THE EFFECTS OF PHW:

Post hydrothermal liquefaction wastewater, also known as PHW, is a byproduct of the process of transforming wet biomass into biocrude oil. This process is being utilized worldwide in order to create transportation biofuel without the need of fossil fuels.

MY SOLUTION:
Treat the post hydrothermal liquefaction waste water which is rich in organic nitrogen, but also contains heavy metals such as arsenic. This water will be treated utilizing biomass and bacteria in order to eradicate the toxic components as well as converting the organic nitrogen into inorganic nitrogen, more specifically ammonium and nitrate. This water will then be recycled as a fertilizer in hydroponic systems for lettuce.
I assisted a master’s student here at the University of Illinois at Urbana Champaign in researching
the functionality of the fungi, Trametes versicolor, in 5% PHW. The thesis that this fungi can release
enzymes in order to convert organic nitrogen into inorganic nitrogen as well as deplete the toxicity
from the PHW was defended and approved.

I have received support from Dr. Paul Davidson to implement my own research this semester in
which I combine various methodologies from published papers. The difference in this proposed
action is that I intertwine different strategies to treat PHW to produce the most optimal fertilizer. This
proposal will improve aquatic life and society in the aspect of well-being and economy.

Treating PHW with this method will support the bio
economy which will qualify stem job opportunities in
rural America for positions like chemists and engineers
and lead to economic development. This will also support
a circular economy which keeps resources in use longer
and minimizes waste. New market opportunities will also
develop for agricultural commodities.

Utilizing PHW in hydroponic systems will reduce waste generation through recycling
and reuse. Diminishing the toxic environment of the PHW will also reduce chemical waste,
minimizing the adverse impacts on aquatic and human health.

Utilizing fungi as the main source of treatment will provide an alternative
dependency on fossil fuels that lead to serious environmental problems, including
the decimation of forests. It is also known that fossil fuels are the main factor in
worsening global warming.

Terminating the addition of PHW into
ponds, lakes, oceans, etc. will improve the
sustainability for aquatic life by not
allowing the addition of harmful chemicals
into the water environment. Recycling this
water will help prevent the deaths of
aquatic life due to chemical pollution.
The fermenter will contain 5% PHW and the main media will consist of potato dextrose agar. The conditions in the fermenter must be sterile and kept at 28°C with an agitator set at 135 RPM.

A DSM stainless steel filter will be used to separate the PHW from the fungi.

The fungi that is separated will be reinoculated into the fermenter.

This process would be implemented in a power plant and will consist of a continuous process. The resources required are finances, engineers, and technology. The main obstacle in the solution will be the need for financial funding, however, as many of the resources required in this process are recyclable, financial profits are probable.

REFERENCES:


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