

# Parameter estimation for models of ligninolytic and cellulolytic enzyme kinetics

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## Objective

- Provide well-documented enzymatic parameters for application in enzyme-driven soil organic carbon (SOC) decomposition models by compiling a database of kinetic parameters for typical ligninases and cellulases through a literature search and data synthesis.

## New Science

- The maximum specific enzyme activity ( $V_{max}$ ) was log-normal distributed, with no significant difference in  $V_{max}$  exhibited between enzymes originating from bacteria or fungi.
- Ligninases had higher activation energy ( $Ea$ ) and lower optimum pH ( $pH_{opt}$ ). An increase or decrease of 1.1–1.7 pH units from  $pH_{opt}$  would reduce  $V_{max}$  by 50%.
- $V_{max}$  from lab measurements with purified enzymes were 1–2 orders of magnitude higher than those under field conditions.

## Significance

- The developed kinetic parameters add to our understanding of key ligninolytic and cellulolytic enzyme kinetics essential for modeling the decomposition of plant litter and soil organic matter.

