PFOS and PFOA Science Presentation for US EPA Office of Water

Introduction & Overview

October 15 and 16, 2009

Overview

- The term “perfluorinated chemicals” includes a wide range of chemicals with varied uses, characteristics and environmental profiles.

- Working with EPA, industry has made substantial progress in reducing environmental loadings of PFOA and PFOS and in moving toward a set of effective replacement products that offer a favorable environmental profile.

- Perfluorinated chemicals have been studied extensively over the last 10 years by a wide array of scientific experts across the world. The resulting science is complex, but it offers a reliable foundation for reaching conclusions on the risks of these chemicals.

- We will provide an overview of the science, anticipating discussion and identification of any further areas where we can address Office of Water information needs

Chemical Categorization

- Top level distinction: perfluorocarboxylates (PFCA) vs. perfluoroalkylsulfonates (PFAS)
  - Perfluorinated carbon chain with a functional end group
- Within each group, the carbon chain can vary
  - Range from C4 to C18
  - Sharp differences in technical performance and environmental profile
- Need to distinguish end products, residuals, breakdown products
  - End products are long-chained polymers of lesser interest for risk evaluation
  - Interest in addressing precursors (e.g., residuals) that may transform to breakdown products in environment
  - Risk assessment focuses on ultimate breakdown products; stable substances like PFOA and PFOS that are unlikely to break down

Fluorinated Substances: *different commercial categories*

Fluoro-Organics and FC Polymers

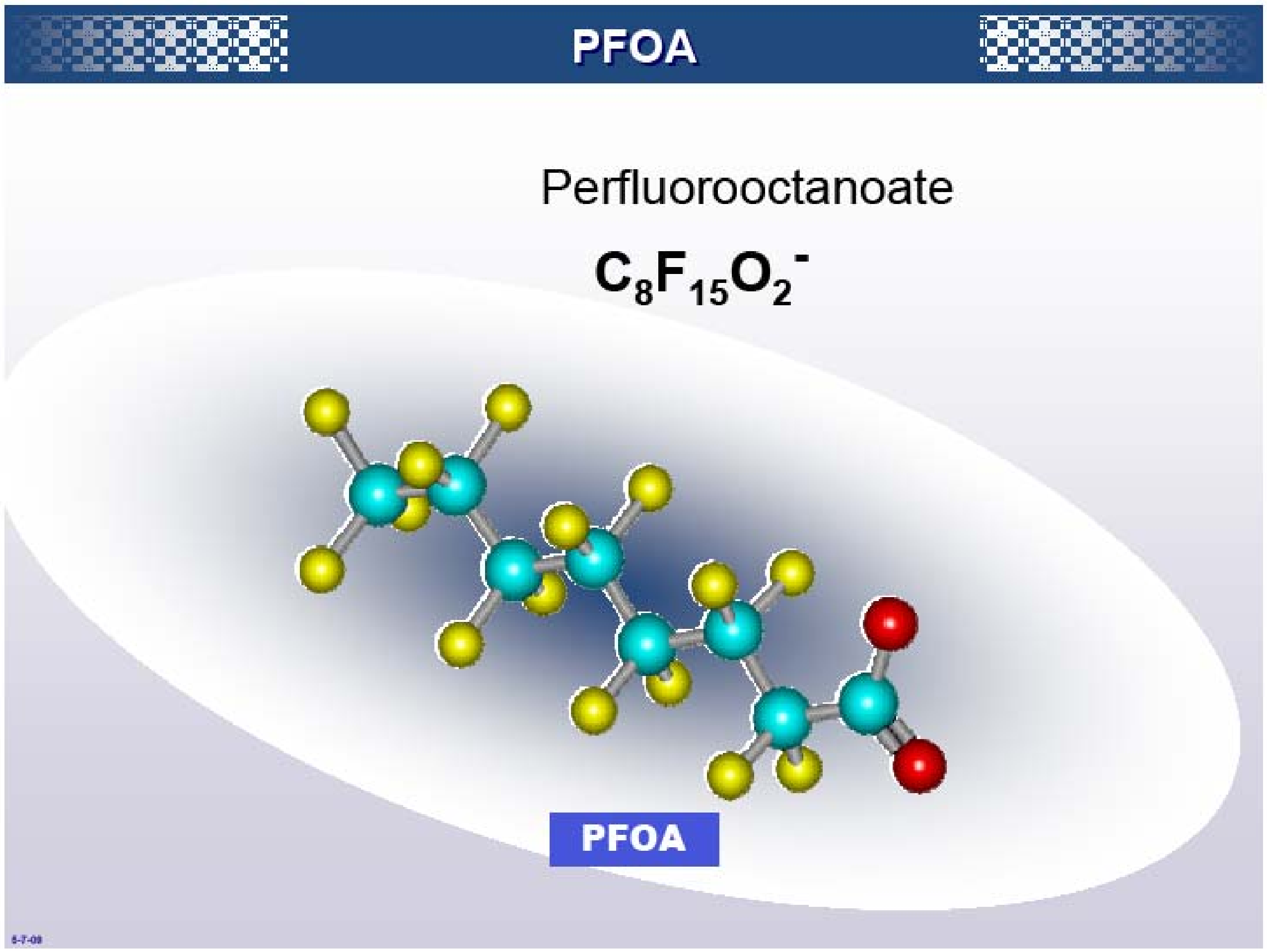
- Includes Sulfonates and Fluorotelomers
- Fluorine chains linked to organic polymer backbones
- surface modification & protection
- surfactants
- water & oil repellency
- fire fighting foam

