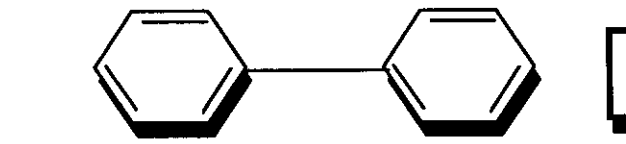
Chemical Wastes

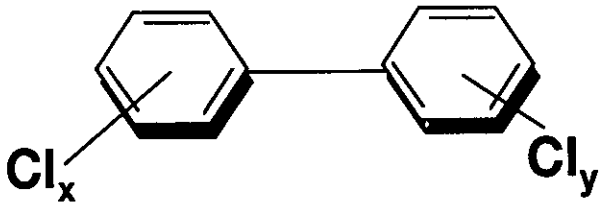
PCBs

Polychlorinated Biphenyls (PCBs)

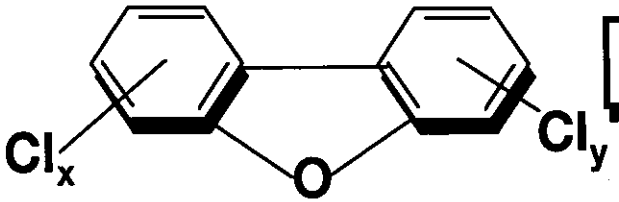
- Used in electrical equipment
- Potentially carcinogenic
- Use discontinued (1977-1990)
- Need to be safely disposed off
  - Liquid
  - Contaminated equipment
  - Contaminated solids (e.g., soil, etc.)



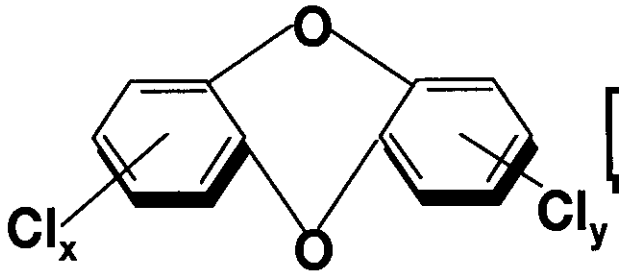
Biphenyl



PCBs (x+y ≥ 2)



Chlorinated dibenzofurans



Chlorinated dibenzo-p-dioxins

Processes for Destroying PCBs

- Incineration (> 1200°C)
- Cement kiln (incineration)
- Plasma arc
- Miscellaneous (>80)

Incineration of PCBs

- Limitations

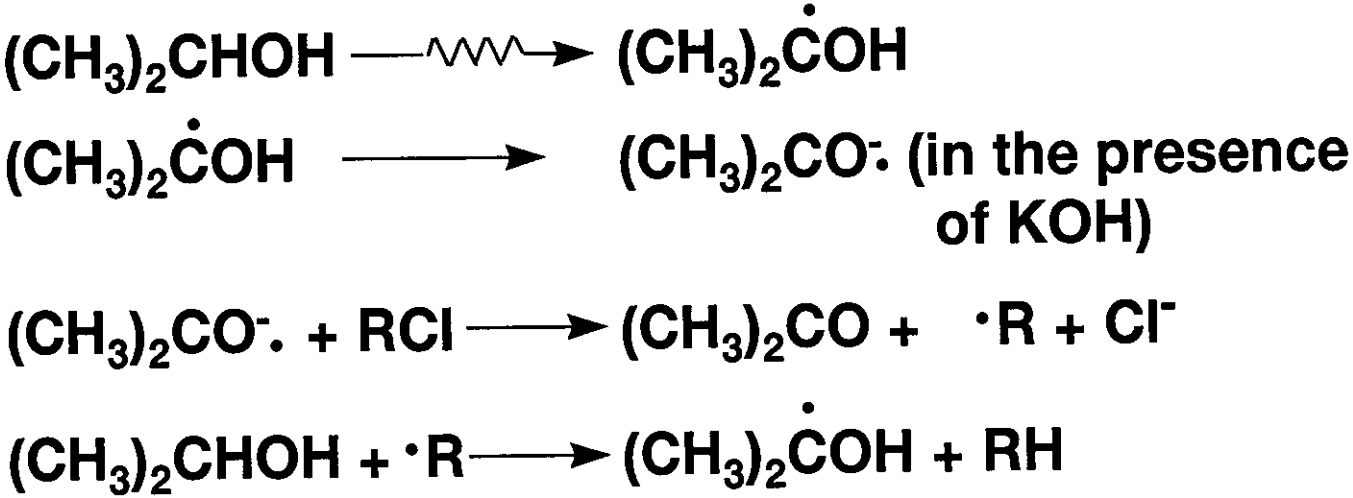
- Licensing difficult
  - License denied in Boston
- Solids need to be heated to 1200°C to pyrolyze small amounts (ppm)
- Costs $1-2/kg for liquids, very high for solids

Radiolysis Process

-Advantages

- Absence of oxygen - no dioxins or dibenzofurans
- On-line monitoring
- Bulk PCBs and PCB-contaminated items
- Toxic waste → useful products

Key Reactions



Overall reaction

Estimated Costs for Radiation Processing of Liquid PCBs (in 1987$)

Radiation Source	Maximum Rate (kg/h)	Cost ($/kg)
Mobile facility (200 kCi Co-60)	9	13.95
Permanent Facility 1 MCi Co-60	101	4.22
40 kW accelerator	195	2.1