

PFAS – THE FOREVER CHEMICALS

AVOID FUTURE RISKS

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WELCOME!

PFAS – THE FOREVER CHEMICALS

AVOID FUTURE RISKS



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AGENDA

1. WELCOME
2. WHAT ARE PFAS & WHAT IS THEIR IMPACT
Dr. Jan Beringer | Hohenstein
3. CURRENT & UPCOMING LEGAL REQUIREMENTS USA & EU
William L. Troutman | Norton Rose Fulbright
4. TESTING UPDATE
Dr. Helmut Krause | Hohenstein
5. Q&A

The background features a dark blue gradient with large, semi-transparent light blue geometric shapes, including a large circle and several vertical bars. A solid orange horizontal bar is positioned at the bottom of the slide.

WHAT ARE PFAS & WHAT IS THEIR IMPACT

PFAS

DEFINITION

Per- and polyfluoroalkyl substances (PFAS or PFASs) are a group of synthetic organofluorine chemical compounds that have multiple fluorine atoms attached to an alkyl chain.

PFAS are a group of nearly 15,000 synthetic chemicals, according to a chemicals database (CompTox) maintained by the U.S. Environmental Protection Agency (US EPA).

To date, more than 4,700 Chemical Abstracts Service (CAS) numbers have been identified.



PFOS (perfluorooctanesulfonic acid) „C8“

PFAS

PROPERTIES & USE



Chemical industry
including PTFE production



Metal plating industry



Photo imaging industry



Semi-conductor industry



Biocides, household
agents such as cleaning
agents and impregnation
sprays



Non-stick cook and
bake-ware



Fire-fighting foams



Water- and oil-proof
apparel



Stain resistant
upholstery, carpet,
etc.



Food packaging

- Heat / flame resistant
- Surface protection
- “Non-stick” properties
- Water, oil & stain repellent
- Lubricant / low friction
- El. Insulator

