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ProductInformation

Glucose Oxidase
from *Aspergillus niger*

Product Number **G 9010**
Storage Temperature 2-8 °C

Product Description

Enzyme Commission (EC) Number: 1.1.3.4
CAS Number: 9001-37-0
Molecular Weight: 160 kDa (gel filtration)[1]
pI: 4.2[2]
Extinction coefficient: $E^{1\%}$ = 16.7 (280 nm)[3]
Synonyms: GOD, β-D-Glucose: oxygen 1-oxidoreductase

Glucose oxidase from *Aspergillus niger* is a dimer consisting of 2 equal subunits with a molecular weight of 80 kDa each. Each subunit contains one flavin adenine dinucleotide moiety and one mole of iron. The enzyme is a glycoprotein containing approximately 16% neutral sugar and 2% amino sugars.[1] The enzyme also contains 3 cysteine residues and 8 potential sites for N-linked glycosylation.[4]

Glucose oxidase is capable of oxidizing D-aldohexoses, monodeoxy-D-glucoses, and methyl-D-glucoses at varying rates. D-glucose, 2-deoxy-D-glucose, 4-O-methyl-D-glucoses, 6-deoxy-D-glucose, 4-deoxy-D-glucose, 3-deoxy-D-glucose and 3-O-methyl-D-glucose are oxidized at decreasing rates and in the order listed. The pH optimum for glucose oxidase is 5.5, while it has a broad activity range of pH 4 - 7.[2] Glucose oxidase is specific for β-D-glucose with a K_m of 33 - 110 mM.[5,6]

Glucose oxidase does not require any activators, but it is inhibited by Ag^{+}, Hg_{2+}, Cu^{2+}, phenylmercuric acetate and p-chloromercuribenzoate. It is not inhibited by the nonmetallic SH reagents: N-ethylmaleimide, iodoacetate, and iodoacetamide.[7]

Glucose oxidase can be utilized in the enzymatic determination of D-glucose in solution. As glucose oxidase oxidizes β-D-glucose to D-gluconolactate and hydrogen peroxide, horseradish peroxidase is often used as the coupling enzyme in glucose determinations. Although glucose oxidase is specific for β-D-glucose, solutions of D-glucose can be quantified as α-D-glucose will mutorotate to β-D-glucose as the β-D-glucose is consumed by the enzymatic reaction.[8]

Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

Preparation Instructions

This enzyme is soluble in 50 mM sodium acetate buffer, pH 5.1 (0.1 ml in 5 ml), yielding a clear solution.

References

1. Tsuge, H. J., et al, Purification, properties, and molecular features of glucose oxidase from *Aspergillus niger*. J. Biochem., **78**, 835-843 (1975).
2. Pazur, J. H., and Kleppe, K., The Oxidation of Glucose and Related Compounds by Glucose Oxidase from *Aspergillus niger*. Biochemistry, **3**, 578-583 (1964).
3. Fasman, G. D., CRC Handbook of Biochemistry and Molecular Biology, CRC Press (Boca Raton, FL), p. 244 (1990) (Product Code C 3671)
4. Frederick, K. R., et al., Glucose oxidase from *Aspergillus niger*. Cloning, gene sequence, secretion from *Saccharomyces cerevisiae* and kinetic analysis of a yeast-derived enzyme. J. Biol. Chem., **265**, 3793-3802 (1990).

5. Swoboda, B. E. P., and Massey. V., Purification and properties of glucose oxidase from *Aspergillus niger*. J. Biol. Chem., **240**, 2209-2215 (1965)
6. Gibson, Q. H., et al., Kinetics and Mechanism of Action of Glucose Oxidase. J. Biol. Chem., **239**, 3927-3934 (1964).
7. Nakamura, S., and Ogura, Y., Mode of inhibition of glucose oxidase by metal ions. J. Biochem., **64**, 439-447 (1968).
8. Bergmeyer, H. U., Methods of Enzymatic Analysis, Weinheim (Deerfield Beach, Fla) 3rd ed., **2**, 201-202 (1983).

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