

# Microbial conversion of syngas to single cell protein using hydrogen-oxidizing bacteria: the role of carbon monoxide

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Syngas is a renewable gas including CO, H<sub>2</sub> and CO<sub>2</sub> has been widely utilized as substrate for microbial processes to produce various products. Nevertheless, its applicability for single cell protein (SCP) production by hydrogen-oxidizing bacteria (HOB) has never been explored. This study first investigated the effect of different CO content on *Cupriavidus necator* H16 growth and SCP production during the process using H<sub>2</sub> as the energy source for CO<sub>2</sub> fixation. The growth of H16 was significantly restrained with the increase of CO partial pressure and almost completely ceased once the H<sub>2</sub>/CO ratios were above 1. In addition, the influences of shaking frequency, inoculum size and gas-liquid ratio on H16 performance were also explored. The raw protein contents were around 50-60% regardless of CO concentration, and the amino acid profiles had no apparent differences. The results showed that although the presence of CO reduced the growth rate of H16, it has a limited effect on the SCP quality. H<sub>2</sub> and CO<sub>2</sub> in syngas were the primary substrates for SCP production, while CO served more as a toxic inhibitor.

**Keywords:** Syngas; Hydrogen-oxidizing bacteria; Carbon dioxide fixation; Single cell protein; Carbon monoxide