

# Product Information

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## Acid Phosphatase from sweet potato (*Ipomoea batatas*)

Catalog Number **P1435**

Storage Temperature 2–8 °C

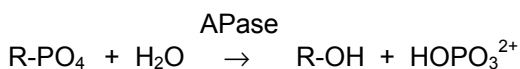
CAS RN 9001-77-8

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:



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.<sup>1</sup>

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.<sup>2</sup> Some APases may be regulated by cellular inorganic phosphate (P<sub>i</sub>) content and serve to salvage leaked or organic phosphates, converting them to P<sub>i</sub> for reabsorption.<sup>3</sup>

Sweet potato cell wall APase has six isoenzymes.<sup>4</sup>

Molecular mass:

- Isoenzyme PII-I:<sup>4</sup> 400 kDa (gel filtration)
- Isoenzymes PI-I and PI-II:<sup>4</sup> 320 kDa (gel filtration)
- Isoenzymes PI-III and PIII-I:<sup>4</sup> 250 kDa (gel filtration)
- 120 kDa<sup>5</sup> (gel filtration)
- 110 kDa<sup>4</sup> (gel filtration)

pH Optimum:<sup>4</sup> 5.5

pH Range:<sup>4,6</sup> 4.5–6.0

Temperature optimum:<sup>4</sup> 45 °C

E<sup>mM,7</sup>: 3.2 (550–560 nm)

Substrates (relative reaction rate):<sup>4</sup>

<i>p</i> -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<sub>M</sub> (mM): (*p*-nitrophenyl phosphate substrate)<sup>6,8</sup>

Mn <sup>3+</sup> enzyme, pH 4.4	0.049
Fe <sup>3+</sup> -substituted enzyme, pH 4.4	0.077
isoenzymes PI-II and PI-III	0.5
isoenzymes PII and PIII-I	0.71

Inhibitors:<sup>4,6</sup>

PCMB	pyridine
Acetylacetone	AsO <sub>4</sub> <sup>3-</sup>
bromosuccinimide	Cu <sup>2+</sup>
iminodiacetic acid	EDTA
nitrilotriacetic acid	Hg <sup>2+</sup>
	F <sup>-</sup>
	MoO <sub>4</sub> <sup>2-</sup>
	Zn <sup>2+</sup>

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<sub>2</sub> 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

1. Vincent, J.B., *et al.*, Hydrolysis of phosphate monoesters: a biological problem with multiple chemical solutions. *Trends Biochem. Sci.*, **17**, 105-10 (1992).
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3. Duff, S.M.G., *et al.*, Phosphate-starvation response in plant cells: *De novo* synthesis and degradation of acid phosphatases. *Proc. Natl. Acad. Sci.*, **88**, 9538-42 (1991).
4. 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).
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6. Kawabe, H., *et al.*, Mn(III)-containing acid phosphatase. Properties of Fe(III)-substituted enzyme and function of Mn(III) and Fe(III) in plant and mammalian acid phosphatases. *Biochim. Biophys. Acta*, **784**, 81-89 (1984).
7. Schenk, G., *et al.*, Binuclear metal centers in plant purple acid phosphatases: Fe-Mn in sweet potato and Fe-Zn in soybean. *Arch. Biochem. Biophys.*, **370**, 183-89 (1999).
8. Sugawara, S., *et al.*, Resolution and some properties of acid phosphatase isoenzymes bound to the cell wall of potato tubers. *Agric. Biol. Chem.*, **45**, 1767-73 (1981).

KAD, RBG, JWM, MAM 12/07-1

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