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Product Information

Glucose Oxidase, Type VII
from *Aspergillus niger*

Catalog Number **G2133**
Storage Temperature –20 °C

CAS RN 9001-37-0
EC 1.1.3.4
Synonyms: Gox; β-D-Glucose:oxygen 1-oxidoreductase

Product Description

Glucose oxidase catalyzes the oxidation of β-D-glucose to form D-glucono-1,5-lactone and hydrogen peroxide.

$$\beta\text{-D-glucose} + O_2 \rightarrow \text{D-glucono-1,5-lactone} + H_2O_2$$

Glucose oxidase can be utilized for 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.[1]

Molecular mass:[2] 160 kDa (gel filtration)

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

Extinction coefficient:[4] $E^{1\%}$ = 16.7 (280 nm)

Isoelectric point:[5] 4.2

Optimal pH:[2] 5.5 (broad activity range of pH 4-7)

Inhibitors: Ag^+, Hg^{2+}, and Cu^{2+} ions, phenylmercuric acetate and *p*-chloromercuribenzoate inhibit glucose oxidase. Nonmetallic sulfhydryl reagents, such as *N*-ethylmaleimide, iodoacetate, and iodoacetamide, are not inhibitors.[6]

Substrates: Glucose oxidase is relatively specific for β-D-glucose (K_M of 33–110 mM)[7,8] It also oxidizes D-aldohexoses, monodeoxy-D-glucoses, and methyl-D-glucoses at varying rates. The following substrates are listed in decreasing order of oxidation rate: D-glucose, 2-deoxy-D-glucose, 4-O-methyl-D-glucose, 6-deoxy-D-glucose, 4-deoxy-D-glucose, 3-deoxy-D-glucose, 3-O-methyl-D-glucose

One publication has examined kinetics data and structural data to postulate on the chemical mechanism of action of glucose oxidase from *A. niger*.[9] The role of FAD in the oxidation of glucose, as catalyzed by glucose oxidase from *A. niger*, has been investigated using electrospray ionization mass spectrometry.[10] The crystal structure of a partially deglycosylated form of glucose oxidase from *A. niger* has been reported.[11]

This product is supplied as a lyophilized powder containing phosphate buffer salts and sodium chloride.

Protein content: ≥60% protein

Specific activity: ≥100,000 units/g solid (without added oxygen). If the reaction mixture is saturated with oxygen, the activity may increase by up to 100%.

Unit definition: One unit will oxidize 1.0 μmole of β-D-glucose to D-gluconolactone and H_2O_2 per minute at pH 5.1 at 35 °C.

Other enzyme activities:
Catalase: ≤10 Sigma units/mg protein
Amylase, maltase, glycogenase, invertase, and galactose oxidase: lot-specific results are reported on the Certificate of Analysis.

Precautions and Disclaimer

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

Preparation Instructions
This enzyme is soluble (0.2 mg/mL) in 50 mM sodium acetate buffer, pH 5.1, yielding a clear solution. One publication reports preparation of stock solutions of this product in 50 mM sodium acetate, pH 5.0, at 3.7 mg/mL.[12] Another publication reports preparation of 2 mg/mL stock solutions of this product in a buffer of 80 mM PIPES, pH 6.9, 1 mM EGTA, and 1 mM $MgCl_2$, and storage of stock solutions in aliquots at –20 °C.[13,14] We have not tested this latter condition.

Storage/Stability
This product is stored at –20 °C and is stable for at least 5 years, when properly stored and unopened.

References

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