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Formate Dehydrogenase

rec. *E. coli*

Formate: NAD oxidoreductase

 **Version: 07**

Content Version: August 2022

Lyophilized

Cat. No. 10 244 678 001 80 U

Cat. No. 10 837 016 001 250 U

Store the product at +2 to +8°C.

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1. General Information

1.1. Contents

Vial / bottle	Label	Catalog number	Content
1	Formate Dehydrogenase	10 244 678 001	1 vial, 80 U
		10 837 016 001	1 vial, 250 U

1.2. Storage and Stability

Storage Conditions (Product)

When stored at +2 to +8°C, the product is stable through the expiry date printed on the label.

Vial / Bottle	Label	Storage
1	Formate Dehydrogenase	Store at +2 to +8°C. ⚠ Store dry. No detectable decrease in activity within 6 months.

1.3. Application

Formate Dehydrogenase is most widely used in cofactor recycling systems for NADH.

Product Description

Enzyme structure

Formate Dehydrogenase is a dimer of two identical subunits. The enzyme has a cysteine residue which is essential for activity or structural integrity.

2. How to Use this Product

2.1. Before you Begin

General Considerations

Additional information

- Some commercial preparations of NAD contain formate. To avoid formate interference, use only the pure lithium salt of NAD which contains no formate in formate and oxalate assays with Formate Dehydrogenase.
- The presence of formaldehyde (≥ 5 mg in assay cuvette) will retard the activity of Formate Dehydrogenase. Increase the assay time for determination of formate content in samples which contain significant formaldehyde.
- Reducing substances such as sulfur dioxide (≥ 10 mg in the assay cuvette) retard the activity of Formate Dehydrogenase. To remove SO_2 from the assay, add 10 ml of 30% H_2O_2 (for 3 ml reaction mixture) to the cuvette.
- The presence of ethanol in the sample causes a creep reaction (reaction fails to reach a clear end point) in the assay of formate. Formate Dehydrogenase contains low levels of alcohol dehydrogenase (ADH) which also utilizes NAD and will oxidize alcohol, leading to a slow increase in absorbance. To eliminate this interference during assay of alcohol-containing samples, add 3.4 mM pyrazole (ADH inhibitor) to the assay cuvette.

2.2. Parameters

Activator

No activators are needed.

Contaminants

<0.005% LDH and ADH each
<0.1% MDH

EC-Number

EC 1.2.1.2

Inhibition

- Cu^{2+} , Hg^{2+} and 4-chloromercuribenzoate are strong inhibitors.
- Azide (10 mM inhibits 99% of activity) and cyanate (50 mM, 76% inhibition), thiocyanate (1 mM, 50% inhibition), nitrite (1 mM, 5% inhibition), and nitrate (10 mM, 24% inhibition) are inactivators.
- Formaldehyde and reducing substances, such as sulfur dioxide will retard Formate Dehydrogenase activity.

Not inhibited by

1 mM concentrations of EDTA, citrate, 1,10-phenanthroline, iodoacetic acid, halogen ions, Ca^{2+} , Mg^{2+} , Zn^{2+} , Mn^{2+} , Cd^{2+} , Sn^{2+} , and ascorbic acid.

Molecular Weight

74 kDa

pH Optimum

pH 7.5 to 8.5

Specific Activity

Approximately 0.4 U/mg lyophilizate (3 U/mg protein) at +25°C with formate as the substrate.

Specificity

Substrate specificity

- Formate Dehydrogenase only reacts with formate and NAD.
- It does not react with acetate, oxalate, lactate, succinate, propionate, or ascorbate, nor will the enzyme reduce NADP.

K_m

Formate:

- $K_m = 13$ mM at +30°C and pH 7.5.
- $K_m = 11$ mM at +25°C and pH 7.5.

NAD:

- $K_m = 0.09$ mM at +30°C and pH 7.5.

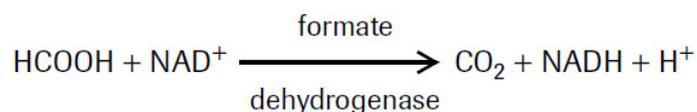
Unit Definition

One unit of Formate Dehydrogenase will oxidize 1 μ mol of formic acid to CO₂ in 1 minute at +25°C and pH 7.6.

3. Additional Information on this Product

3.1. Test Principle

The assay below produces 1 mmol of NADH per mmol of formate oxidized.



4. Supplementary Information

4.1. Conventions

To make information consistent and easier to read, the following text conventions and symbols are used in this document to highlight important information:

Text convention and symbols	
 <i>Information Note: Additional information about the current topic or procedure.</i>	
 Important Note: Information critical to the success of the current procedure or use of the product.	
   etc.	Stages in a process that usually occur in the order listed.
   etc.	Steps in a procedure that must be performed in the order listed.
* (Asterisk)	The Asterisk denotes a product available from Roche Diagnostics.

4.2. Changes to previous version

Product Name has been updated from the native origin *Formate Dehydrogenase from Candida boidinii* to the recombinant enzyme *Formate Dehydrogenase rec. E. coli*.
Editorial changes.

4.3. Trademarks

All product names and trademarks are the property of their respective owners.

4.4. License Disclaimer

For patent license limitations for individual products please refer to:
List of biochemical reagent products and select the corresponding product catalog.

4.5. Regulatory Disclaimer

For life science research only. Not for use in diagnostic procedures.

4.6. Safety Data Sheet

Please follow the instructions in the Safety Data Sheet (SDS).

4.7. Contact and Support

To ask questions, solve problems, suggest enhancements or report new applications, please visit our **Online Technical Support Site**.

To call, write, fax, or email us, visit **sigma-aldrich.com**, and select your home country. Country-specific contact information will be displayed

