Abstract

Protein plays a vital role in human activities. However, environmental factors often lead to protein aggregation, which has a serious impact on human health. In addition, certain protein drugs, such as insulin, also lose their efficacy due to degenerative aggregation and can even be life-threatening. Therefore, the inhibition of protein aggregation has become an important problem to be solved.

In this study, developed a polyampholytes electrolyte composed of ε-polylysine and succinic anhydride, and comprehensively evaluated its protein protective effect. The experimental results show that this polymer can effectively protect a variety of proteins from thermal stress damage, and its effect is significantly better than that of previously reported zwitterionic polymers. In addition, I have synthesized derivatives with different hydrophobicity, further improving their protection efficiency. In particular, the polymer concentration required to achieve protein protection is extremely low. By promoting the retention of protein enzyme activity and stabilizing higher-order structures, these polymers allow proteins to remain in their natural state even after being subjected to extreme thermal stress.

Therefore, this polyampholytes electrolyte performs well in protecting proteins from extreme stress and has a wide range of applications, especially in protein biopharmaceutical and drug delivery systems. In addition, the synthesis process of the polymer is simple, low cost, and can play a good protective role at very low concentration, which lays a solid foundation for its large-scale application.

[Keyword] Polyampholytes; hydrophobicity; protein protection; surface charge; low concentration.