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Product Information

Urease, Type C-3
from *Canavalia ensiformis* (Jack Bean)

Catalog Number **U0251**
Storage Temperature –20 °C

E.C. 3.5.1.5
CAS RN 9002-13-5
Synonym: Jack Bean Urease

Product Description
Urease is involved in purine metabolism and the urea cycle. It catalyzes the hydrolysis of urea to produce ammonia and carbon dioxide:

$$\text{Urea} + H_2O \xrightarrow{\text{Urease}} CO_2 + 2\,NH_3$$

Hydroxyurea is also a substrate of the enzyme.[1]

Jack bean urease was the first enzyme to be crystallized and the first enzyme found to contain nickel. It is a multi-subunit enzyme, consisting of 91 kDa subunits in three protein forms. The major protein form has a molecular mass range of 440–480 kDa and two lesser forms have molecular mass ranges of 230–260 kDa and 660–740 kDa.[2,3]

Isoelectric point:[4] 5.0-5.2

Optimal pH:[2] 7.4

Optimal temperature: 60 °C
Urease begins to denature at temperatures above 45 °C for 60 minutes.

K_M:[2] 1.3 mM (in Tris HCl)

Inhibitors:
2-mercaptoethanol[5]
acetohydroxamate[6]
EDTA[7]
phosphoramidate[5]
fluoride ion[5]
1,4-benzoquinone
2,5-dimethyl-1,4-benzoquinone[8]

This product is purified by crystallization and is supplied as a powder.

Specific activity: ≥600,000 units/g solid

Unit definition: one unit will liberate 1.0 μmole of NH_3 from urea per minute at pH 7.0 at 25 °C. One unit is equivalent to 1.0 I.U. or 0.054 Sumner unit (1.0 mg ammonia nitrogen released in 5 minutes at pH 7.0 at 20 °C)

Sigma's titrimetric assay uses a 1.10 ml reaction mix. The final concentrations are 684 mM sodium phosphate, 455 mM urea, 0.05% (w/v) bovine serum albumin and 25–50 units of urease.

A FTIR method used to monitor either the disappearance of substrate or the appearance of product has been published.[9]

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
The enzyme is soluble in 0.2 M sodium phosphate buffer, pH 7.0, (1 mg/ml) yielding a colorless to light yellow solution with a haze. The following buffers have been shown not to inhibit urease activity: MES, HEPES, and CHES.[2]

Storage/Stability
The recommended storage temperature is –20 °C.

References

1. Fishbein, W., and Carbone, P., J. Bio. Chem., **265**, 9464 (1990).
2. Cesareo, S.D., and Langton, S.R., Kinetic properties of *Helicobacter pylori* urease compared with jack bean urease. FEMS Micobiol. Lett., **78**, 15-21 (1992).
3. Krajewska, B., and Ciurli, S., Jack Bean (*Canavalia ensiformis*) urease. Probing acid-base groups of the active site by pH variation. Plant Physiol. Biochem., **43**, 651-58 (2005).
4. Sumner, J.B., and Hand, D.B., The isoelectric point of crystalline urease. J. Am. Chem. Soc., **51**, 1255-60 (1929).
5. Dixon, N.E. *et al*., Jack Bean urease (EC 3.5.1.5). III. The involvement of active-site nickel ion in inhibition by beta-mercaptoethanol, phosphoramidate, and fluoride. Can. J. Biochem., **58**, 481-488 (1980).
6. Dixon, N.E. *et al*., Metal ions in enzymes using ammonia or amides. Science, **191**, 1144-1150 (1976).
7. Dixon, N.E. *et al*., Jack been urease (EC 3.5.1.5). II. The relationship between nickel, enzymatic activity, and the "abnormal" ultraviolet spectrum. The nickel content of jack beans. Can. J. Biochem., **58**, 474-480 (1980).
8. Zaborska, W. *et al*., Inhibition of jack bean urease by 1,4-benzoquinone and 2,5-dimethyl-1,4-benzoquinone. Evaluation of the inhibition mechanism. J. Enzyme Inhib. Med. Chem., **17**, 247-53 (2002).
9. Karmali, K. *et al*., The use of Fourier transform infrared spectroscopy to assay for urease from *Pseudomonas aeruginosa* and *Canavalia ensiformis*. Anal. Biochem., **331**, 115-21 (2004).

GY,KAD,RBG,JWM,MAM 03/14-1