

MALS + AFFF for Colloidal Drug Carrier Systems

Although gelatin provides important advantages, like its proteinaceous structure and its biodegradability, there is one major drawback of gelatin that disturbs the manufacturing process. Related to the extraction of gelatin from collagen originating from different animal sources, its molecular weight distribution is very heterogeneous. Generating gelatin nanoparticles via desolvation is, therefore, not possible. To overcome this problem a two-step desolvation technique was proposed and successfully realised.

Part of this manufacturing process is the separation of the gelatin base material into a high molecular weight (hmw) and a low molecular weight (lmw) fraction, whereby the high molecular weight fraction is further applied for the production of the gelatin nanoparticles.

To determine the molecular weight and molecular weight distribution of the hmw fraction and to understand what had been empirically found for the two-step desolvation process, we used the combination of MALS and AF4. We investigated the gelatin base material we usually purchased, the hmw fraction obtained during the two-step desolvation, and some modified gelatin batches from a new supplier (concentration of all gelatin batches 2.5 mg/ml).

During our experiments we were able to show the differences between the gelatin base material and the hmw fraction, influencing the nanoparticle's formation process (Fig. 1). Furthermore, while describing the new modified batches, we were able to define a specific molecular weight and molecular weight distribution response that is necessary to simplify the nanoparticle formation to a one-step desolvation process (Fig. 2).

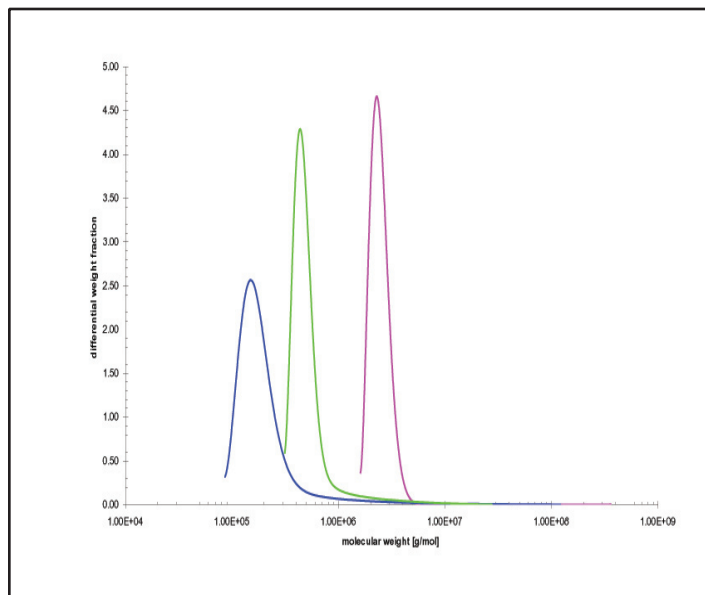


Figure 1. The differences in the molecular weight distribution between the gelatin base material and the hmw fraction are shown. Even the slightly shifted balance point of the new material enables us to produce gelatin nanoparticles by means of a one-step desolvation procedure.

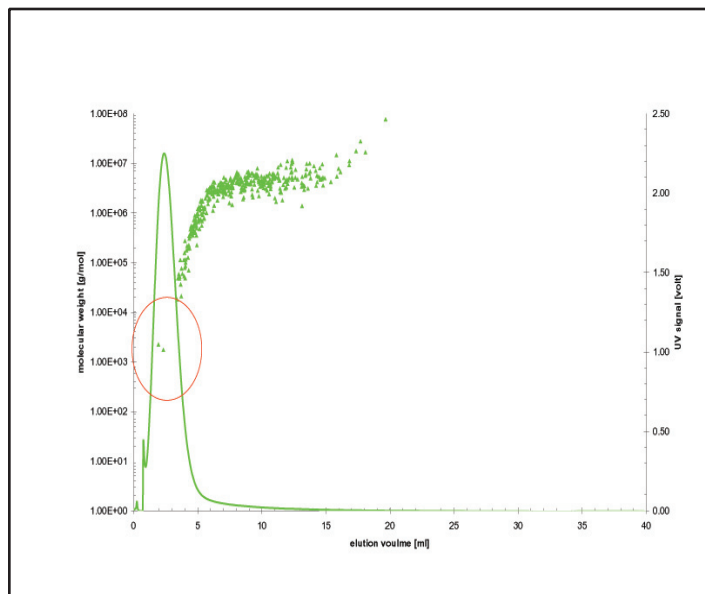


Figure 2. Molecular weight distribution of one of the new experimentally modified gelatin batches (see Fig. 1, green line): The graph shows the reduced amount of the low molecular weight fraction of this experimentally modified batch (red circle).

