Environmental Risk Assessment and Remediation

(ENCE 701R/489R),
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Dr. Upal Ghosh

Research Interests:

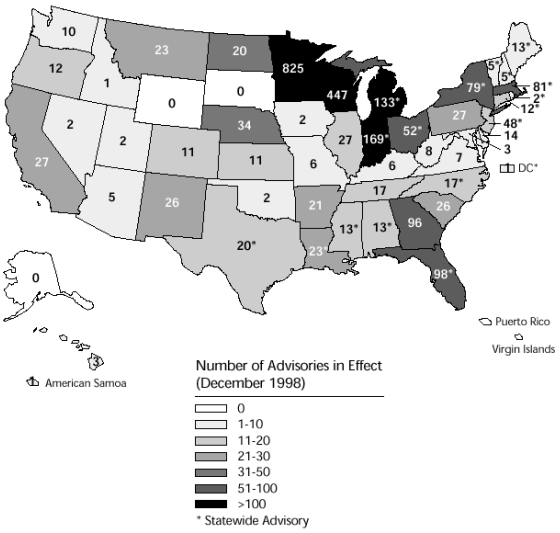
- Fate of organic contaminants in the environment
- Remediation of contaminated soil and sediment
- Site risk assessment
- Biological treatment processes

Appointments and Education:

- Assistant Professor, UMBC, Nov 2002-
- Lecturer and Research Associate, Stanford University, 2000-2002
- Research Faculty, Post Doc, Carnegie Mellon Univ, 1998-1999
- Visiting Fellow, Inst. of Development Research, India, 1990 and1993

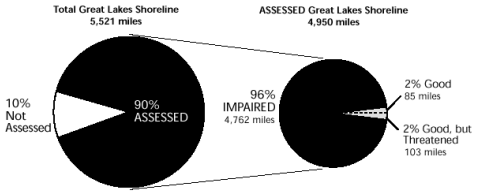
- Ph.D. Environmental Engr., SUNY Buffalo, 2/98
- M.S. Environmental Engr., SUNY Buffalo, 2/93
- B.Tech. Chemical Engr., IIT, Bombay, India, 4/89

Fish and Wildlife Consumption Advisories in the United States

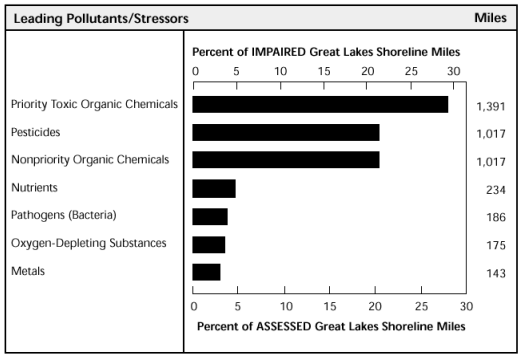


The Quality of Our Nation's Waters: A Summary of the National Water Quality Inventory: Report to Congress, EPA, June 2000

Summary of State Assessments of Great Lakes Shoreline

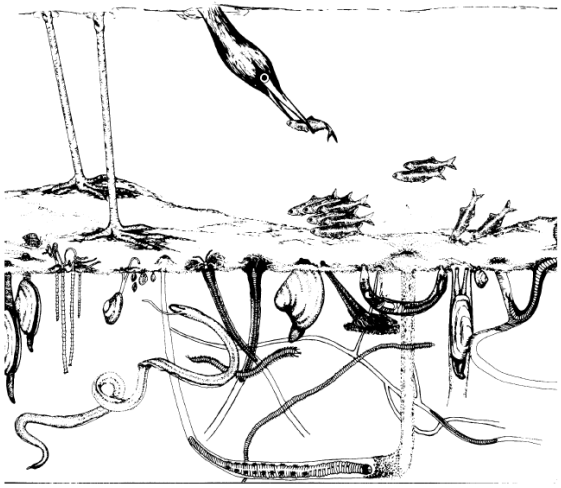


Leading Pollutants and Sources Impairing Great Lakes Shoreline



The Quality of Our Nation's Waters: A Summary of the National Water Quality Inventory: Report to Congress, EPA, June 2000

