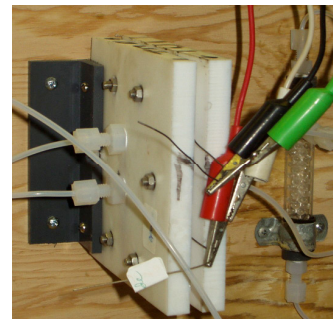


ELECTROLYSIS OF UREA USING GEL ELECTROLYTE

TECHNOLOGY OVERVIEW

Urea is a major constituent of human and animal waste. It causes nitrate contamination in the ground and in the sources of drinking water. The technology is a process of removal of urea from wastewater by its electrolysis in an alkali medium. It is a highly cost effective technique as it uses a low cost gel electrolyte as contrasted with the previous techniques that used potassium hydroxide (KOH). The process denitrifies the wastewater along with simultaneously producing hydrogen and ammonia. The effects are further enhanced using an inexpensive nickel catalyst. The gel electrolyte was proven to have high conductivity and a performance comparable to the KOH electrolyte. Previous techniques of urea electrolysis used platinum electrodes and were shown to be ineffective in terms of commercial widespread applications. The adjoining diagram is an ammonia electrolytic cell.



POTENTIAL FIELDS OF USE

The most important application for the technology is being planned in the area of mobile energy production. The technology is the only available process that is capable of direct conversion of urine into hydrogen and ammonia. It can be efficiently used to create energy from human excreta in mobile units such as military camps. Currently, each of the 200 plus US domestic military camps spends more than \$7 million on energy. Also, conventional sewage remediation techniques cause the release of several million tonnes of green house gases in the atmosphere on an annual basis. The technology would provide an eco-friendly mechanism for these units to drastically reduce their energy spending, in addition to making them self-reliant in terms of energy production.

BENEFIT ANALYSIS

The technology has several benefits over other processes currently in use:

- Low temperature, low cost and low power consuming process that is able to manufacture energy.
- Eliminates the release of green house gases in the atmosphere unlike other sewage treatment processes.
- Eliminates safety concerns of the urea electrolysis process associated with using KOH as the electrolyte.
- Efficient storage of released hydrogen in fuel cells, providing a better alternative to using diesel generators.
- Feasibility of operation of the ammonia electrolyte cell using any renewable source of energy.

STAGE OF DEVELOPMENT

The electrolysis of urea has been performed at different temperatures and different electrolyte concentrations to test its operational suitability. An electrolytic cell was constructed to compare urea electrolysis in aqueous KOH with each gel electrolyte system. Gaseous products were analyzed using gas chromatography. The gel displayed a current response similar to that of the traditional aqueous alkaline cell, indicating feasibility of this technology.

FUTURE DEVELOPMENT

The technology stands at an advanced stage of development. The economic feasibility of the process for distributed power production has already been demonstrated. Future efforts will be concentrated towards increasing the efficiency of the process, and constructing a larger scale prototype of the technology to accurately compute its operational costs.

LICENSING OPPORTUNITIES

A patent for the technology is pending. Licensing opportunities are available.

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