# Biological hydrogen production by *Escherichia coli*

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Biological hydrogen production research has been carried out as a means of solving energy and environmental problems concurrently for over quarter century. Among the various approaches, biological hydrogen production by dark-fermentation has been rapidly researched in recent times[1]. Dark-fermentation is a process of hydrogen and organic acids production through fermentation a substrate like glucose in anaerobic and dark condition by some anaerobic bacteria. Above all, the most important thing in the dark-fermentation is to maintain anaerobic condition. This problem can be solved by sparging N2 gas to remove O2 gas in the reactor. We performed study about hydrogen production mechanism, separation and analysis method.

There are many fermentative bacteria, but widely used and well-known coli-form, *Escherichia coli* is suitable for this experiment. The fermentation products of *Escherichia coli* comprise a mixture of ethanol ,acetate, formate, lactate and succinate[1].Especially, we concentrated on formate. Formate is anaerobically decomposed to molecular hydrogen and carbon dioxide by *Escherichia coli* according to the equation : $HCOOH \rightarrow CO_2 + H_2$ .This decomposition is done by a multi-enzyme system(formate hydrogenlyase, FHL) containing formate dehydrogenase(FDH) and hydrogenase. Studies identified an absolute requirement of selenium and molybdenium for the synthesis of active formate dehydrogenase(FDH) and hydrogen gas production by *Escherichia coli*[2,3]. And fermentative hydrogen production can be maximizing through an active hydrogenase.[4] This study was aimed at investigating the effect of Mo, Se and Fe on the activity of FDH and Hydrogen production rate for dark fermentation.

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## References

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