L-Leucine-dehydrogenase

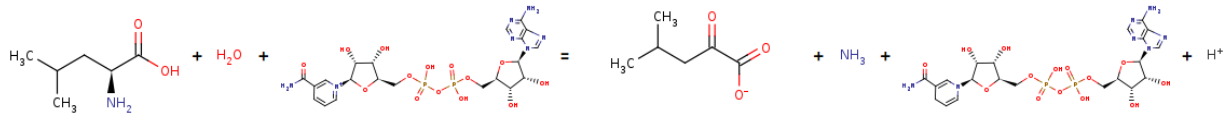
L-Leucine: NAD^+ oxidoreductase, E.C. 1.4.1.9

Description:

L-Leucine Dehydrogenase catalyses the oxidative deamination of L-leucine, L-valine und L-isoleucine as well as of amino acids with unbranched-chained aliphatic carbonic chain.

Caused by the reverse reaction a lot of 2-ketoacids in particular 2-isocapronate, 2-ketoisovalerate and 2-keto-3-methylvalerate with 0.9 M ammonium were aminated reductively to the corresponding amino acid.

Catalysed reaction:



L-leucine + H_2O + $NAD^+ \rightarrow$ *4-methyl-2-oxopentanoate* + NH_3 + *NADH* + H^+

Origin:

Bacillus cereus

Application:

Synthesis of L-leucine as well as a lot of other amino acids with unbranched-chained and branched-chained carbonic chain, e.g. L-tert-leucine and L-methionine

Amination of 2-ketoacids under continuous conditions in enzyme-membrane-reactors (usage of formiat dehydrogenase in order to the regeneration of the coenzyme).

Synthesis of radioactively marked amino acids

Activity:

> 50 U/ mL
(Method: ASA Spezialenzyme GmbH)

Specific activity:

> 30 U/ mg Protein

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Parameter:	pH oxidative deamination	Optimum: 10.7 (L-leucine, L-isoleucine and L-valine)
	pH reductive amination	Optimum: 9.0 – 9.5 (2-ketoisocapronate, 2-ketomethionine) Optimum: 8.5 (2-ketovalerate)
	Temperature	Optimum: 60°C (oxidative deamination)

Molecular weight: 310 000 (± 10 000) Da [1]

Structure: The enzyme is composed of six identical subunits with a molecular weight 39 000 D each. [1]

Isoelectric point: pH 5.75 (native enzyme) pH 4.0 (subunits) [2]

Michaelis-constants:

Oxidative deamination:

Substrate	KM [mM]
NAD+	0.34
L-α-aminobutyrate	22.0
L-norvaline	2.9
L-norleucine	1.5
L-valine	2.5
L-leucine	1.5
L-isoleucine	1.0
L-methionine	23.0

Reductive amination:

substrate	KM [Mm]
NADH	0.034
2-ketobutyrate	1.5
2-ketovalerate	0.4
2-ketocapronate	1.2
2-ketoisovalerate	2.1
2-ketoisocapronate	0.45
2-keto-3-methylvalerate	0.9
2-keto-4-mercaptobutyrat	2.1

Article-no.:	1410
Form of delivery:	Suspension with 50% glycerine
Stability:	Stable at -20°C
Storage:	-20°C

Literature:

[1] Schütte H., Hummel W., Tsai H., Kula M.R.: Appl. Microbiol. Biotechnol., 22, 306 – 317 (1985)

[2] Kärst U., Schütte H., Baydoun H., Tsai H. Proc. 4th European Congress on Biotechnology, Vol.2 (1987)

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