Adsorption of PFOA on Activated Carbons

by J. Epstein, J. Michael, Y. Jiang, Dr. Jason Berberich, and Dr. Catherine Almquist
Chemical and Paper Engineering Department, Miami University, Oxford, Ohio

• Perfluoroalkyl compounds (PFCs):
  – anthropogenic compounds that do not readily degrade in the environment.
  – PFOA, PFOS are listed as persistent organic chemicals

• Research goals:
  – Analytical methods development for PFOA
  – Adsorption isotherms for PFOA on commercially-available activated carbons
  – Effects of pH, ions in water, organics in water on PFOA adsorption

• Progress:
  – GC/FID, UV-Vis methods of analysis for PFOA demonstrated
  – Adsorption isotherms for PFOA on three activated carbons developed
  – Comparison of PFOA adsorption in deionized water and tap water
  – Comparison of PFOA adsorption in pH range from 4 to 10
  – Comparison of PFOA adsorption in presence of organic substrate (Bz) in tap water

• Preliminary Conclusions:
  – Adsorption follows a Langmuir isotherm at relatively high concentrations of PFOA (up to 500 mg/L)
  – Adsorption of PFOA is impacted (lowered) by presence of ions in water, extent to which is likely dependent upon pore size distribution in activated carbon
  – Very little impact of pH in range of 4 to 10 on PFOA adsorption
  – The presence of other organics in water will lower adsorption capacity of activated carbon for PFOA