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SIGMA®

ProductInformation

ACTIN FROM BOVINE MUSCLE
Sigma Prod. No. A3653

CAS NUMBER: N/A

PHYSICAL DESCRIPTION:

Appearance: white powder
Molecular weight: approximately 42-43,000, based on sequence information of the rabbit muscle protein, general similarity of actins across species[1] and SDS electrophoresis.[2]

STRUCTURE:

A schematic representation has been published.[3]

STORAGE / STABILITY AS SUPPLIED:

Store at 2-8º C.

SOLUBILITY / SOLUTION STABILITY:

The G-form (monomer) is soluble in water at 1-3 mg/mL. It is recommended that solutions be used promptly, but aliquots may be frozen and stored at –20ºC.[2]

GENERAL REMARKS:

Actin is a major protein of muscle tissue and found in all eukaryotic cells. It is involved in a variety of cellular events: cell movement, cytokinesis, phagocytosis, exocytosis and chromosome movement.[4]

In the absence of salts, actin exists as a globular monomeric protein (G-actin). In the presence of ATP, a divalent cation (Ca^{2+} or Mg^{2+}) and high salts (KCl, NaCl or $MgCl_2$), the G-actin polymerizes to form a fibrous or filamentous actin (F-actin) which incorporates the cation and ATP.[3,4] Dialysis of the F-actin solution (viscous) against water reverses the polymerization.[2]

Filamentous actin can be detected in tissue sections by antibodies or by phalloidin (a toxin produced by Amanita phalloides mushrooms), usually dye-labeled.[5-7]

GENERAL REMARKS: (continued)

Hinshaw et al. used actin to inhibit DNAse I activity during flow cytometric assays of actin polymerization. "...Significant polymerization of actin was detected only under conditions in which sulfhydryl oxidation occurred after exposure to the two oxidizing agents.."[8] Actin was used as an inhibitor of DNAse.[9]

METHOD OF PREPARATION:

A3653 was prepared from the acetone powder of bovine skeletal muscle[2] by the method of Spudich and Watt.[10] Muscle acetone power is extracted with buffer A (2 mM Tris buffer, pH 8.0 containing 0.2 mM ATP, 0.5 mM ß-mercaptanol and 0.2 mM $CaCl_2$). The filtrate is clarified by centrifugation, then the actin is polymerized by addition of 50 mM KCl and 2 mM $MgCl_2$ (final concentration). The KCl concentration is then increased to 0.6 M and the solution is stirred for 1.5 hour (critical for obtaining high purity actin). The F-actin is then collected by centrifugation at 80,000 x g, resuspended in Buffer A and extensively dialyzed to convert it actin to G-actin.[2] Protein content (Biuret) is approximately 90%, (the remainder being buffer salts).

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9. Lazarides, E. and Lindberg, V., *Proc. Natl. Acad. Sci. USA*, 71, 4742 (1974).