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## **Biohydrogen production by dark fermentation : Current trends and main scientific challenges**

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The degradation of our natural environment and energy crisis are two vital issues for sustainable development worldwide. In this context, the production of bioenergy from lignocellulosic biomass or urban residues is receiving ever-increasing interest. Among the different processes, biohydrogen production by dark fermentation presents considerable advantages since bioH<sub>2</sub> is renewable, carbon free and environmental friendly. An overview of the literature shows a worldwide interest of the scientific community to propose new ways of carbon-free biological processes having a low energy demand. In particular, biohydrogen production from agricultural waste is very advantageous since agri-wastes are abundant, cheap, renewable and highly biodegradable. However, biological conversion to biohydrogen is often limited by the accessibility of readily degradable sugars that are embedded in the lignin network. Considering that such wastes are complex substrates and can be degraded biologically by complex microbial ecosystems, the current trends and recent findings in biotechnological development are here presented, with a special focus on the key operational parameters such as pH, partial pressure, temperature and microbial actors. Finally, the main scientific challenges are exposed and discussed to facilitate further research in this domain.

**KEYWORDS:** Biohydrogen, dark fermentation, biogas, hydrogen, methane, physicochemical treatment, operational parameters