EPA's Contaminated Sediment Management Strategy



Four fold strategy:

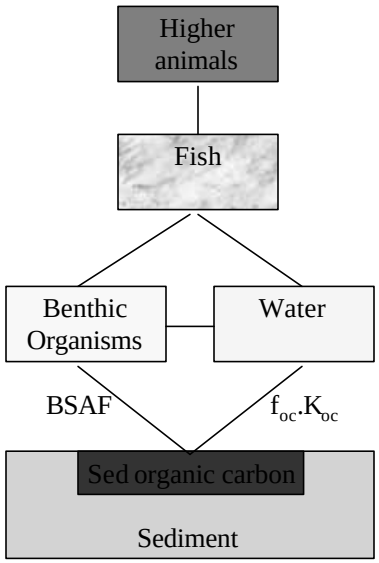
1. Prevent further contamination of sediments
2. Reduce the extent of contamination
3. Ensure proper disposal and management of dredged sediments
4. Develop sound sediment management tools

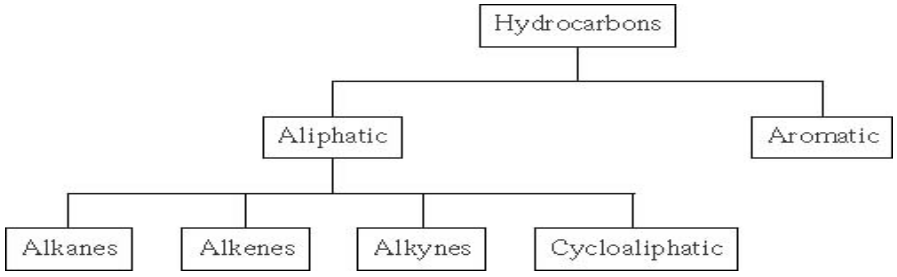
US EPA, Office of Water, April 1998, EPA-823-R-98-001

In situ treatment of PCB contaminated sediments

- Hunters Point Navy Shipyard, SF Bay
- PCB hot spot SF Bay
- Fish advisory in SF Bay for PCBs

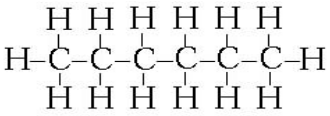
Traditional view of contaminant biouptake



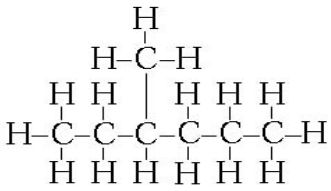


Alkanes are hydrocarbon compounds that contain only single bonds between carbon atoms. Alkanes are also referred to as saturated compounds.

hexane:

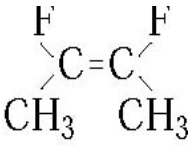


3-methyl-hexane:

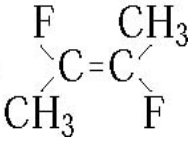


Many organic compounds have both a systematic and a common name. This is due in part to the way the science of organic chemistry developed.

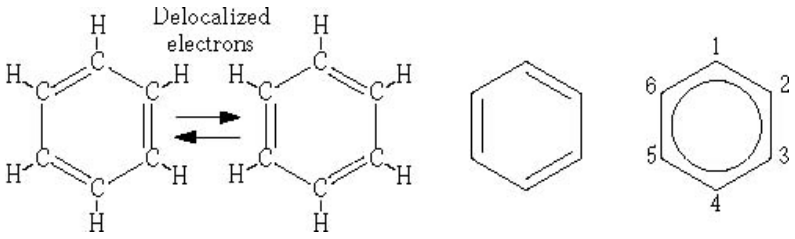
cis-2,3-difluoro-2-butene:



