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Certificate of Analysis

Product: YNaR: Recombinant Yeast (*Pichia Pastoris* NAD(P)H:Nitrate Reductase)

SKUs: YNaR-U#, YNaR-RPk

Lot #: YNaR- #####

CAS #: 9029-27-0

E.C. #: 1.7.1.2 (as of 2004; formerly number 1.6.6.2)

Specific Activity: 20 - 40 units/mg enzyme protein

Purity: Greater than 90%

Physical Form: Freeze-dried protein glass 50 mM MOPS, pH 7.0, 0.1 mM EDTA, sugar

Activity Supplied: 0.5-5.0 Units/vial

Active Temperature Range: Active at 2 – 30 °C

Storage Conditions & Shelf Life Information*

*Shelf life guaranteed if stored as directed below

| | -80°C | -20°C | 4°C | RT: 20°C – 25°C | Above 40°C |
|---------------------|----------|-----------|--------------|-----------------|-----------------|
| Freeze-Dried | 3+ Years | 2+ Years | 1+ Year | 6 months | Up to 1 week |
| In Solution* | 1+ Year | 6+ months | Up to 1 week | Not recommended | Not recommended |

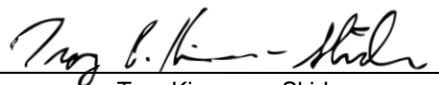
+ Enzyme provided with enzyme diluent working solution, contains 25% glycerol

Product Specifications

Immobilized Metal Affinity Chromatography (IMAC) purified yeast NAD(P)H: nitrate reductase expressed in the GRAS yeast *Pichia pastoris*. Purified to homogeneity by affinity chromatography^[1]. NaR catalyzes the NADH or NADPH dependent reduction of nitrate to nitrite. The product has been highly purified so that it does not contain any residual fermentation material other than the highly purified enzyme. The product does not contain ingredients of animal, plant or microbial origin other than that used in the fermentation process. Additives are reagent grade. No hazardous materials. Partially inhibited by the presence of Cl⁻ ion and complex organics (e.g. humic acids). End use is for analysis of nitrate in agricultural, environmental, industrial, biomedical, water or wastewater samples.

General Information:

- **MOPS:** 3-[N-Morpholino]propanesulfonic acid)
- **Unit definition:** 1 unit reduces 1.0 μmole of nitrate to nitrite per minute with NADH, pH 7.5, 30°C
- **Protein Units:** 25 - 50 micrograms of protein equals 1.0 U YNaR
- **Stability problems:** Thermal denaturation; pH extremes. Use standard precautions for proteins
- **Impurities & relative %'s:** High mw polymers of nitrate reductase, <5%; fragments of NaR
- **Additives & relative %'s:** 50 mM MOPS/ 0.1 mM EDTA, sugar > 99% of dry weight

Certified Analytical Grade by: 
 Troy Kinnunen-Skidmore

Title: Head of Production

Date: MM/DD/YYYY

[1] Modified method of Barbier, GG, RC Joshi, ER Campbell & WH Campbell (2004) *Protein Expression and Purification* 37: 61-71.