STUDY OF OLIGOMERIZATION POLYDISPERSITY OF METHIONINE GAMMA-LYASE

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Testing the functional activity of proteins may require characterizing their oligomeric state, for which the small-angle scattering method is well suited. This work presents the results of a study of the oligomerization of methionine gamma-lyase (MGL), the main functional state of which assumed to be a tetramer [1]. Samples of methionine gamma-lyase were studied with small-angle neutron scattering (SANS) on a YuMO spectrometer at IBR-2 [2], [3].
Methionine gamma-lyase is an enzyme that degrades sulfur-containing amino acids to α-keto acids, ammonia, and thiols. Regulation of these amino acids is important because sulfur-containing amino acids play a role in many biological processes.
Comparison of the SANS data obtained for MGL from *Clostridium tetani* with the theoretical curve calculated for the crystal structure of their homolog, MGL from *Clostridium sporogenes* (PDB ID: 5DX5), shows that experimentally obtained structural parameters (Rg, D_{MAX}) exceed those of the tetramer model.
The availability of information about the crystal packing of proteins and/or their homologs makes it possible to build models of oligomers, which can then be verified using small-angle scattering data. For example, the literature describes how the early stages of lysozyme crystallization were studied using small-angle scattering [4], [5]; the interaction interface between monomers in oligomers corresponded to crystalline contacts. Following this idea, we construct a model of an octamer (dimer of tetramers) of MGL based on crystalline contacts (PDB ID: 5DX5) [1]. Along with the tetramer and octamer models, the MGL monomer and dimer models were also used in the calculations.
Processing of the experimental SANS data with OLIGOMER program [6] shows that the fractions of monomers, tetramers and octamers are approximately 15%, 65%, and 20%, respectively, while the fraction of dimers is zero.
This result confirms that the tetramer is the main oligomeric state of MGL in solution. However, there is also a certain proportion of octamers, which can be characterized as a dimer of tetramers formed at crystalline contacts.

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