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溶液中变性剂浓度对蛋白溶菌酶复性的影响

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收稿日期 2005-4-13 修回日期 2006-1-11 网络版发布日期 接受日期

摘要 在蛋白质变性复性三态模型的基础上, 给出了一个描述溶液中变性剂浓度对变性蛋白复性率影响的关系式,

通过它可以获得两个描述蛋白质复性过程的特征参数, 一个是参数 $n(m_1 - m_2)$,

表示 n 个蛋白质分子从折叠中间态复性到原始态时所释放的变性剂分子数和从折叠中间态积聚成聚集体时所释放的变性剂分子数之差,

另一个是参数 K_a , 表示蛋白质从原始态到形成聚集体过程的表观积聚平衡常数,

由它们可以描述变性剂分子对变性蛋白复性过程性质的影响。以蛋白溶菌酶在盐酸胍和脲溶液中的复性过程对此关系进行了验证,

结果表明, 当溶液中盐酸胍和脲浓度分别大于1.25 mol/l和3.0 mol/l或分别小于1.0 mol/l和3.0 mol/l时,

它们的折叠中间体分子分别更倾向于集集成聚集体或更倾向于复性成原始态分子。当不同浓度蛋白溶菌酶在脲溶液中复性时,

蛋白溶菌酶折叠中间体有形成二分子积聚体的趋势, 这个推测得到了非还原电泳和体积排阻色谱结果的证实。

关键词 [蛋白溶菌酶,脲,盐酸胍,复性率,变性剂浓度](#)

分类号

Effect of Denaturant Concentration on Hen-egg White Lysozyme Renaturation

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Abstract Based on three-state renaturation process of denatured proteins, an equation describing the effect of denaturant concentration on renaturation yield of denatured proteins was presented. By this equation, two parameters $n(m_1 - m_2)$ and K_a can be obtained. The former indicates the difference in the number of denaturant molecules between the renaturation process of n number of refolding intermediates from refolding intermediate state to native state and their aggregate process from refolding intermediate state to aggregate state, the latter denotes the apparent aggregate equilibrium constant for protein molecules aggregated from native state to aggregate state, and from them, the characteristics of the renaturation process of denatured proteins in denaturant solution can be identified. This equation was tested by the renaturation processes of denatured egg white lysozyme in guanidine hydrochloride and urea solutions, with the results to show that when guanidine hydrochloride and urea concentrations were separately higher than 1.25 and 3.00 mol/L or separately lower than 1.00 and 3.00 mol/L, the refolding intermediates of egg white lysozymes were more easily aggregated to aggregate state or more easily renatured to native state, respectively. Under different initial total egg white lysozyme concentrations in urea solution, the refolding egg white lysozyme intermediates could be deduced to have a tendency to form a bimolecular intermediate aggregate, and this inference was further confirmed by their nonreducing SDS-PAGE and size exclusion chromatography.

Key words [egg white lysozyme](#) [urea](#) [guanidine hydrochloride](#) [renaturation yield](#) [denaturant concentration](#)

DOI:

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