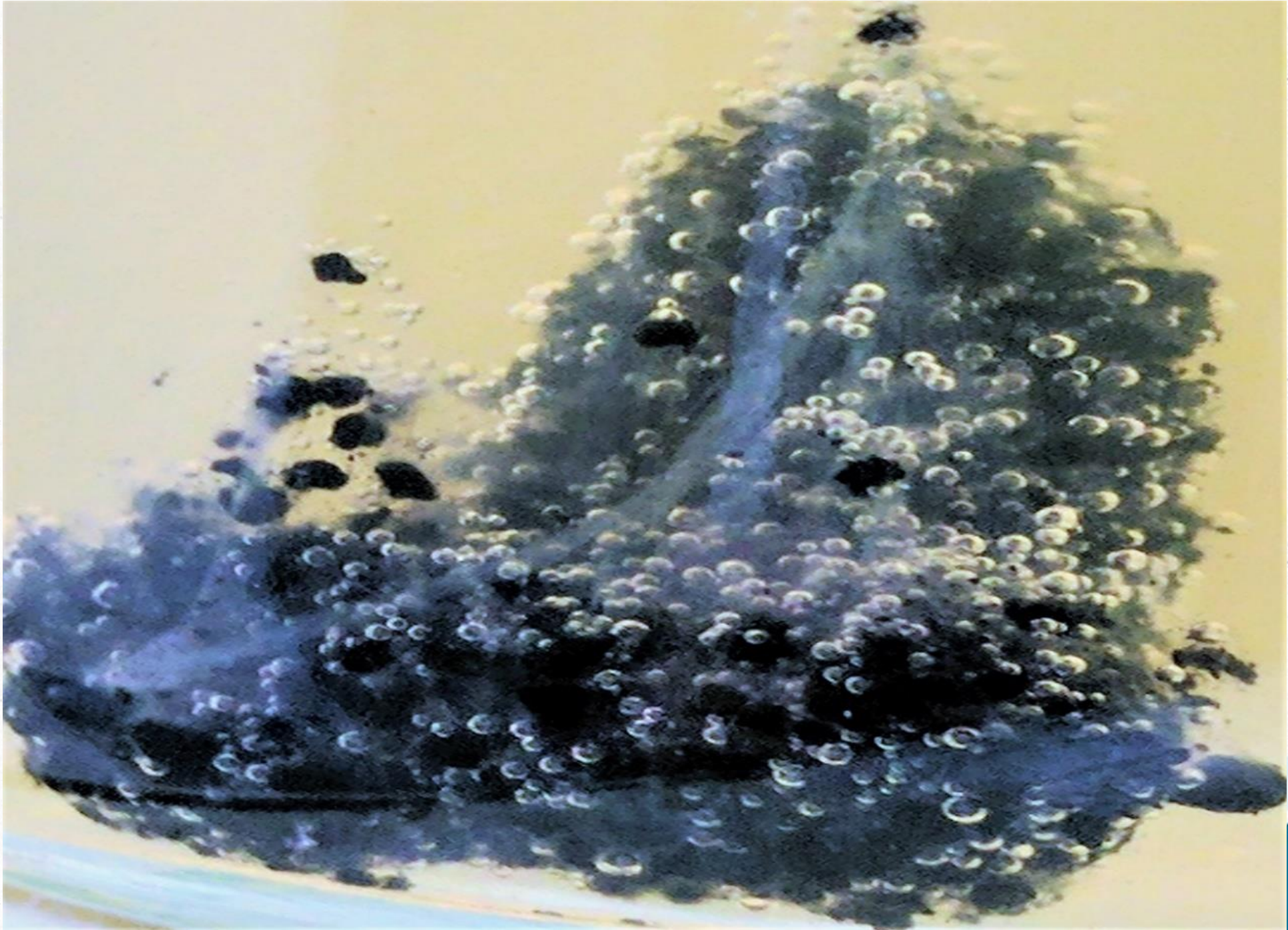




# LNAPL, R&D







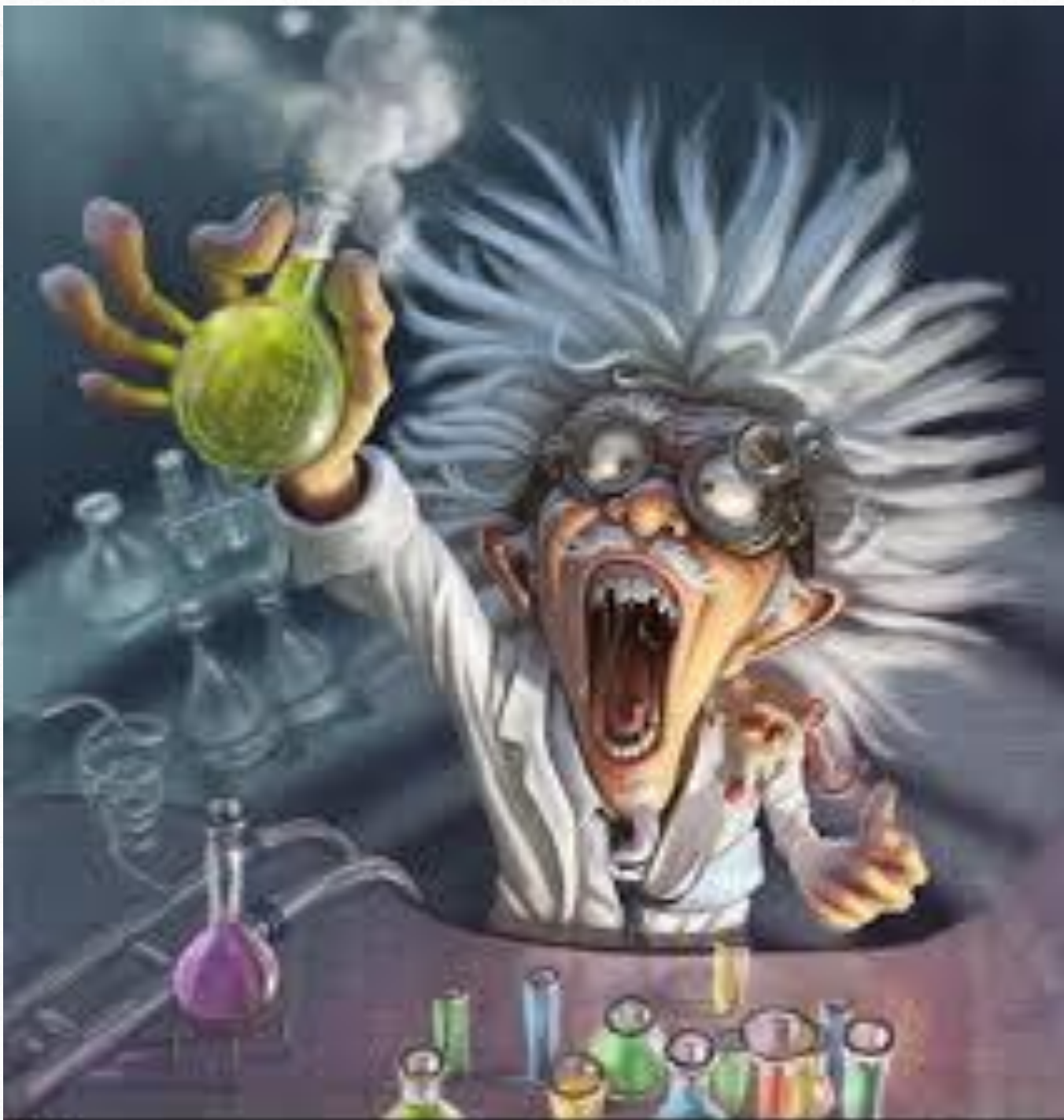
# LNAPL – A FOUR LETTER WORD

- Can Activated Carbon Offer a Solution?

# ACTIVATED CARBON

- Simple Phase Change
- Not Bioavailable – the bugs are too big
- Bio-regeneration not viable
- You Can't Put Enough In the Ground





A Typical Eureka Moment  
in the lab

Diesel Fuel LNAPL  
Bench Test

# Saturation Adsorption Capacity

- 1 liter bottles – add water and carbon – mixed 2 days.
- Excess Diesel fuel added – mixed for several days.
- Allowed to stand for phase separation.
- Carbon settled to bottom – excess Diesel siphoned and wicked with paper towels.
- Vacuum Filtered to isolate Carbon.
- Carbon Washed on filter with cold Methanol to remove surface contamination.
- Dried in Desiccator and stored in amber glass.



