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1-21: The effect of heat pretreatment on the analysis of bacterial community for fermentative hydrogen production

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Hydrogen production by dark fermentation has been demonstrated as a viable approach in converting organic compounds into H_2. Enrichment by heat treatment of inocula eliminates non-spore forming hydrogen consuming microorganisms and initiates spore germination in *Clostridia*, which are known as one of the key hydrogen producers. Usually mixtures of products are produced by *Clostridia* and the available hydrogen from glucose is determined by acetate/butyrate ratio. Thus, the objectives of this work were to investigate the effect of heat pretreatment on microbial community, intermediate metabolites and hydrogen production, and the expression of genes related to hydrogen synthesis. The anaerobic sludge was obtained from a municipal sewage treatment plant (Rio de Janeiro, Brazil). The sludge was heated at 100ºC for 1 hour to inhibit methanogenic activity. The solution in the fermentor was composed of heat-treated anaerobic sludge or "in natura" sludge, sucrose and micronutrients. The pH was 5.5, which was reported to be optimum for H_2 production. The fermentors were operated at temperature of 35ºC and 100rpm of agitation. The H_2 was analyzed by gas chromatography and soluble metabolites (acetic, propionic, butyric and iso-butyric acids) by high-performance liquid chromatography. The microbial community was determined by anaerobic bacterias counting and PCR using 16SrRNA primers, confirming that pre treatment is efficient to select the hydrogenic bacteria. The expression of the hydrogenase gene (Hg), showed the relationship between microbial selection and hydrogen production, as the pretreated sample had a higher acetate/butyrate ratio compared with the in nature sample, and presented higher hydrogen production.

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