

PROCESS FOR REMOVING TOXIC AROMATICS FROM WATER



This invention is an efficient continuous-flow process from removing toxic aromatics (benzene, toluene, xylene, etc.) from water.

INVENTION

A process of removing aromatic hydrocarbons from contaminated fluids. The contaminated fluid will pass through a pipeline filled with carbon nanotubes (CNT) and exposed to LED-UV (Light-Emitting Diode Ultra-Violet) light. While the CNT will work as an adsorbent, the LED-UV light will help degrading the toxic hydrocarbons and break them down into more environmentally-friendly molecules. Contaminant's removal efficiency reaches up to 99.9%.

MARKET NEED

The global water and wastewater treatment technologies market had an estimated value of USD 5,342.73 million in 2017 and is expected to grow at a CAGR of 9.00% during the forecast period (2018-2023). The major factors driving the market are the rapidly diminishing freshwater resources and the increasing demand from the shale gas exploration activities. [Source: [Link](#)]

With this increasing demand in future, more efficient water treatment equipment and processes are highly in need. Removal of aromatic pollutants from water and wastewater is still a challenge that faces today's global industry. [Source: [Link](#)].

Long term exposure to aromatics can cause serious developmental defects and damage the central nervous and reproductive system in human beings. This process gives an efficient way of removing single ring aromatics from effluents and wastewater.

APPLICATIONS

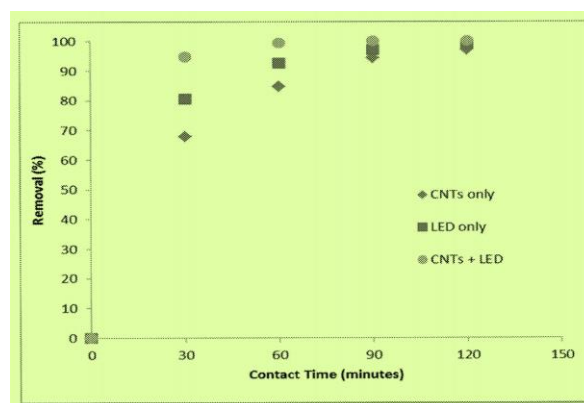
The main application of this process is the removal of aromatic compounds from contaminated fluids. The targeted Aromatics compound are benzene, toluene, ethylbenzene and xylene isomers (ortho, para, meta). This process can be applied for any kind of aqueous effluents that come from industrial plants. This includes petrochemical industries, pharmaceutical plants, textile industry effluents and wastewater plants.

ADVANTAGES

- It can be used for treating different types of fluids: Refinery industry effluents, chemical industry effluents, wastewater, ground and river water.
- It can be applied as both Batch process and continuous process as Fixed-Bed reactor.
- It includes CNT and UV light (LED). The combination of carbon nanotubes and Light Emitted Diode UV gives a removal efficiency as high as 99%.

PROJECT STATUS

Currently, all lab testing and validation was performed successfully, and the results are promising. Figure below shows results of removing aromatics from water effluent using CNT and then comparison with CNT/UV-LED. Removal up to 99.9% was achieved.



LOOKING FOR A DEVELOPMENT PARTNER

We are looking for experienced industrial partner to license or join us in a development project to validate the followings:

1. Develop a pilot plant for the whole setup.
2. Conduct experiments for very low concentrations (ppm) and test adsorption capacity for CNT/UV.
3. Study and enhance operating parameters such as CNT loading and contact time.
4. Conduct techno-economic analysis for the process and compare it with existing technologies.

PATENT PROTECTION

The inventions are covered by patents US9981863 and US10399866 owned by King Fahd University of Petroleum and Minerals (KFUPM).

ABOUT KFUPM

King Fahd University of Petroleum & Minerals, located in Saudi Arabia, is a leading educational organization for science and technology. KFUPM Innovation & Technology Transfer office is tasked with taking innovation from lab to market place.

For further information please contact:
Email: IP-License@kfupm.edu.sa