Fluoropolymers

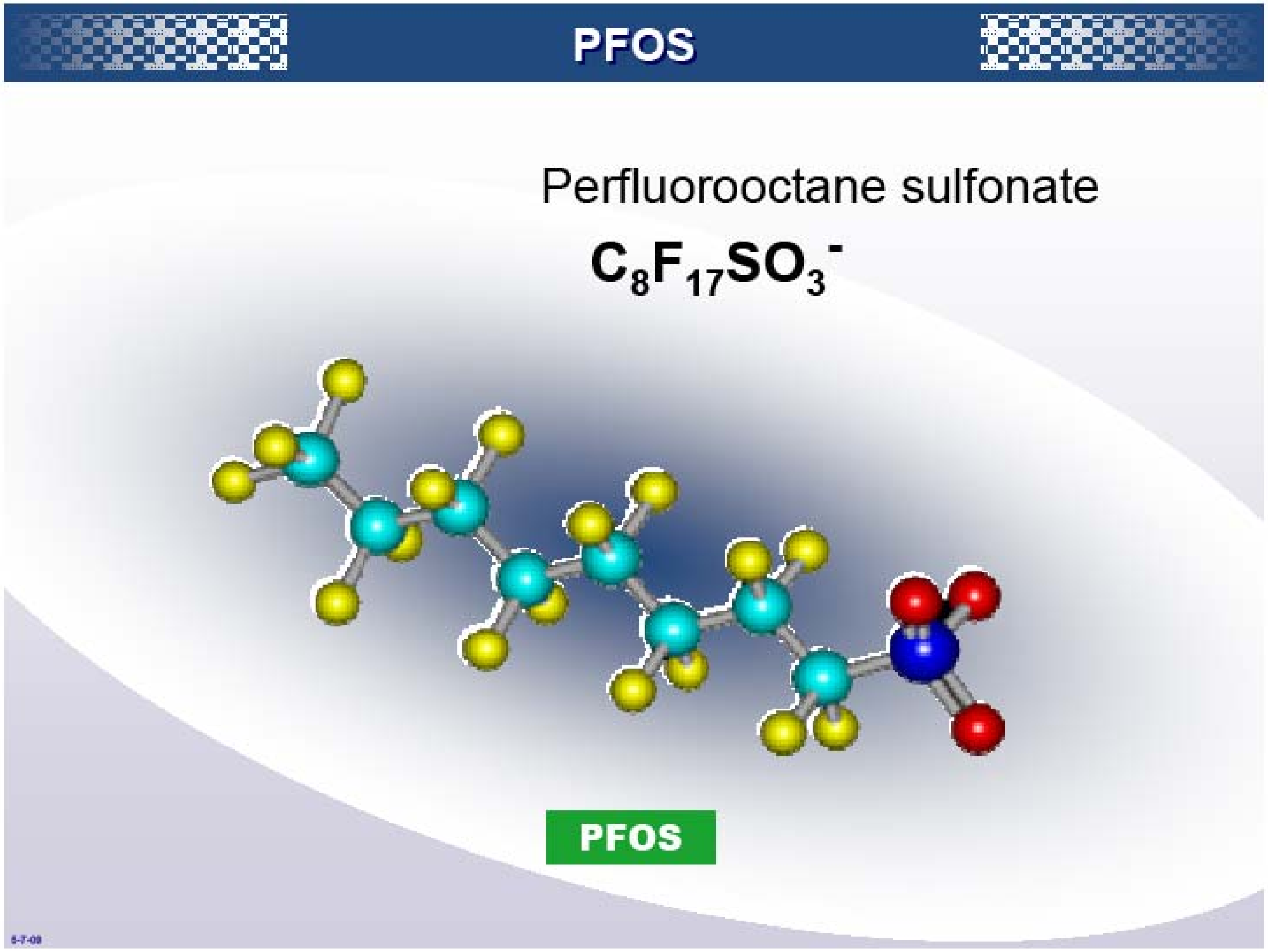
- high MW (10^7)polymers
- PTFE & Melt resins
- fluorinated “backbone”
- chemical resistance
- cookware, CPI linings, aerospace, automotive, apparel, construction, etc

