NEW SOURCE AND OPTIMIZED CONDITIONS FOR HYDROGEN PRODUCTION BY *RHODOBACTER SPHAEROIDES* DURING PHOTO-FERMENTATION

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Photosynthetic bacteria are often presented as perspective organisms for the biohydrogen (H_2) production [1]. Purple non-sulfur bacteria *Rhodobacter sphaeroides*, isolated from Arzni (sodium-chloride type with pH 6.3–6.6) and Jermuk (sulphate-chloride type with pH 5.9–7.6) mineral springs in Armenian mountains [2], can produce H_2 in various conditions upon illumination. H_2 production by *R. sphaeroides* during "photo-fermentation" depends on different factors. of carbon (succinate, malate) and nitrogen (various amino acids, yeast extract) sources Yeast extract enhanced ~6 fold H_2 production (compared to glutamate) [3]. Various metal ions such as Fe^{2+}, Mo^{6+} and Mg^{2+} had stimulating effect on H_2 production and F_OF_1-ATPase activity [4]. Regulations of H_2 production by external reducers and oxidizers and light-dark duration alternations have been also shown [5,6]. To develop biotechnology enhancing H_2 production cheap source and optimized conditions are of significance.

Using ethanol fermentation waste, distillers grains (DG), for H_2 production has the advantages of recycling wastes and protecting environment. H_2 production by pure and co-cultures of photo- (*R. sphaeroides*) and dark-fermentative (*Escherichia coli*) bacteria using DG has been investigated. During growth on diluted DG media at pH 7.0 H_2 production by pure and co-cultures was started at 24 h growth, whereas H_2 production by *R. sphaeroides* cells, grown on Ormerod medium, was detected after 48 h. Moreover, the co-culture has produced significantly more (~2-3-folds) H_2 from 2-5-folds diluted DG during 96 h growth compared with pure culture. This could be related with formation of reductive power and ATP synthesis during photo-fermentation [5,6]. The results obtained indicate that DG can be used as effective and valuable substrate in H_2 production by *R. sphaeroides* and other bacteria.

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