# Analysis Showed

- RPI Activated Carbon - 58 wt% Diesel
- Each gram contained – 0.61 gms carbon and 0.35 gms Diesel
- Wood Based Carbon – 29 wt% Diesel
- Each gram contained 0.35 gms carbon and 0.1 gms Diesel





Fig 5

### Mass Diesel Fuel Remaining (mg) (Activated Carbon + RPI Culture)

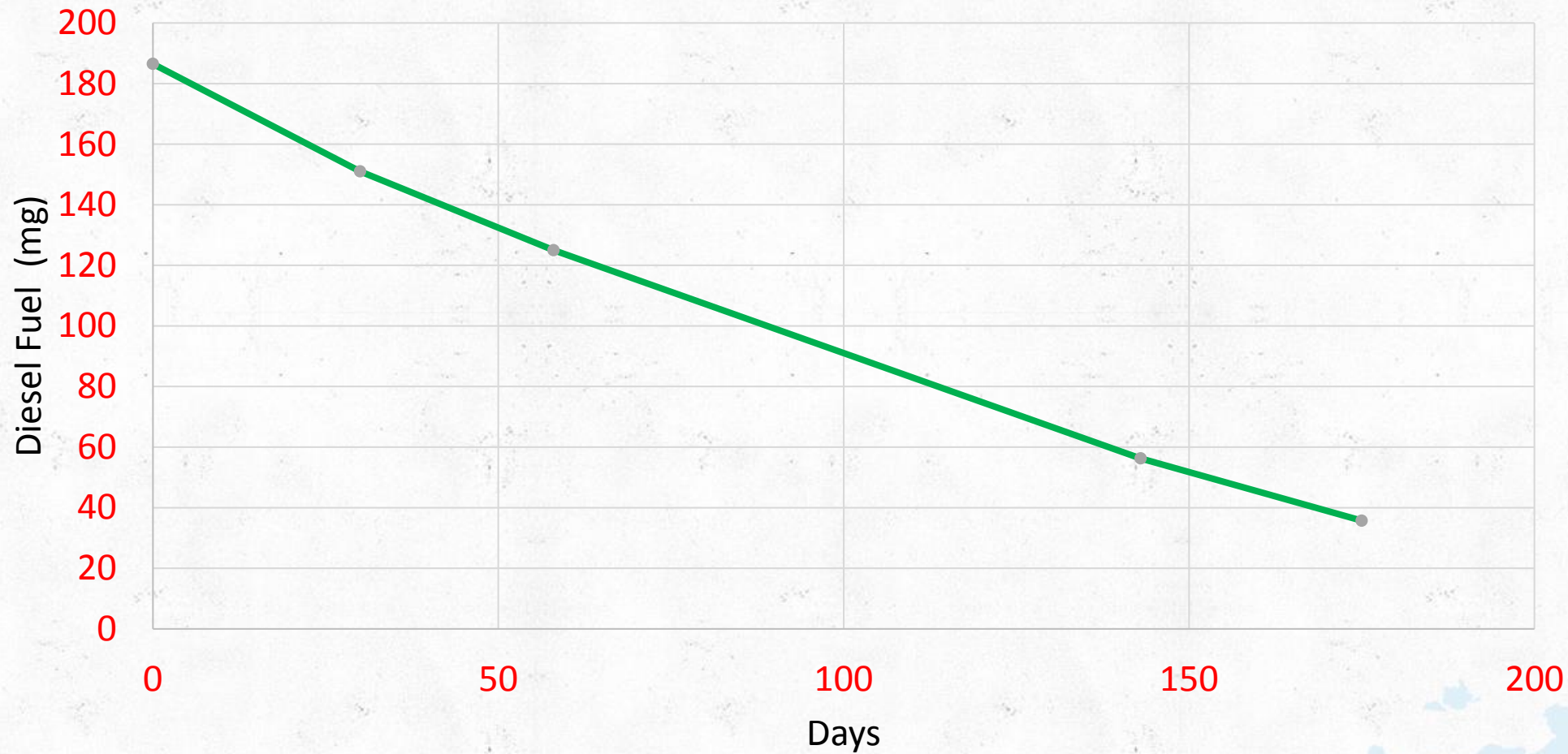


Fig 6

### Benzene, Hexane & TVPH Degradation (Activated Carbon + Nitrate)

