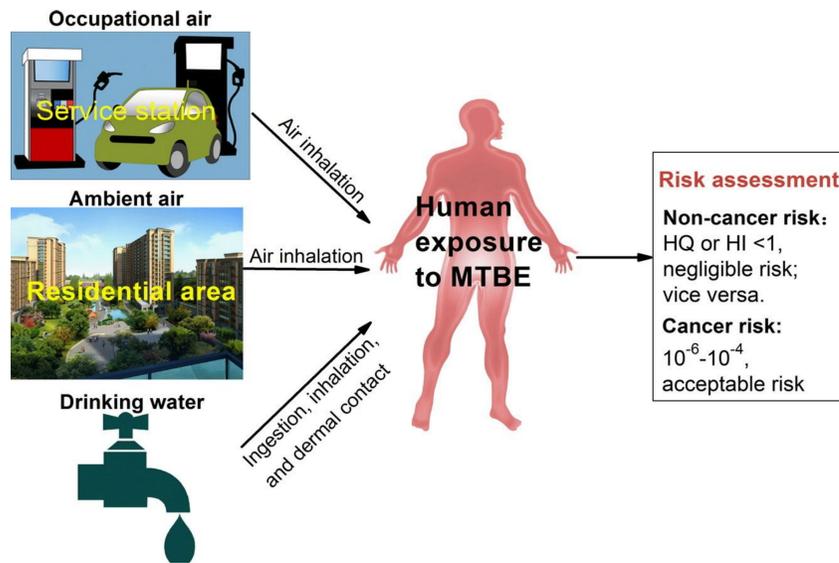


# Extracting Perfluorinated Compounds and Chloroform from Water by Absorption

## The Big Switch: From an Elitist Luxury to a Basic Human Right

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Source: <https://ida-ore.com/zeolite-industrial-uses/>

### Experiment

- A known method to remove MTBE is through granular activated carbon (GAC) zeolites, they have a higher efficiency in removal of organic contaminants.
- I have created a method to evaluate the effectiveness of several types of granular zeolites to determine adsorption ability in tap water found in a sink, public water fountain, and local lake. I analyze adsorption capacities and effectiveness so that clean water can be seen as a human right, not elitist quality.

Zeolites Tested:

1. ZSM-5
2. Clinoptilolite
3. Mordenite

Supplier: Zeolyst Ida-Ore



Source: <https://www.amazon.com/Zeolite-Powder-Pound-less-than-Clinoptilolite/dp/B01590118U>

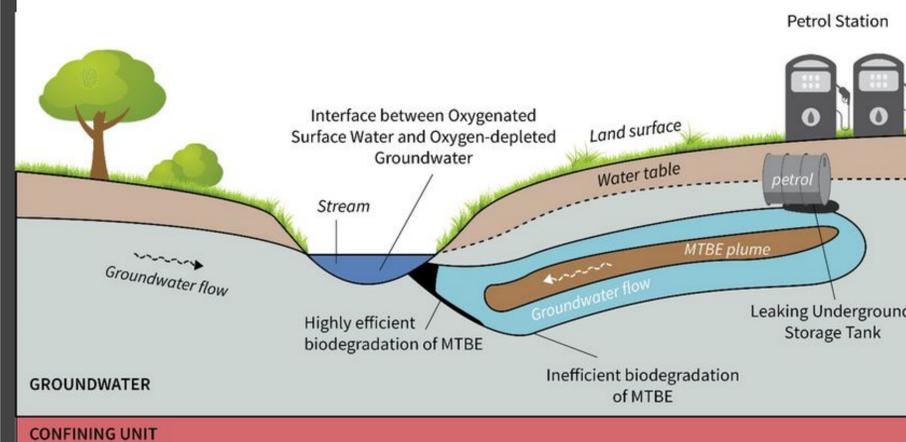
### Abstract

- November 2019 Trump Administration
  - repealed major clean water regulation
    - allows chemical pesticides and fertilizers that run off into bodies of water
  - Why?
    - For "time and money"

## Clean Water: from an *Elitist Luxury* to a Basic Human Right

- Home sinks, water fountains and neighborhood backyards contain a fine print-
  - the presence of harmful pollutants known as Perfluorinated compounds [PFCs].
    - Methyl tert-butyl ether (MTBE)
      - The California EPA set a primary health-based MTBE standard of 13 µg/L and a secondary MTBE standard based on taste and odor of 5 µg/L [20].
- EPA reviewed drinking water
  - "adverse health effects at concentrations 20 and 40 ppb"
  - "5x higher concentrations where federal reformulated gasoline is sold".
  - Impoverished areas like in **Los Angeles** will develop health problems transferring to offspring on account of just their location.

### Chloroform and MBTE



<https://www.dhs.wisconsin.gov/chemical/chloroform.htm>

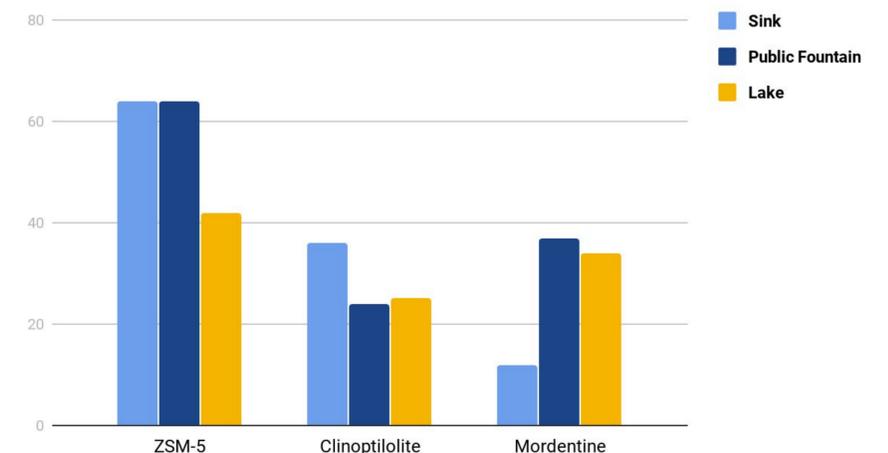


<https://www.dhs.wisconsin.gov/chemical/chloroform.htm>

Filter Fracturing Water with Zeolite  
The selectivity sequence for Clinoptilolite was shown to be:  
Pb > Cu > Cd > Zn > Cr > Co > Ni

### The Big Switch Results

Mass Absorbed (mg/g) vs. Type of Granular Zeolite



Chloroform absorption from the aqueous phase onto granular zeolites, using a 24 hour period.

### Conclusion:

ZSM-5 with the powdered grain size was the most effective in removing chloroform from water. Compared to Clinoptilolite and Mordenite which is more readily available, it was not as effective. However, compared to the traditional use of Sewage Sludge in city of Los Angeles for filtration, using Zeolites would not affect the water by containing heavy metals such as Cadmium, Zinc, Copper, and Nickel.