Treatment of Fuel Process Wastewater Using Fuel Cells

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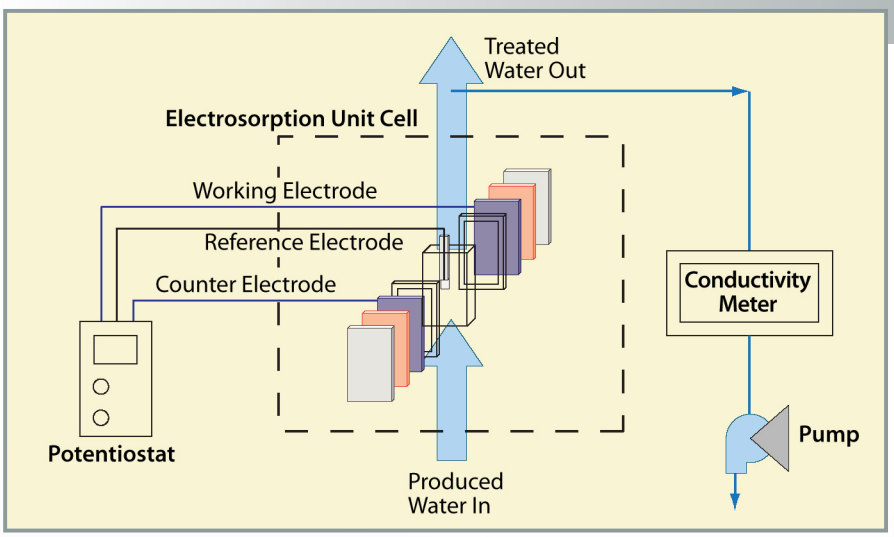

Technology Summary

ORNL researchers invented a method using microbial fuel cells for cleansing fuel processing water of hydrocarbon by-products and metal salts. This cost efficient method can be used on-site, so that water does not need to be transported to a treatment facility. It also permits fuel processing water to be safely discharged into the environment or used for other purposes.

Oil and natural gas drilling operations use copious amounts of water. Due to the presence of significant levels of petroleum by-products and metal salts, water from drilling operations is unfit for discharge into the environment or for reuse. Currently, no practical technologies exist for cleansing this water, so it is typically accumulated near the rigging operation, stored in underground wells, or transported to a treatment facility.

The invention involves contacting the processing water with an anode of a microbial fuel cell. The anode contains microbes that oxidatively degrade one or more of the carbonaceous compounds, while producing electrical energy from the oxidative degradation. This energy is then directed to drive an electrosorption unit designed to reduce the concentration of one or more inorganic salts in the process water.

Advantages

- Permits on-site treatment
- Allows fuel processing waters to be safely discharged or reused
- Reduces costs associated with process water disposal
- Generates electricity that can be used to power ancillary equipment

Potential Applications

- Cleansing of fuel processing effluent
- Treatment of wastewater that contains hydrocarbon compounds and/or metal salts
- Electricity generation for powering ancillary field equipment

Patent

Abhijeet P. Borole and Constantino Tsouris, *Microbial Fuel Cell Treatment of Fuel Process Wastewater,* U.S. Patent Application 12/366,709, filed Feb 6, 2009.

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