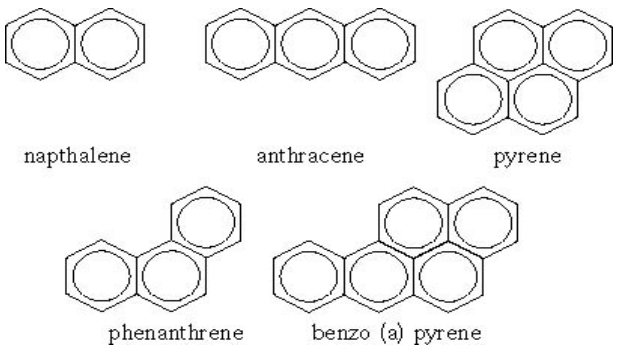
trans-2,3-difluoro-2-butene:



If a double bond has two identical groups, the prefixes *"cis-"* and *"trans-"* are used. *(Cis-* denotes two identical groups on the same side of the molecule. *Trans-*is used if they are on opposite sides.)

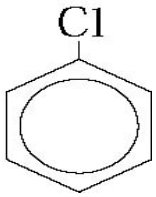


The second general category of hydrocarbons is **aromatics.** The simplest aromatic ring is benzene:



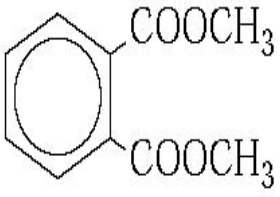
Polynuclear aromatic hydrocarbons (PAHs) are groups of aromatic rings containing only carbon and hydrogen. They may be considered as two or more benzene rings fused together with at least two common carbons.

chlorobenzene:



Nomenclature of substituted benzenes is divided into two categories. For mono-substitute compounds, benzene is the base name and the group is designated as a prefix.

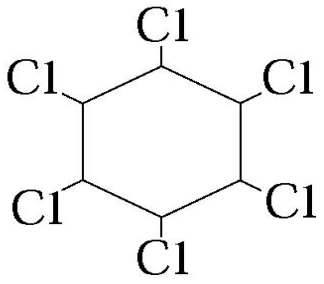
dimethyl phthalate:



Phthalate esters contain the phthalate ion and any alkyl groups.

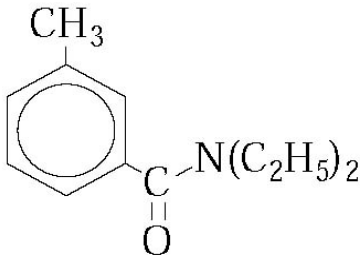
A somewhat different class of organic compounds are ketones.

lindane



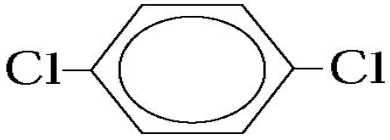
Particularly good against the boll weevil, the cotton aphid and the locust.

m-delphene



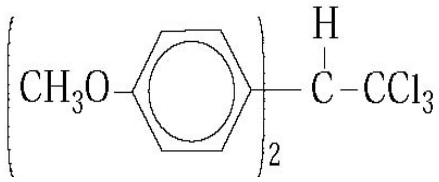
Good mosquito repellent

p-dichlorobenzene



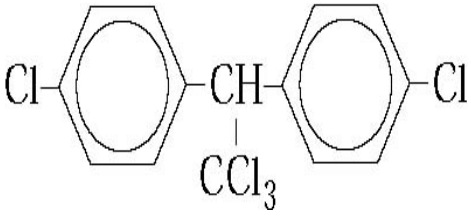
Common moth repellent

methoxychlor



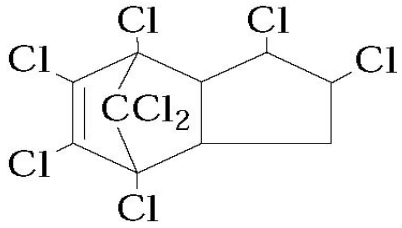
Methoxy analog of DDT; can be used in dairies without imparting toxicity or off-taste to milk

