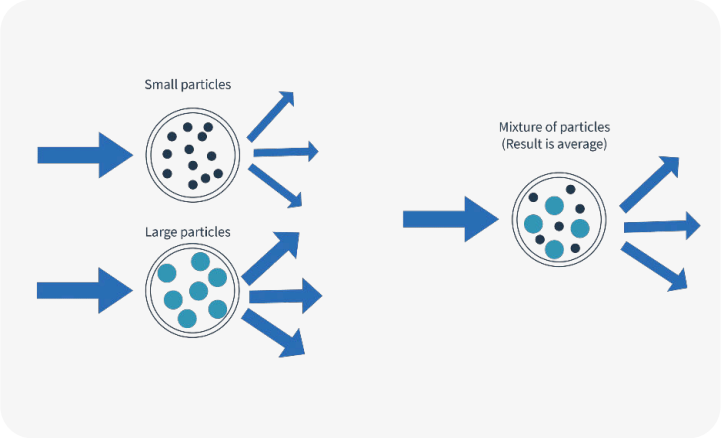
high enough for subsequent DLS experiments.

Molecular weight, MW

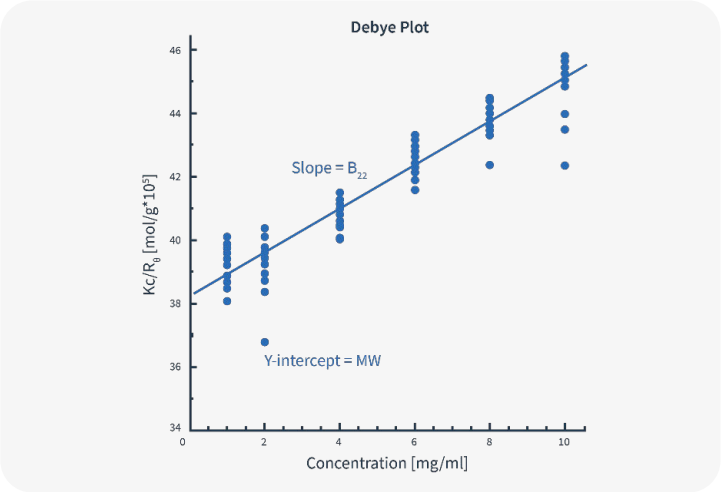
Molecular weight, MW, derived from SLS is the average mass of particles in solution.

Second virial coefficient, B_{22}

Second virial coefficient, B_{22}, is a parameter that uses scattering to determine the self-association propensity of a sample. If proteins are likely to self-associate – indicating a tendency towards high viscosity or aggregation as the sample becomes more concentrated. High concentrations are required for clinical administration, so researchers must avoid negative indicators of self-association, either by optimizing the construct or its buffer environment.



All particles scatter light. When visible light enters a solution, some of that light deflects at angles from the path of the light. Heavier particles scatter more light. By measuring the amount of light scattered at a fixed angle, it is possible to measure the average weight of particles in solution, and subsequently derive the B_{22} parameter.



Scattering data from SLS measurements is plotted and generates a Debye plot. With this plot, it is possible to determine the molecular weight and second virial coefficient.