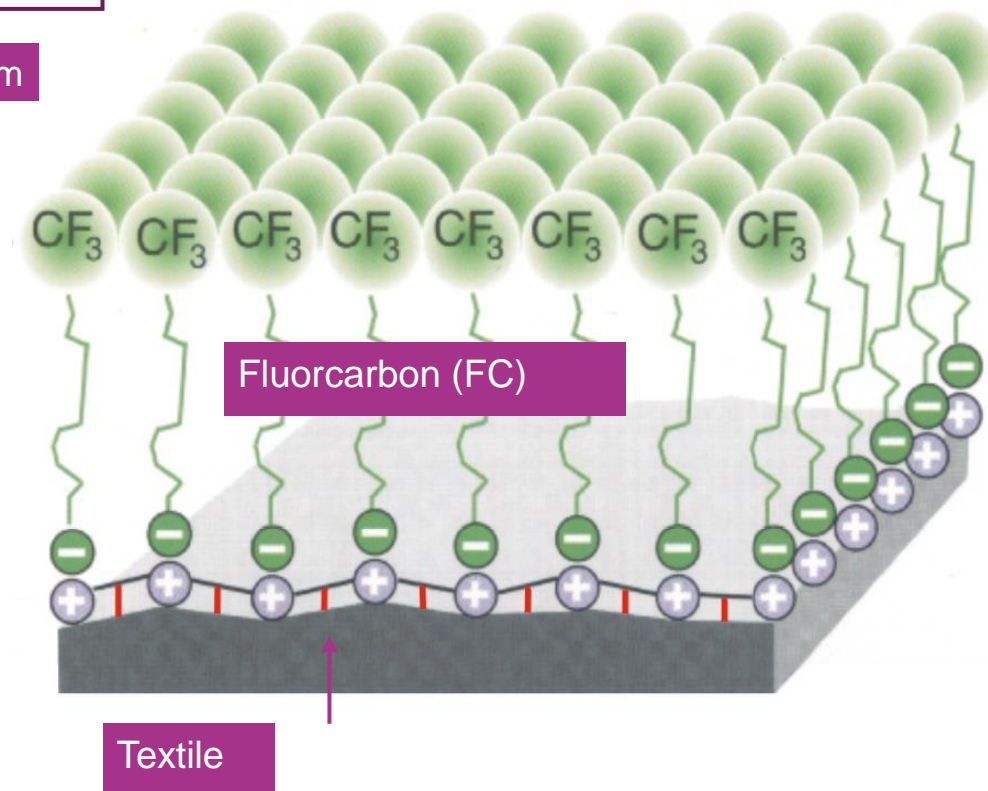
PFAS

USE IN THE TEXTILE INDUSTRY AS WATER, OIL & STAIN REPELLENT FINISHES

- THE SCIENCE BEHIND

Surface tension γ_c :	
+ Wasser	ca. 73 mN/cm
+ „oil“ (HC's)	20-35 mN/cm
<hr/>	
+ FC (-CF ₃)	ca. 9 mN/cm
+ PTFE (-CF ₂ -)	ca. 18 mN/cm
+ Paraffin (-CH ₃)	ca. 24 mN/cm
+ Silicone (-SiO ₂ -)	ca. 24 mN/cm
+ PE (-CH ₂ -)	ca. 31 mN/cm

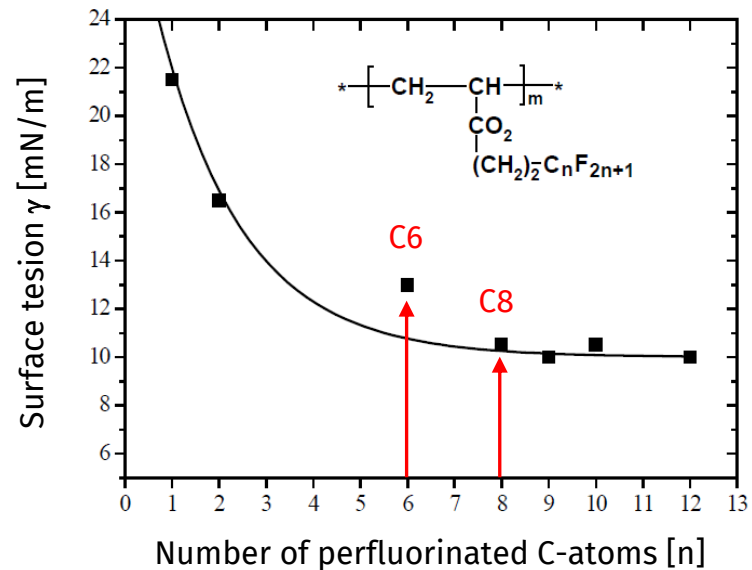
For good effects $\Delta\gamma_c > 10$ mN/cm



PFAS

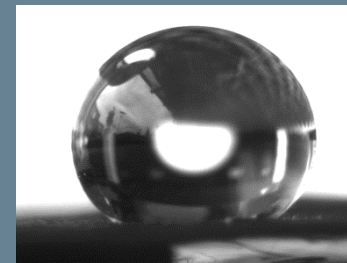
USE IN THE TEXTILE INDUSTRY C8, C6 CHEMISTRY EXPLAINED

Surface tension vs. number of alkyl chain C atoms



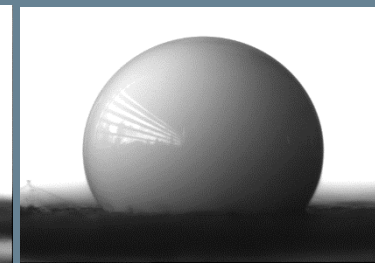
Source: T. Malner, Dissertation

WATER



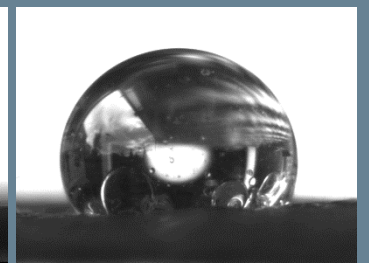
High

MILK



<<< Surface Tension >>>

OIL



Low

PFAS

IMPACT ON ENVIRONMENT & HEALTH

- Highly persistent „forever chemicals“
- Highly mobile in air, water, soil
- Bioaccumulation (environment, wildlife, humans)
- Health risks known since 1990's
- Long-chain PFAS linked to cancer, reproductive harm, immune system damage and others