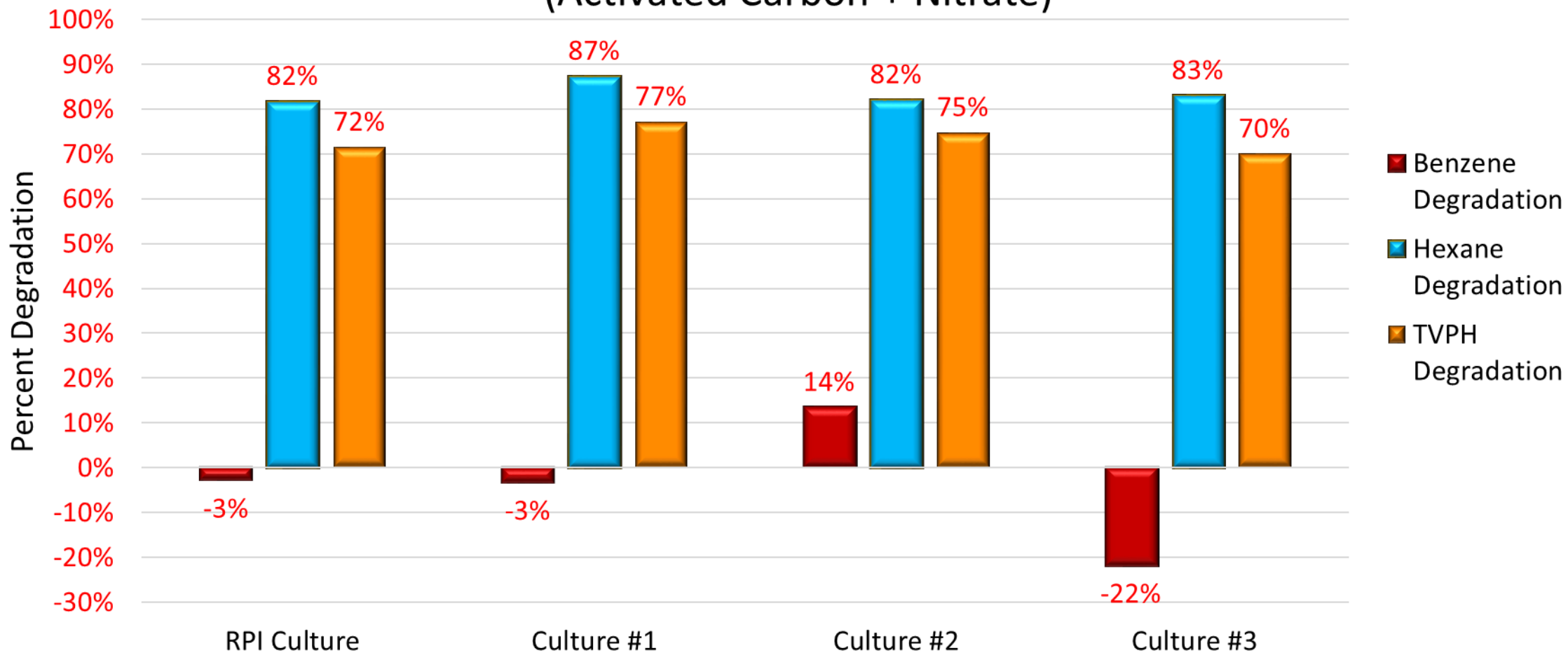




Fig 7

### Benzene, Hexane & TVPH Degradation (Activated Carbon + Nitrate + Sulfate)

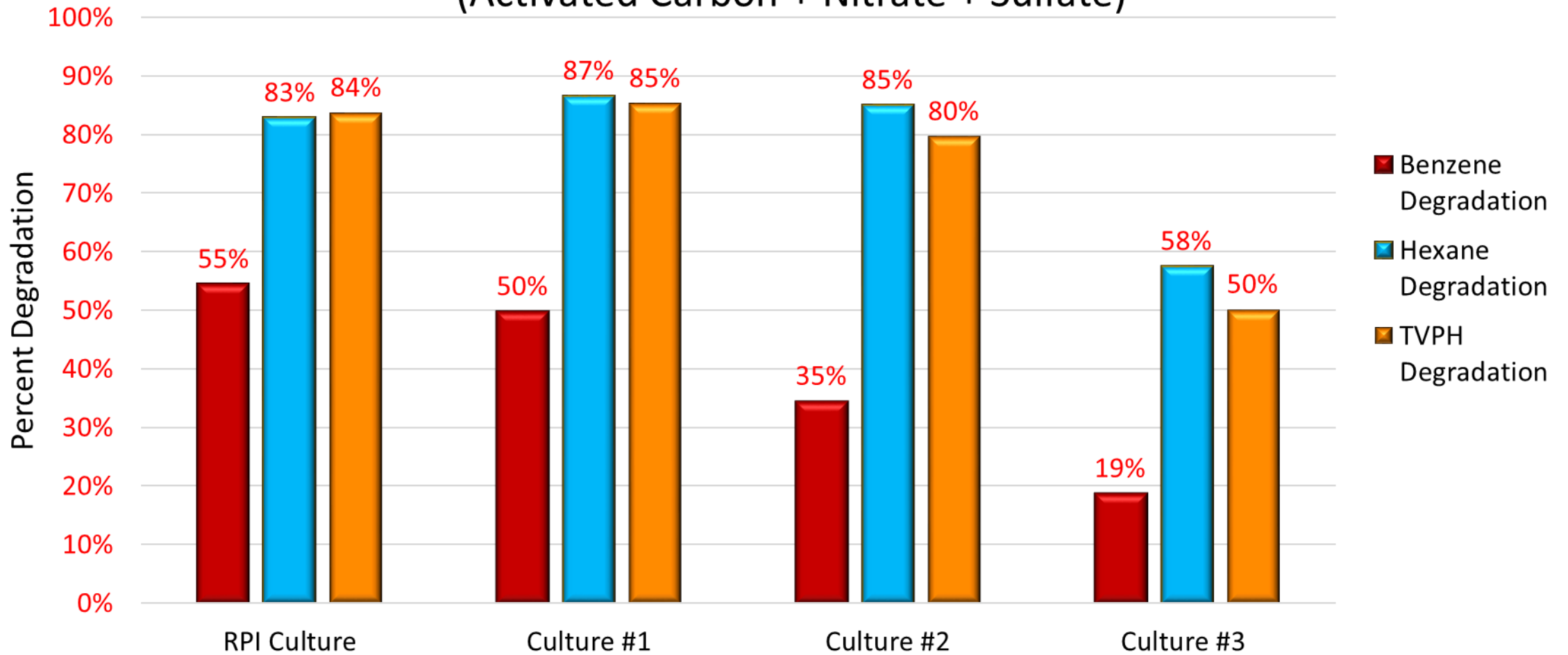
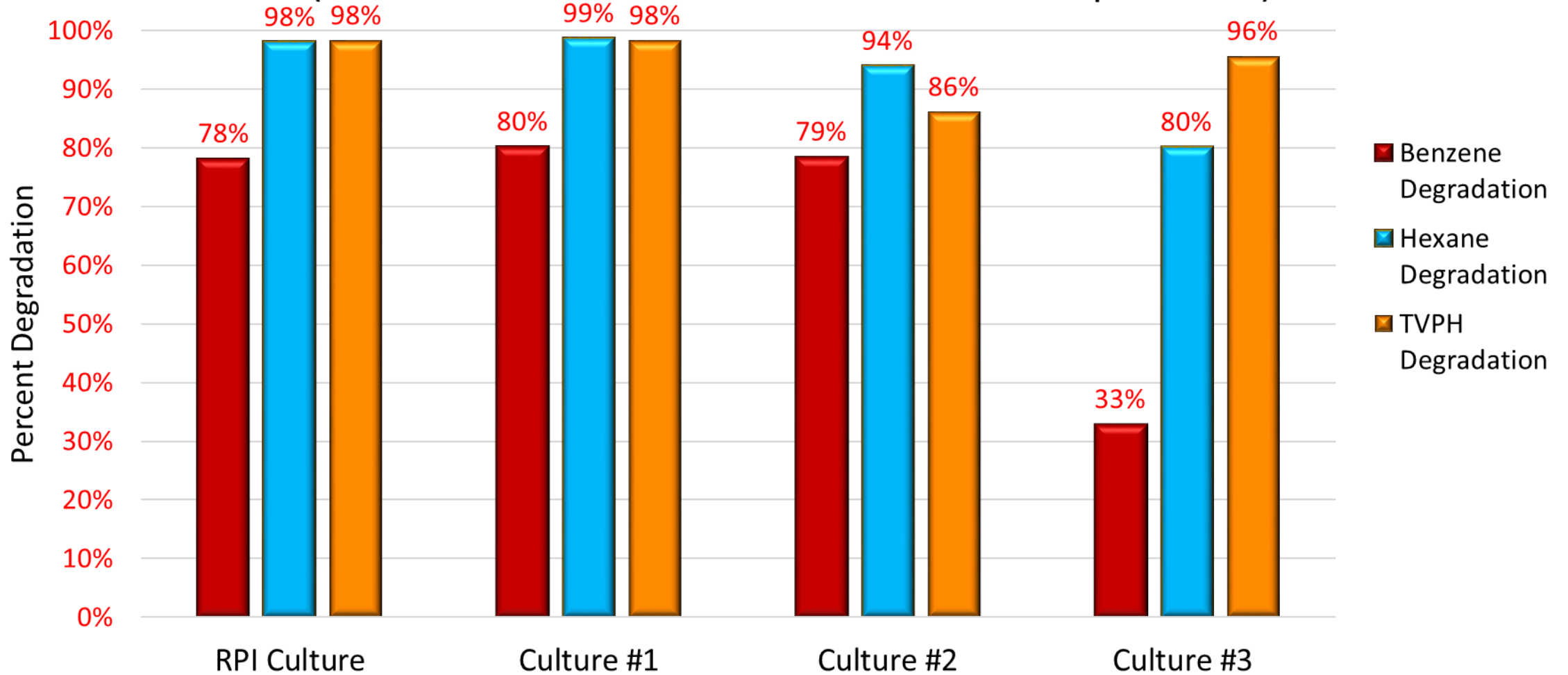