Fluoropolymers: 3M / Dyneon, Daikin, Asahi Glass, DuPont, Arkema, Solvay-Solexis
Telomers: Asahi Glass, Clariant, Daikin, DuPont *Sulfonates: 3M*

PFOA Structure



PFOS Structure



Transition to New Products

- Industry has been transitioning its technology since 2000
  - All leading companies began implementing new process, recycling and control technology for these substances
  - Included industry actions on public commitments to reductions and on sharing technology
- Transition to effective alternative chemistries has been harder
  - High value uses with no readily available substitutes
  - Diverse applications meant challenging technological conversions in multiple customer industries
- Substantial progress in last few years in identifying alternatives that can work for a range of customers

The Current Path for Transition

- From 8-Carbon to 4-Carbon-based sulfonate chemistry
- From 8-Carbon to 6-Carbon Fluorotelomer chemistry
- From 8- and 9-Carbon Perfluorocarboxylate Polymerization Aids (PFOA/PFNA) to certain Mono- and Poly-perfluoroethers or other substances
- Requires cooperation from manufacturers in a wide range of downstream industries, from consumer product manufacturers to defense and aerospace industry

Strategic Role of EPA

- EPA has supported transition with a 2-prong strategy
  - PFOA Stewardship Program set goals for transition
    - 95% reduction by 2010 – encouraged process change, pollution control
    - "Working toward elimination" by 2015 – established need for new chemistries
  - Review of alternative chemistry under TSCA new chemical program
    - Required toxicology, fate testing to fill out the environmental profile of alternatives
  - OPPTS now planning a regulatory strategy based on this framework
- Result has been a green chemistry policy success
  - Accomplishing a transition that is not technologically easy
  - Data supports the comparative environmental benefits of the alternatives
  - Actions achieved without mandatory ban (statute, treaty, regulation)
  - Proactive action while research and risk assessment activity continued

Extensive Body of Scientific Information

- These chemicals have been the subject of intensive research
  - Mainly PFOA, PFOS; but strong database exists on many other PFCA and PFAS
  - Reflects work by a global community of experts across institutions
  - Extensive data sharing and collaboration with EPA
- Multiple factors play into understanding risk profile
  - Relative biopersistence plays key role in distinguishing chemicals
  - Evaluating toxicity requires understanding of information on epidemiology, animal toxicity, modes of action and pharmacokinetics
  - Evaluating exposure requires understanding of physical/chemical properties, transport mechanisms, environmental chemistry
- Challenges in the areas of analytical chemistry and water treatment are also important considerations in implementation activities

Meeting Objectives

- Provide an overview of scientific information on PFCA and PFAS, with a particular focus on PFOA and PFOS

- Knowing that a two-day meeting cannot adequately cover the full range of information on these chemicals, identify additional areas where more information would be helpful

Meeting Presentations

- Sequence of presentations
  - Hazard assessment: epidemiology, pharmacokinetics, animal toxicology data, mechanisms of action and human relevance
  - Compare leading approaches for risk assessment (discussion format)
  - Analytical chemistry issues, physical-chemical characteristics, fate and transport, environmental monitoring
  - Review available water treatment technologies
- Expectation of Transparency for Shared Information
  - Data sources are identified; we will facilitate access to underlying data
  - Assume all presentations will be made available in public dockets
  - Open to discussing this information with other stakeholders