Phthalates in First Creek

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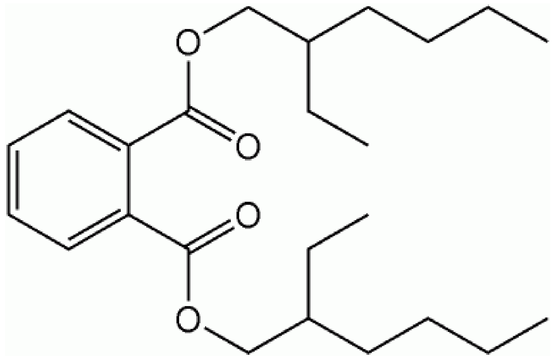


Health Effects:

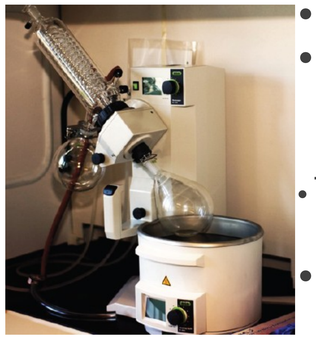
- Hormone Disruptor.
- Causes decreased sperm motility and damage to sperm DNA.
- Possible premature breast development in young women.
- Decreased cognitive ability in exposed rats.
- Damage to certain organs in fetal rats.
- Affects neural transmission in catfish.

Methods:

- Collected sediment samples from three sites at the intersection of Portland Ave. and 56th, Fairbanks, and 34th St.
- The samples were Freeze dried, and sieved.
- Extracted Phthalates using Soxhlet extraction.
- Acetone used as solvent to separate the phthalates from the soil.
- The extraction was run for 45 minutes.

Introduction

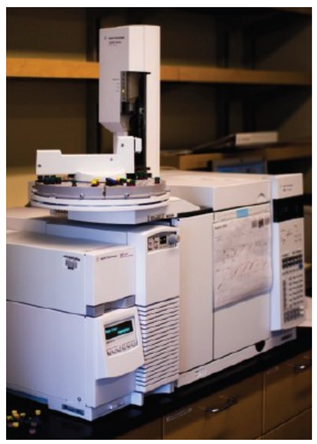
Phthalates are a group of chemicals that are added to plastics to make them soft, and less brittle. They are often found in PVC and other household products. Phthalates leech out of these materials into wastewater, and storm runoff. The goal of thos project is to create a useable method to determine phthalate concentrations in First Creek sediment.



- Solutions concentrated in Rotavap.
- Acetone is evaporated, but the phthalates remain due to differences in the boiling points.
- This concentrates the solution down from 250mL to about 20mL.
- Solutions concentrated further using nitrogen evaporation.
- Nitrogen is blown over solutions.
- This speeds the evaporation rate of the solvent.
- Samples analyzed using gas chromatography coupled with mass spectroscopy (GC-MS).
- Separates different chemicals in solution based on polarity.
- Fragments molecules and identifies the mass of the pieces.

. Shows concentration of the sample.

Results:



- Unable to determine exact concentrations of phthalates due to problems with the GC analysis.
- Estimated concentrations show a maximum concentration of 600 parts per billion near the end of the creek.
- This is slightly lower than other urban areas that have been studied.
- More measurements need to be taken to determine the actual concentration in First Creek.

Hui, Liu et al. 2009. *Distribution of phthalate esters in alluvial sediment: A case study at JiangHan Plain, Central China.* Chemosphere, Vol. 78, Iss. 4:382-88.

Earls A. O., I.P. Axford, J.H. Braybrook., "Gas chromatography–mass spectrometry determination of the migration of phtha late plasticisers from polyvinyl chloride toys and *childcare articles*," Journal of Chromatography A 983, 237-246 (2003)

Arcadi F. A., et al., "*Oral toxicity of bis(2-ethylhexyl) phthalate during pregnancy and suckling in the Long-Evans rat*," Food and Chemical Toxicology 36, 963-970 (1998)

Recent Studies

- New methods are being developed to speed the process, and yield better results.
- Sediments are extracted with accelerated solvent extra tion (ASE) and concentrated using a turbovap.
- The concentrated samples are cleaned through column chromatography which separates the phthalates from other materials.
- The cleaned samples are concentrated a second time in the turbovap.
- These samples are then analyzed using GC-MS to deter mine concentration of phthalates in the original samples.
- This method is still under development, so no data is available.