Enzymes for Analytical Chemistry

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Biotechnology Chemists Can Use
We’re Evolving

The Nitrate Elimination Company, Inc

Biotechnology Chemists Can Use
Collaborative Efforts to Improve Environmental Monitoring

Method Validation Across Disciplines:
Biotechnology for Green Analytical Chemistry

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NECi Superior Enzymes

- Since 1993, NECi has been pioneering green chemistry by implementing enzymes as “chemical” reagents
- Our claim to fame is Nitrate Reductase
- We’re now delving into other enzymes
- Current research is building upon years of recombinant protein expression and stringent quality control
Enzymes

From HE laundry detergent…
to nutraceuticals…
to analytical chemistry reagents?

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It’s a new generation

**Back Then**
- Parts per billion was an achievement
- Toxicity was part of the chemistry game
- Enzymes? Those are for animals…

**Now**
- Single molecule detection limits
- Lab safety is the name of the game
- Enzymes? Those are for analytical chemists!

*Biotechnology Chemists Can Use*
Enzymes for Analytical Chemistry

**Specificity** – False negatives and positives are rare

**Selectivity** – Finds target analyte in complex mixtures

**Sensitivity** – Low detection limits in a variety of samples

**Stability** – Ability to ship and store ambient

**Safety** – Handling and disposal is benign

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Nitrate Reductase

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Production

All of NECi's enzymes are manufactured in a yeast called Pichia pastoris.

A single 19 liter fermentation can yield anywhere from 1,000 to over 3,000 units of enzyme.

Recombinant Enzymes:

- Increased lot-to-lot reproducibility
- Increased production capacity
- Reasonable production costs
- Improved Stability
- Efficient production
- Tight quality control
Many Formats
Same Results

From the high-throughput laboratory to the field, analytical grade enzymes deliver equivalent results to chemists and novice users.
Cadmium vs. Nitrate Reductase

Line of equal correlation

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New Method Validation

- Change is hard, displacing tried-and-true proves more difficult than adopting completely new technologies.
- Enzymes were previously thought of as only being useful in biomedical or clinical laboratories.
- Advantages of enzymes in analytical chemistry applications are finally gaining attention from the laboratory community.
Now What?

Enzymes for quantifying glycerol in biodiesel, galactose in complex mixtures, alcohol for on-site gas and beverage testing, phosphate levels in the fields, and a handheld spectrophotometer to analyze it all.

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