Fig 8

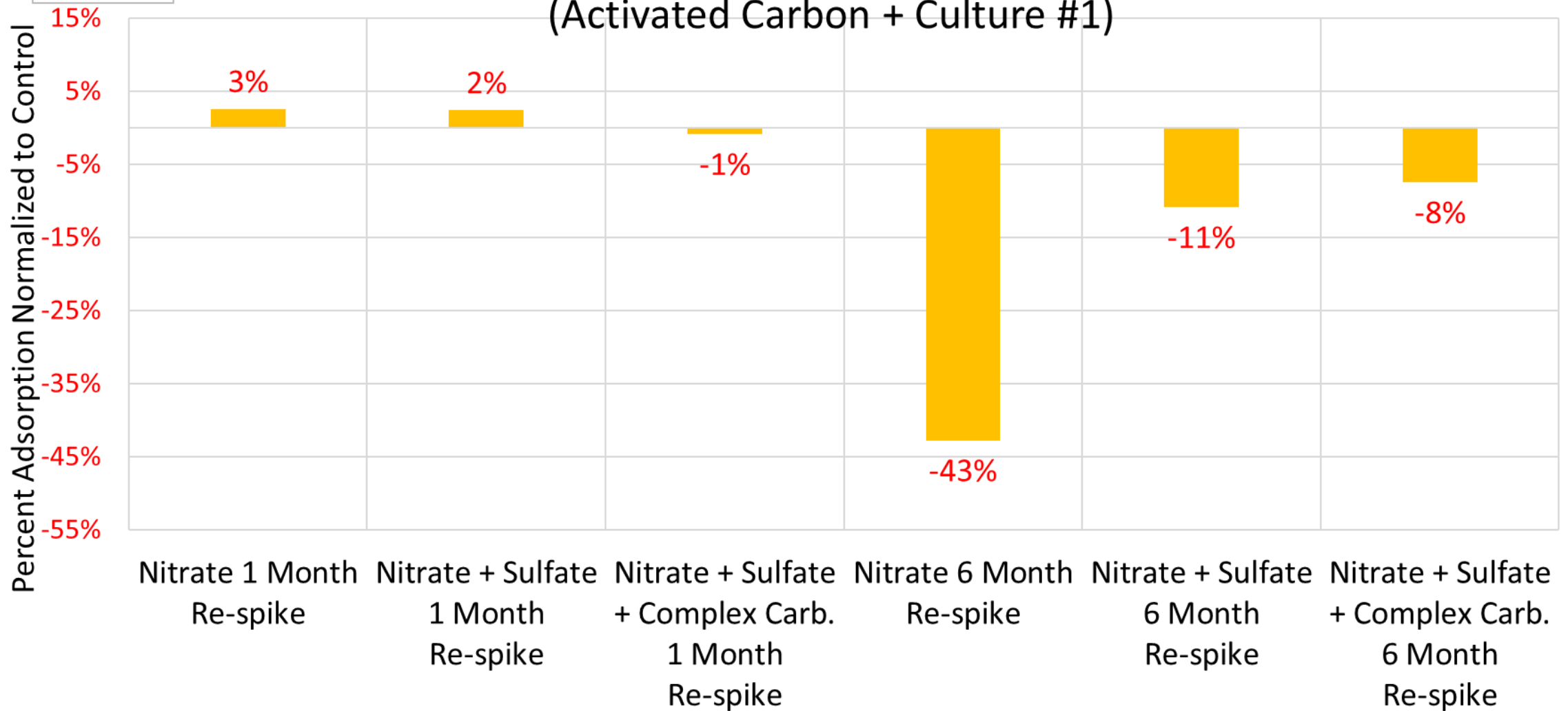
### Benzene, Hexane & TVPH Degradation (Activated Carbon + Nitrate + Sulfate + Complex Carb)





