

## COVALENT IMMOBILIZATION OF HORSERADISH PEROXIDASE ON BIO-LINKED MAGNETITE NANOPARTICLES

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### Abstract

*Enzymes, such as peroxidases, are “green” catalysts used in various environmental processes. Enzymes can be used in free form or immobilized on a solid support such as metal oxides, carbon and composite materials. The appropriate choice of carrier can significantly improve the properties of the enzyme, increase its stability and enable its reuse in multiple cycles.*

*In this work, the suitability of bio-linked magnetite particles as a solid support for the immobilization of horseradish peroxidase was investigated. The magnetite particles were synthesized by the co-precipitation method in the presence of subcritical water extracts from tangerine peels. The extraction was carried out at 140 °C and autogenous pressure for 10 minutes. The synthesized bio-linked magnetite particles were used as carriers for the immobilization of peroxidase over glutaraldehyde. First, the magnetite particles were modified by mixing with 1% glutaraldehyde for 6 hours to attach functional groups suitable for covalent binding of the enzyme to the surface of the magnetite. Subsequently, the commercial horseradish peroxidase was covalently bound to the modified magnetite particles via aldehyde groups. The resulting biocatalyst showed high enzymatic activity (65 U/g). The biocatalyst retains its high activity in the pH range of 6-8 and in the temperature range 40-60°C. It can be concluded that the synthesized biocatalyst has the potential to be used in various environmental applications.*

**Keywords:** Biocatalyst, Magnetite particles, Biofunctionalization, Enzyme activity.

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