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Acid Phosphatase
from sweet potato (*Ipomoea batatas*)

Catalog Number **P1435**
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] Some APases may be regulated by cellular inorganic phosphate (P_i) content and serve to salvage leaked or organic phosphates, converting them to P_i for reabsorption.[3]

Sweet potato cell wall APase has six isoenzymes.[4]
Molecular mass:
- Isoenzyme PII-I:[4] 400 kDa (gel filtration)
- Isoenzymes PI-I and PI-II:[4] 320 kDa (gel filtration)
- Isoenzymes PI-III and PIII-I:[4] 250 kDa (gel filtration)
- 120 kDa[5] (gel filtration)
- 110 kDa[4] (gel filtration)

pH Optimum:[4] 5.5

pH Range:[4,6] 4.5–6.0

Temperature optimum:[4] 45 °C

E^{mM}:[7] 3.2 (550–560 nm)

Substrates (relative reaction rate):[4]

p-nitrophenyl phosphate	100
fructose-1,6-diphosphate	69
β-glycerophosphate	69
α-glycerophosphate	48
5′-ATP	38
glucose-6-phosphate	33
fructose-6-phosphate	29
ribose-5-phosphate	25
5′-ADP	15
5′-AMP	9

K_M (mM): (*p*-nitrophenyl phosphate substrate)[6,8]

Mn^{3+} enzyme, pH 4.4	0.049
Fe^{3+}-substituted enzyme, pH 4.4	0.077
isoenzymes PI-II and PI-III	0.5
isoenzymes PII and PIII-I	0.71

Inhibitors:[4,6]

Acetylacetone	PCMB	pyridine
bromosuccinimide	AsO_4^{3-}	Cu^{2+}
iminodicateic acid	EDTA	F^-
nitrilotriacetic acid	Hg^{2+}	MoO_4^{2-}
	Zn^{2+}	

This product is partially purified from sweet potato and is supplied as a tan suspension in 1.8 M ammonium sulfate containing 10 mM $MgCl_2$ at pH 5.3.

Specific activity: ≥10 units/mg protein (modified Warburg-Christian)

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: less than 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 2–8 °C. When stored at 2–8 °C, the enzyme retains activity for at least one year.

References

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