**Fig 4**

### Percent Adsorption of Respike vs Adsorption of Intial Spike by Control (Activated Carbon + Culture #1)

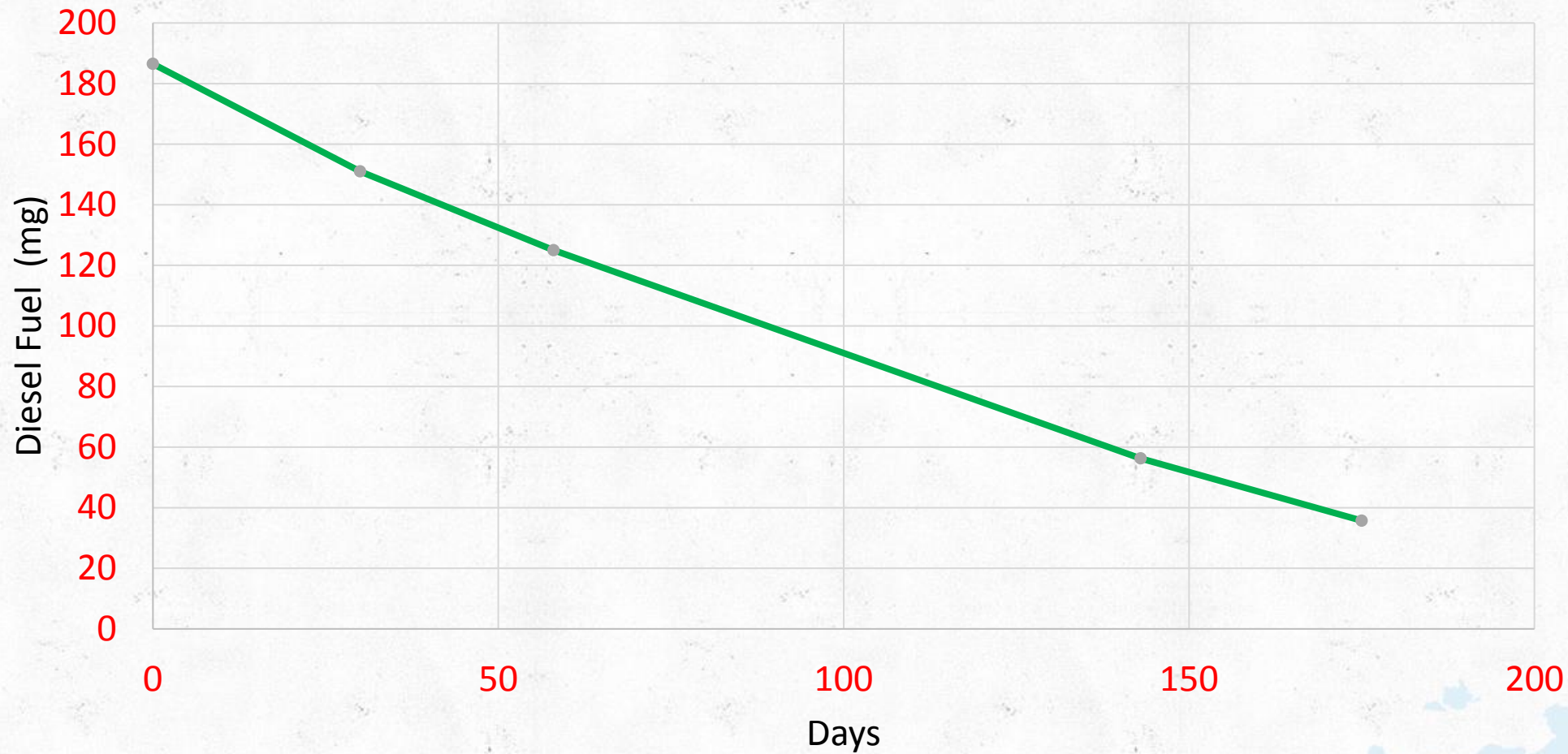


# ■ ENTROPY SUCKS



Fig 5

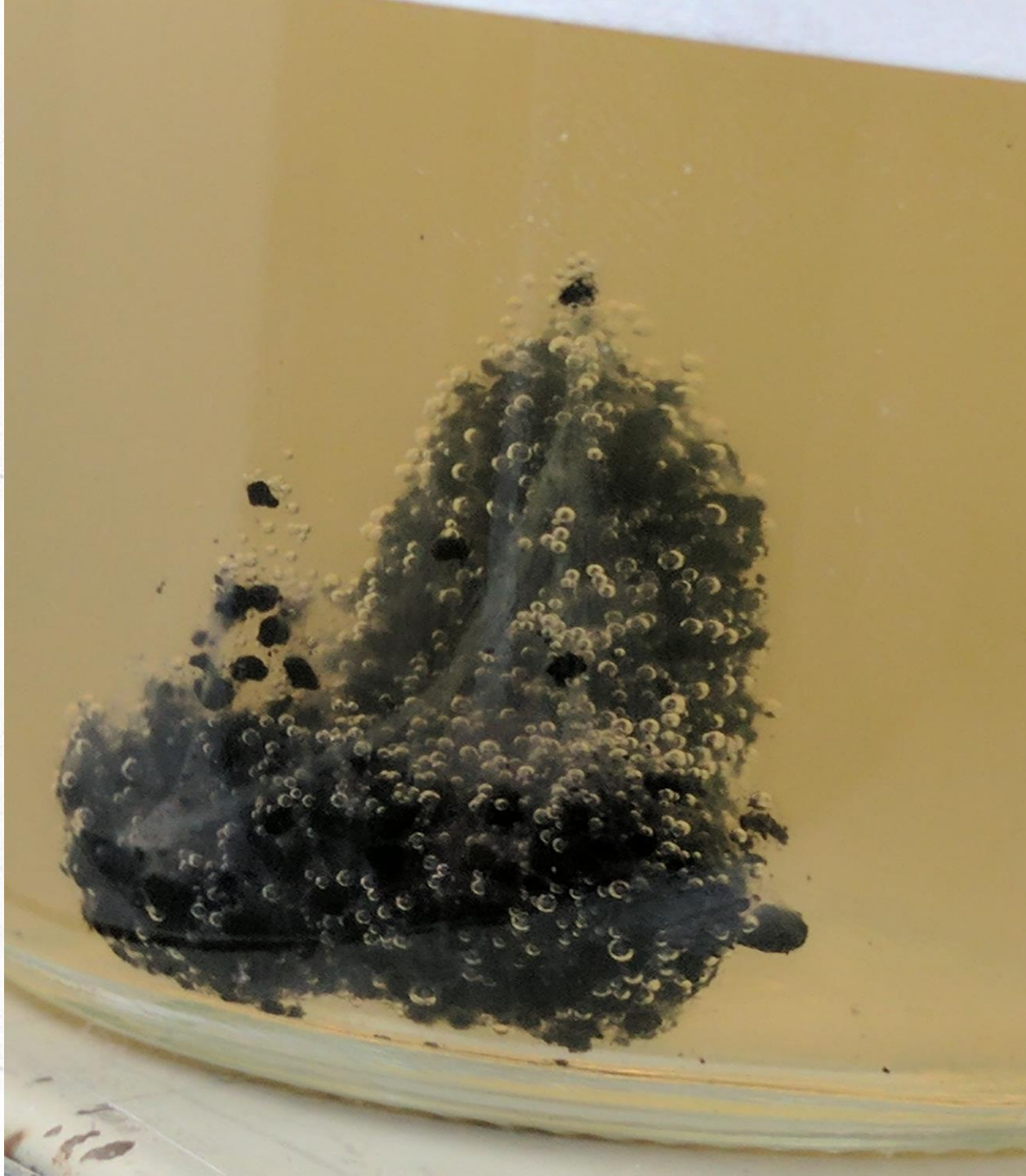
### Mass Diesel Fuel Remaining (mg) (Activated Carbon + RPI Culture)



# ACTIVATED CARBON

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- Not Bioavailable – the bugs are too big
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- You Can't Put Enough In the Ground





**Diesel Bench showing  
extensive Biofilm  
formation and gases**

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