

**HYDROGEN EVOLUTION THROUGH COUPLING OF  
HYDROGENASE WITH OXIDATIVE PENTOSE PHOSPHATE CYCLE  
ENZYMES – MESOPHILIC VS. THERMOPHILIC**

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The maximum yield of hydrogen from glucose using only the oxidative portion of the pentose phosphate pathway (two moles per mole of glucose 6-phosphate) has been achieved using mesophilic sources of these enzymes in conjunction with a hyperthermophilic hydrogenase at 40°C. Additional monitoring of CO<sub>2</sub> evolution confirmed the stoichiometry of H<sub>2</sub> to CO<sub>2</sub> to be 2:1. Preliminary results indicate that the kinetic properties of the pathway are different compared to the properties of the individual components.

The hyperthermophilic counterpart is being established using enzymes isolated from the Archaeon *Sulfolobus solfataricus*. 6-Phosphogluconate dehydrogenase has been partially purified and determined to have the following N-terminal sequence :  
MKIGLIGLGIMGYRIAANLAKANKLNLVYDRTQE?IE(R). Degenerate primers were designed within the N-terminal sequence and a highly conserved region downstream to produce a 150-200bp PCR fragment for use in hybridization experiments. Sequencing of the hybridized clone is also hoped to reveal a glucose 6-phosphate dehydrogenase in its flanking regions.