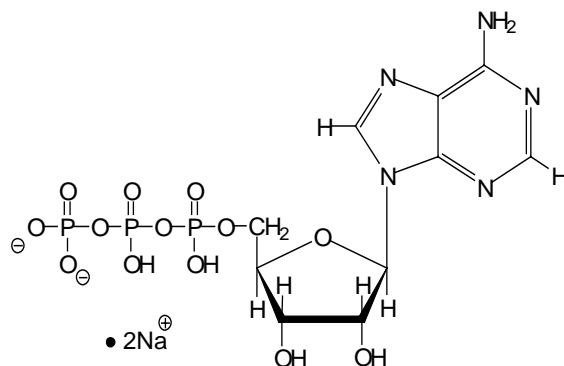


**ADENOSINE 5'-TRIPHOSPHATE, ATP****Disodium Salt****Sigma Prod. No. A6144****CAS NUMBER:** 51963-61-2**PRODUCT DESCRIPTION:**

Equine muscle source, high purity (not less than 99%), and a very stable material in crystalline form and in neutral aqueous solutions. This product may contain up to 40 ppm vanadium. Sigma offers this product for those customers who have historically used it or for those who do not require a low vanadium preparation.

**PHYSICAL DESCRIPTION:**Formula -  $C_{10}H_{14}N_5O_{13}P_3Na_2$  Formula Weight - 551.1

Apparent molecular weight may be calculated from the water and organic solvent content provided on the label. For each mole of water per mole of ATP salt, add 18 to the formula weight. This calculated number is then corrected for organic solvent by dividing by the following factor:  
[(100 - per cent of solvent content) / 100].

**GENERAL INFORMATION:**

ATP and its phosphate bonds are the basic components of energy exchange in many biological systems. The purification and crystallization of ATP from equine muscle led to the entry of Sigma Chemical Company into the research biochemical market. Sigma became the first to offer stable, crystalline ATP with a purity approaching 100%. The initial products were isolated from muscle tissue and precipitated with ethanol.<sup>1</sup> Currently, products are isolated from equine muscle or prepared by bacterial fermentation. Production of high quality ATP is now synonymous with Sigma and today the focal point of the entrance to the Sigma Chemical Company headquarters is a 15 foot high, rotating, molecular model of ATP suspended from the ceiling.

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**GENERAL INFORMATION:** (continued)

Over the years, ATP has been reported to contain various trace ionic impurities which affect enzyme systems. Vanadate ions have been reported to inhibit Na/K ATPase activity.<sup>2,3,4,5</sup> In response to this concern, Sigma offers products with less than 1 ppm vanadium content. Other papers have detailed the metal ion content of commercial ATP preparations.<sup>6,7</sup> This may be due to chelation of the metal ions by the ATP.<sup>8</sup> Methods have been suggested for treatment of ATP solutions, if removal of metal ions is necessary.<sup>9,10,11</sup> A very slow dismutation of 2 ATP molecules in the powdered product results in the formation of ADP and adenosine 5'-tetrphosphate. Other possible trace impurities are AMP or other nucleotides.

**PHYSICAL PROPERTIES:**

Appearance: white, crystalline powder

pKa<sup>12</sup>:     (amino)       (secondary phosphate)  
          4.1                   6.5

UV Absorption <sup>13</sup> :	EmM	Wavelength	pH
	15.4	259	7
	15.4	259	11
	14.7	257	2

Purity: not less than 99% (Enzymatic and HPLC assay) - Analytical Specification available

**STABILITY / STORAGE AS SUPPLIED:**

The product is routinely shipped at ambient temperature without degradation. For long term storage it is suggested to routinely store the powder frozen with desiccation. A decomposition of <0.5% per year is observed.

**SOLUBILITY / SOLUTION STABILITY:**

The sodium salt is water soluble, routinely yielding a clear solution at 50 mg/ml. This solution is mildly acidic (pH approximately 3.5). Neutral ATP solutions stored frozen are stable for at least one year. A refrigerated solution would be stable for at least one week (see special concerns regarding standards for bioluminescence). ADP is the first hydrolysis product formed, with additional hydrolysis leading to the formation of AMP. Acid lability has been used to characterize phosphorus compounds. ATP has a half-life of 8 minutes in 0.1 N acid at 100°C and 67% hydrolysis will occur in 7 minutes at 100°C in 1 N acid.<sup>14</sup> It is stable several hours in a 7% TCA solution at 0°C. In alkali solutions, ATP will hydrolyze to AMP and pyrophosphate.<sup>15</sup>

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**APPLICATIONS / PROCEDURES:**

Sigma currently offers two bioluminescent kits (FL-AA and FL-SCA) for the assay of ATP. The sodium salt of muscle origin has several product listings which can be used as a standard for bioluminescent experiments: A5394 (bulk material to be weighed by user) and A3147, 660-30, and FL-AAS (preweighed vials). Standard solutions of 1 mg/ml or less should be used for one day. Solutions at higher concentrations may be frozen in aliquots at -20°C for at least one year. Other methods for the enzymatic assay of ATP have been published.<sup>16,17</sup>

The sodium salt is usable in other enzyme systems including protein kinases A and C. Products A6559 and A6419 have been developed for molecular biology and tissue culture applications, respectively.

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