

Application News

Nano Particle Size Analyzer: SALD-7101

No. 3

Observation of Protein Antigen - Antibody Reaction

Applying the outstanding features of the Nano Particle Size Analyzer SALD-7101, which includes “measurement range: 10 m to 300 μm ”, “shortest measurement time: 1 second”, and “measurement concentration range: a few ppm to 20%”, observations and measurements can be conducted with this instrument not only with respect to fixed particle distribution (unchanging), but also with variation (time-related behavior) in particle size distribution (particle diameter) due to a variety of conditions and influences. One application utilizing these features is the direct observation of the state of protein – protein interaction including antigen – antibody reactions, by observing changes in particle size as they occur without the use of labeling or other facilitating techniques.

In this measurement, the SALD-BC71 batch cell shown in Figure 1 is used. The amount of the sample measured using the batch cell is 7 cc, including the liquid medium.

First, the antibody component is transferred to the batch cell, next the antigen is added, and the mixture is slowly and continuously stirred until the antigen – antibody reaction takes place, and which completes within 30 seconds to several minutes.

Stirring is achieved by the up-and-down movement of the stirring plate, as shown in Figure 2.

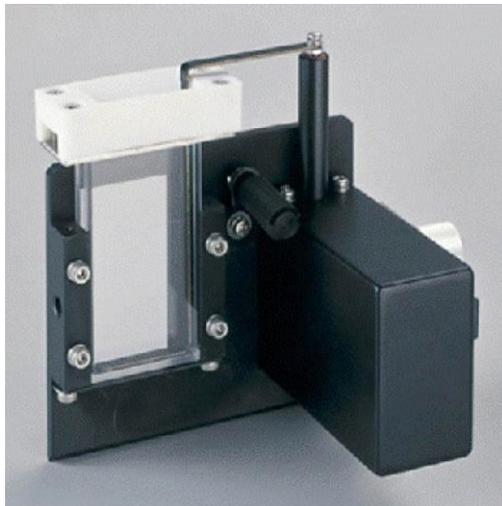


Figure 1: Batch Cell SALD-BC71 for SALD-7101

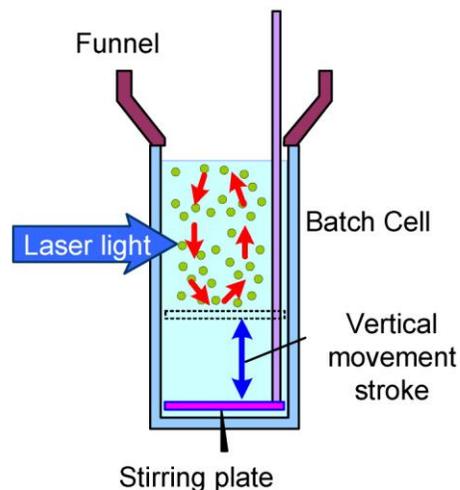


Figure 2: Design of SALD-BC71 Batch Cell

As the reaction progresses, agglutination occurs between the particles (antigen – antibody) due to particle interaction, and the particles become larger as the process advances. Therefore, the progress of the antigen – antibody reaction can be understood and observed as a change in the particle size.

In addition, as the particle size distribution (particle diameter) stops changing once the antigen – antibody reaction is completed, the time required for the reaction to take place can be investigated. Because the SALD-7101 supports measurement over a wide concentration range, this also allows evaluation of the effect of concentration on the reaction.

Moreover, since temperature has no direct effect on the measurement itself, devising some sort of temperature control mechanism for the cell may enable evaluation of the effect of temperature on the reaction.

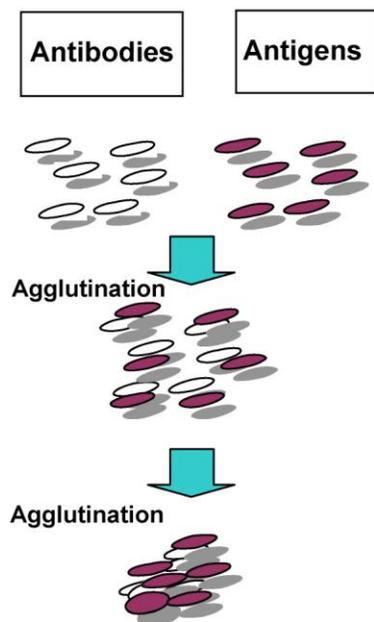


Figure 3: Particle Agglutination due to Antibody – Antigen Reaction

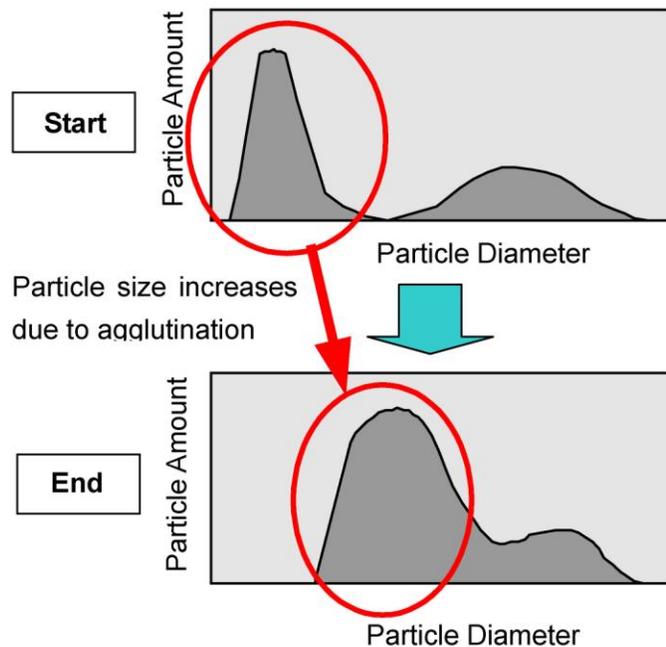


Figure 4: Change in Particle Size Distribution

As shown in Figure 4, the particle size distribution pattern indicates the existence of two separate peaks at the beginning, and as the reaction progresses, agglutination of the particles corresponding to the smaller peak advances, and finally, the entire smaller peak shifts over to the larger peak, and the reaction comes to an end.

By measuring and storing the changes in the particle size distribution at fixed time intervals during this process, completion of the antigen – antibody reaction can be confirmed at the point that the particle size distribution ceases to change.