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TECHNICAL INFORMATION

Catalog Number: 156642
Sorbitol Dehydrogenase

CAS # 9028-21-1
Source: Sheep liver
E.C. 1.1.1.14
Synonyms: L-Iditol dehydrogenase; Polyol dehydrogenase; L-Iditol: NAD^+ 5-oxidoreductase; SDH
Form: Lyophilized powder containing approximately 15% protein with the balance primarily maltose.
Typical Contaminants:

ADH: < 0.01%
GIDH: < 0.02%
Glucose Dehydrogenase: < 0.02%
LDH: < 0.05%
MDH: < 0.05%

Activity: Approximately 20-40 units per mg protein
Unit Definition:

$$\text{D-Fructose} + \text{NADH} + \text{H}^+ \xrightarrow{\text{SDH}} \text{D-sorbitol} + \text{NAD}^+$$

One unit will convert 1.0 umole of D-fructose to D-sorbitol per minute at pH 7.6 at 25°C.
Specificity: Reduces L-iditol to L-sorbose. Also acts on D-glucitol and other closely related sugar alcohols. Allows the reduction of ketones to polyols. The reduction of D-fructose is favored. However, alkaline pH shifts the equilibrium in favor of sorbitol oxidation.
The amount of fructose required to saturate SDH is quite high at approximately 400 mM and somewhat dependent on the assay buffer. For instance, the saturating concentration of fructose is higher in Tris buffer than in triethanolamine.[6]
SDH does not oxidize erythritol, D- or L-arabitol, D-iditol, D-mannitol or inositol. It will not reduce D-tagatose, D-mannoheptulose, D-glucose, DL-glyceraldehyde, pyruvate, 2-oxolutarate or acetaldehyde.
Relative Rates and K_m values:

Conversion	**K_m value**	**Relative Rate**
D-sorbitol to fructose	0.7 mM reduction for fructose: 250-300 mM.	1.00
L-iditol to L-sorbose	--	0.96
xylitol to D-xylulose	--	0.85
ribitol to D-ribulose	--	0.49
allitol to allulose	--	0.45

SDH is specific for NAD(H); however, it will utilize NADP(H) only at a 10- to 100-fold reduced rate.
Molecular Weight: Approximately 115,000. Primary structure has been investigated by Jeffery.[7]
Optimum pH: Approximately 9.0 to 9.5 (oxidation of D-sorbitol); 7.4 to 7.6 (reduction of fructose).
The oxidation of xylitol to xylulose (as well as the oxidation of D-sorbitol) is favored by alkaline pH. At pH 8.6, in triethanolamine buffer with excess NADH, SDH will quantitatively oxidize xylitol.[3]
Activators: The reactions (oxidation or reduction) are fastest in Tris or triethanolamine buffers.
Inhibitors: 4-Chloromercuribenzoate (0.1 mM), cysteine (2 mM), monoiodoacetate, glutathione, cyanide, EDTA and other chelators, borate, metal ions such Ag^+, Hg^{2+}, Pb^{2+}. Not inhibited by heparin.
In the colorimetric assay[4] of sorbitol and xylitol, high concentrations of reducing substances ($\geq$ 5 ug/assay) such as ascorbic acid (in fruit juice) or SO_2 (in jam) interfere. A procedure for removing these substances (with H_2O_2 and alkali) is given in reference # 4.
References:

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