Sorbitol Dehydrogenase (SDH)
Polyol dehydrogenase from sheep liver
L-Iditol: NAD 5´-oxidoreductase, EC 1.1.1.14

Product overview

**Formulation**
Lyophilizate (12 mg contain 2 mg enzyme protein and 10 mg maltose; 60 mg contain 10 mg enzyme protein and 50 mg maltose).

**Contaminants**
ADH < 0.01%,
GIDH < 0.02%,
fructose dehydrogenase < 0.02%,
LDH < 0.05%,
MDH < 0.05%

**M_r**
115,000

**Substrate specificity, relative rates and K_m**
Sorbitol dehydrogenase (SDH) will oxidize D-sorbitol to fructose (K_m = 0.7 mM; relative rate = 1.00). The enzyme will also oxidize many other polyols, including L-iditol to L-sorbose (rate = 0.96), xylitol to D-xylulose (rate = 0.85), ribitol to D-ribulose (rate = 0.49) and allitol to allulose (rate = 0.45). SDH also catalyzes the reverse (reduction) reactions of each of the above. The K_m for fructose is 250-300 mM. SDH is specific for NAD(H); it will utilize NADP(H) only at a 10- to 100-fold reduced rate. The enzyme does not oxidize erythritol, D- or L-arabitol, D-iditol, D-mannitol or inositol. SDH does not reduce D-tagatose, D-mannoheptulose, D-glucose, DL-glyceraldehyde, pyruvate, 2-oxotaurate or acetalddehyde.

**Specific Activity**
Approx. 40 U/mg enzyme protein at +25°C with D-fructose as substrate.

**pH optimum**
Oxidation of D-sorbitol at a pH of approx. 9.0-9.5
Reduction of fructose at a pH of 7.4-7.6

**Note:** The reduction of D-fructose is favored. However, alkaline pH shifts the equilibrium in favor of sorbitol oxidation.

**Activators**
The reactions (oxidation or reduction) are fastest in Tris- or triethanolamine buffer.

**Inhibitors**
4-chloromercuribenzoate (0.1 mM), cysteine (2 mM), monoiodoacetate, glutathione, cyanide, EDTA (and other chelators), borate, metal ions Ag⁺, Hg²⁺, Pb²⁺.

**Note:** Not inhibited by heparin.

**Application**
Reduces L-iditol to L-sorbose. Also acts on D-glucitol and other closely related sugar alcohols. Allows the reduction of ketones to polyols (see aldolases for the synthesis of ketoses).

**Storage and stability**
Stable at +2 to +8°C until the expiration date printed on the label. As aqueous solution stable at +2 to +8°C for several weeks.

**Note:** Store the lyophylizate dry.

**Technical Tips**
- D-sorbitol and xylitol are frequently used as sugar substitutes for diabetics. Sorbitol is a moistener and softener in many foods.
- The amount of fructose required to saturate SDH is quite high (approx. 400 mM) and somewhat dependent on the assay buffer. For instance, the saturating concentration of fructose is higher in Tris buffer than in triethanolamine.
- 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.

**Analysis Information**

**Quality Control**

| SDH + D-fructose + NADH + H⁺ | D-sorbitol + NAD⁺ |

**Unit definition**
One unit (U) sorbitol dehydrogenase will reduce 1 μmol of D-fructose in 1 min at 25°C and pH 7.6 (trisethanolamine buffer; 150 mM fructose (non-saturating concentration)). The above assay consumes 1 μmol of NADH per μmol of D-sorbitol formed.

**References**

6 Boehringer Mannheim GmbH. (1983) in Methods of Enzymatic Food Analysis, pp. 43-44

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