

Investigations into the Mechanism of Hydroxyethylphosphonate Dioxygenase

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Phosphinothricin tripeptide (PTT) is the active ingredient in a variety of commercially important herbicides including Liberty and Ignite. Reexamination of the PTT biosynthetic pathway revealed a biochemically unprecedented transformation, namely the conversion of 2-hydroxyethylphosphonate (2-HEP) to hydroxymethylphosphonate (HMP) by hydroxyethylphosphonate dioxygenase (HEPD). Characterization of HEPD led to the discovery that its only requirements for catalysis were Fe(II) and O₂; unexpectedly, no external source of electrons was required. Recent studies have focused on a variety of techniques, including site-directed mutagenesis and Mössbauer spectroscopy, to tease out the details of this unusual reaction.

