Product Information

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Acid Phosphatase
from potato

Catalog Number **P0157**
Storage Temperature 2–8 °C

CAS RN 9001-77-8
EC 3.1.3.2
Synonyms: Apase; Orthophosphoric-monoester phosphohydrolase (acid optimum)

Product Description
Acid phosphatases (APase) are a family of enzymes that non-specifically catalyze the hydrolysis of monoesters and anhydrides of phosphoric acid to produce inorganic phosphate at an optimum pH of 4 to 7 by the following reaction:

$$R\text{-}PO_4 + H_2O \xrightarrow{APase} R\text{-}OH + HOPO_3^{2+}$$

Their function in the production, transport, and recycling of phosphate is critical for the metabolic and energy transduction processes of the cell. As a group, APases may be as important as kinases in regulatory processes.[1]

Plant APases have been localized in the cytosol, vacuoles, and cell walls. One key role is phosphate acquisition to mobilize organic phosphates in the soil.[2] Phosphate starvation also induces APase generation.

Potato tuber APase is a monomeric glycoprotein. The carbohydrate component makes up 16.6% of the molecular mass.[3]

Molecular mass:[3] 69 kDa

Carbohydrate residues (%):[3]

Mannose	5.0
Glucosamine	3.6
Rhamnose	3.4
Glucose	2.5
Galactose	1.5

pH Optimum:[3] 5.0–5.3

pH Range:[4] 4–7

Temperature optimum: 37 °C

Substrates:[3,5]

α-glyceryophosphate	ATP
fructose-6-phosphate	fructose-6-phosphate
inorganic pyrophosphate	glucose-6-phosphate
p-nitrophenyl phosphate	

K_M (mM):[3]

p-nitrophenyl phosphate	1.25
inorganic pyrophosphate	40.0

Activators:[6]
Cu^{2+}, Mg^{2+}, Mn^{2+}, Zn^{2+}, Hg^{2+} (below 0.4 mM)

Inhibitors:[3,6]
Al^{3+}, Hg^{2+} (above 0.4 mM), MoO_4^{2-}, Zn^{2+}, urea

This product is partially purified from potato tubers and is supplied as a light brown to pink suspension in 1.8 M ammonium sulfate containing 10 mM $MgCl_2$ at pH 5.5.

Specific activity: ≥200 units/mg protein (biuret)

Unit definition: One unit will hydrolyze 1.0 μmole of *p*-nitrophenyl phosphate per minute at pH 4.8 at 37 °C.

APase is assayed spectrophotometrically in a 1.1 ml reaction mixture containing 41 mM citrate buffer, pH 4.8 at 37 °C, 6.9 mM *p*-nitrophenyl phosphate, and 0.015–0.025 unit APase.

Other activity:
Apyrase: None detected (detection limit, <5% of APase activity).

Precautions and Disclaimer
This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions
APase is soluble in cold water (0.15–0.25 unit/ml). Prepare solution immediately before use.

Storage/Stability
Store the product at –20 °C. When stored at –20 °C, the enzyme retains activity for at least one year.

APase can lose half its activity after 30 minutes at 60 °C and 100% of its activity after two hours at 70 °C.[3]

References

1. Vincent, J.B., *et al*., Hydrolysis of phosphate monoesters: a biological problem with multiple chemical solutions. Trends Biochem. Sci., **17**, 105-10 (1992).
2. Olczak, M., *et al*., Plant purple acid phosphatases – genes, structures, and biological function. Acta Biochim. Pol., **50**, 1245-56 (2003).
3. Kruzel, M., and Morawiecka, B., Acid phosphatase of potato tubers (*Solanum tuberosum* L.). Purification, properties, sugar, and amino acid composition. Acta Biochim. Pol., **29**, 321-30 (1982).
4. Waymack, P.P., and van Etten, R.L., Isolation and characterization of a homogeneous isoenzyme of wheat germ acid phosphatase. Arch. Biochem. Biophys., **288**, 621-33 (1991).
5. Sugiura, Y., *et al*., Purification, enzymatic properties, and active site environment of a novel manganese (III)-containing acid phosphatase. J. Biol. Chem., **256**, 10664-70 (1981).
6. Tu, S.I., *et al*., Effects of multivalent cations on cell wall-associated acid phosphatase activity. Plant Physiol., **88**, 61-68 (1988).

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