

Unveiling the Veiled Potential: Investigating Biohydrogen Production from Biomass via Dark Fermentation

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Abstract. The relevance of hydrogen in the power, chemical, and petrochemical sectors continues to expand steadily. Although hydrogen is primarily produced via thermal cracking of petroleum or natural gas fractions or steam reforming, there is ongoing development of efficient techniques for generating hydrogen from sustainable origins, such as waste materials. Biohydrogen is seen as a promising energy source with low carbon emissions due to its high energy density. Research into emerging technologies, such as dark fermentation aims to improve efficiency and competitiveness in hydrogen production. The paper delves into alternative approaches for hydrogen production, focusing specifically on dark fermentation. The review consolidates crucial data concerning bacterial strains utilized for producing hydrogen from waste materials in lignocellulosic biomass and agroindustry. The review discusses how factors like the type of raw material, pH level, hydrogen partial pressure, inoculum preparation method, processing method, hydraulic retention time, substrate concentration, reactor type, and temperature and operation parameters influence the yield of dark fermentation. The review intends to provide an overview of the current understanding of dark fermentation processes that utilize waste materials as substrates.

Keywords: Biohydrogen, Dark Fermentation, Biomass, Hydrogen Production.
