



Treatment of (MTBE) Vapors In Biotrickling Filter Reactor Startup, Performance, and Culture Characteristics

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Overview

A study was conducted at the university and funded by the U.S. EPA to find solutions to remove MTBE from ground water from leaking of underground fuel tanks. **BAE** manufactured by Prodex was added to measure microbial growth and activity.

Introduction

MTBE was introduced as an octane enhancer in gasoline and increased rapidly after the Clean Air Act. As a result became the second ranked chemical sold. Over time fuel tanks began to leak causing groundwater contaminations. This prompted the EPA to find cost effective solutions to prevent MTBE contamination of drinking water supplies.

Materials and Methods

Two parallel laboratory scale bio-trickling filters were constructed and served both culture enrichment and to investigate the removal of MTBE from synthetic waste gas.

Reactor-1: Wet lava rock

Reactor-2: Polypropylene pall rings.

MTBE was continuously pumped into the reactors and circulated through both of the media. **BAE** was added to each reactor at a rate of 0.25 mg/l.

Performance Reporting

Performance was measured by removal efficiency as a function of the inlet and outlet gas concentrations, air flow rates and the packed bed volume.

Elimination capacity represents the amount of MTBE degraded per unit of trickling filter bed volume and the time being reported as a function of pollutant loading.

Inoculum

Groundwater samples and aquifer material from two long-term MTBE contaminated sites were mixed and introduced in both reactors. The first sample was from Canada and second sample from Southern California.

Culture Enrichment and Culture Characteristics

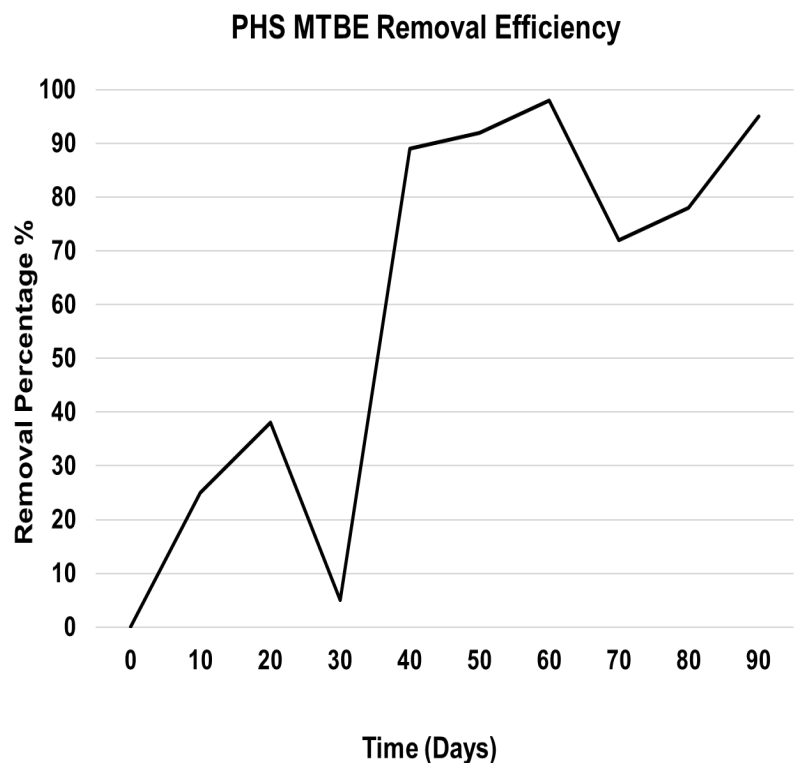
After inoculation of both reactors with contaminated soil and groundwater, various attempts were made to shorten the startup phase. The culture consisted of at least six Gram positive and negative bacteria, bacilli and cocci, fungi, protozoa, and rotifers.

PHS Added To The Systems

On day 33, 0.25mg/L of **BAE** were added to both of the reactors

Removal efficiency increased after 25 days for lava rocks and 35 days for polypropylene pall rings.

Performance reached a relatively steady value at 95% removal after 40-days for the pall ring reactor and after 52-days for the lava rock reactor.



Conclusion

BAE had a beneficial effect on the systems reactors. The concentration at which **BAE** had an effect, can rule out any co-metabolic process. **BAE** can form complexes with growth limiting substrates and improve their assimilation. This suggests that the main effect of **BAE** helps the initial colonization.