DDT



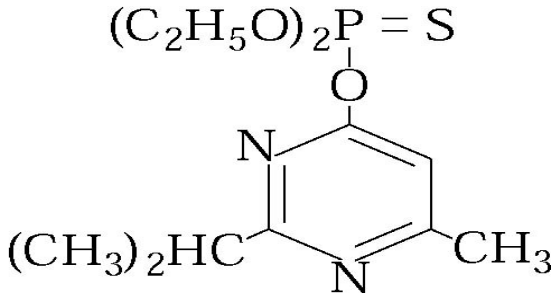
Moderate toxicity to mammals

chlordane



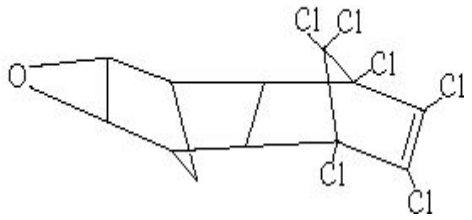
Moderate toxicity to mammals

diazinon



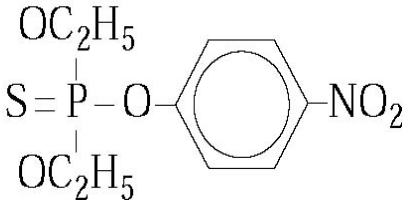
Moderate toxicity to mammals

dieldrin

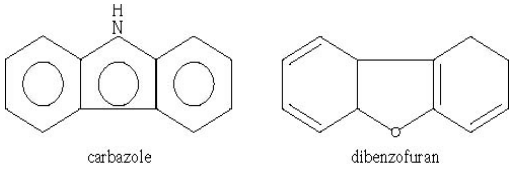


Fairly high toxicity to mammals

parathion

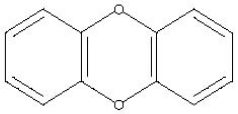


High toxicity to mammals



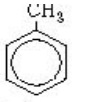
carbazole

dibenzofuran

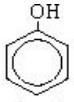


dibenzo-*p*-dioxin

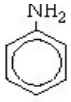
Heteroatoms such as nitrogen, oxygen, and sulfur can be substituted into PAHs. Some of these compounds such as carbazole are characteristic of manufactured gas plant (MGP) wastes. Dibenzofuran and dibenzo-p -dioxin are unwanted combustion by-products.



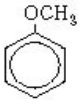
toluene



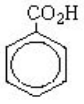
phenol



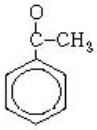
aniline



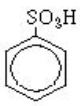
anisole



benzoic acid

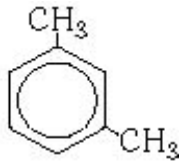


acetophenone

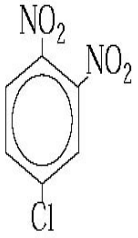


benzenesulfonic acid

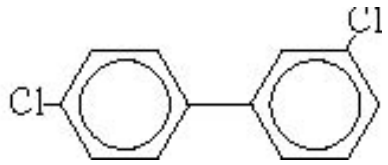
For some compounds, common names used most often are:

meta-xylene: 

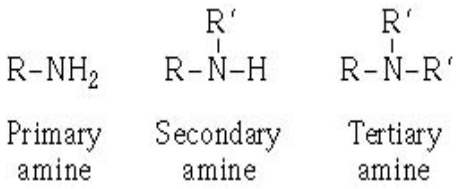
Dimethylbenzenes are given the common name xylenes.

1-chloro-3,4-dinitrobenzene: 

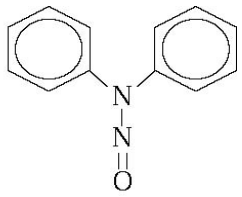
When more than two groups are present, numbers must be used to indicate the positions. The ring is numbered so the groups have the lowest possible numbers.

3,4'-dichlorobiphenyl: 

When a benzene ring is itself a substituent of a larger group, it is called phenyl.



Amines are considered organic derivatives of ammonia. They are classified as primary, secondary, or tertiary mines, by the number of attached alkyl groups.

diphenylnitrosamine: 

A nitrosamine has the nitroso group (.N =O)