

L-Phenylalanine Dehydrogenase

Phe-DH, EC 1.4.1.20

Description: Partially purified enzyme preparation for the oxidative deamination of L-phenylalanine or the enantioselective reductive amination of phenylpyruvate.

Reaction:
$$\text{L-phenylalanine} + \text{H}_2\text{O} + \text{NAD}^+ \xrightleftharpoons{\text{Phe-DH}} \text{phenylpyruvate} + \text{NH}_3 + \text{NADH}$$

Origin: *Rhodococcus spec.* strain M4

Application:

- synthesis of L-phenylalanine
- clinical diagnostics: monitoring of phenylketonury, determination of L-phenylalanine in blood and urine.

Molecular weight: 69 000 Da

Parameters of reaction:

a) pH-optima
9.3 for reductive amination of phenylpyruvate
10.7 for oxidative deamination of L-phenylalanine

b) temperature-optimum: 45°C

Activity: > 120 U/ml (substrate: L-phenylalanine, method: ASA Spezial-enzyme GmbH)

Specific activity: > 40 U/mg

Michaelis-M.-constants: for reductive amination:

$K_m = 0.08$ mM NADH

$K_m = 0.16$ mM phenylpyruvate

$K_m = 2.4$ mM p-hydroxyphenylpyruvate

$K_m = 7.7$ mM indolpyruvate

$K_m = 2,1$ mM 2-keto-4-methyl-mercaptobutyric acid

for oxidative deamination:

$K_m = 0.22$ mM NAD

$K_m = 0.75$ mM L-phenylalanine

$K_m = 4.3$ mM L-methionine

$K_m = 10.5$ mM L-tryptophane

Inhibitors: complete inhibition by p-mercuric benzioc acid and $HgCl_2$;
10-20% loss of activity by:

<i>Substance</i>	<i>Concentration for inhibition [mM]</i>
EDTA	1,0 - 10
1,10-phenanthroline	0,1 - 10
2,2-dipyridyl	0,1 - 10
2-mercaptoethanol	10
dithioerythritol	1,0
glutathione	10

Dithioerythritol in a concentration of 10 mM causes a loss of activity of 50%.

Order-No.: 1420

Form of delivery: yellow liquid stabilized by 50 % (w/w) glycerol

Storage: stable at -20°C

Stability: loss of activity < 5 % per year at -20°C

Literature: Hummel W., Weiss N., Kula M.-R.: *Arch. Microbiol.*,137, 47-52 (1984)