Liver damage



Thyroid disease



Cardiovascular disease



Chronic kidney disease



Low fertility



Testicular cancer



**CURRENT & UPCOMING LEGAL
REQUIREMENTS USA & EU**

PFAS regulation in textiles

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US Overview

Types of restrictions:

- Bans on “intentionally added PFAS”
- Reporting or notification requirements
- Manufacturer certificates of compliance
- Warnings

Scope:

- All PFAS substances *OR* specific PFAS classes or individual substances
- New, not previously used products

Detection

- Due to the number of PFAS substances and relative infancy of testing approaches, despite the “intentionally added” application, some of the laws use detectable (organic) fluorine as a proxy for intentional use
- Result is that contamination/quality control issues can be considered intentional use

Enforcement

- Fines, civil penalties
- For legislation that is not specific about fines or penalties for non-compliance—presume enforcement, if any, will be via Attorneys General and district attorneys for unfair competition
- Private enforcement via class actions for false advertising or unfair competition

Enacted legislation: Apparel

California (AB 1817): *effective 1/1/2025*

- prohibits manufacture, distribution, sale of any new, not previously used, apparel containing:
 - Intentionally added PFAS; or
 - PFAS as a contaminant above 100 ppm (2025), 50 ppm (2027)
 - Contains some exceptions for PPE and military, textiles for boating
 - Delayed implementation for outdoor apparel for severe wet conditions (1/1/2028)
- Requires manufacturer to provide certification to retailers, which releases retailer from liability if relied on in good faith

New York (S 1322): *effective 1/1/2025*

- Mirrors California except:
 - No provision for contaminants, but contains placeholder for state to issue limit by 1/1/2027
 - Does not mandate manufacturer certification, but shields retailer from liability if manufacturer provides certificate of compliance
 - Outerwear for severe conditions is fully exempted—not phased in

Enacted state legislation: Textiles

California (AB 1817): *Effective 1/1/2025*

- Prohibits manufacture, distribution, sale of any new, not previously used, textile articles containing intentionally added PFAS or as a contaminant above 100 ppm (2025), 50 ppm (2027).
- “Textile goods of a type customarily and ordinarily used in households and businesses”
 - accessories, handbags, backpacks, draperies, shower curtains, furnishings, upholstery, beddings, towels, napkins, and tablecloths.
- Requires manufacturer to provide certification to retailers, liability shield for retailer if in good faith

Enacted state legislation: Textiles (cont'd)

CO (HB 22-1345), WA (HB 1694), and MN (HF 2310) mirror CA requirements, except as follows:

- Narrower scope: Textile goods of a type customarily used in households and businesses, including but not limited to draperies, floor coverings, furnishings, bedding, towels, and tablecloths
- **CO:** Effective 1/1/25 for indoor textiles; 1/1/27 for outdoor textiles
- **WA:** Effective 1/1/26 for indoor textiles; requires reporting only for outdoor textiles, as of 1/1/24
- **MN:** Effective 1/1/25
- No provision for contaminants
- No retailer certification provision/no retailer liability shield

Maine PFAS notification requirement

Maine (LD 1503), enacted in 2021, amended in June 2023

- Requires manufacturers of products with intentionally added PFAS to report the intentionally added presence of PFAS in those products to the state
 - January 1, 2023 was the original effective date
 - The state has been delayed in issuing rules and therefore granted extensions to six months after issuance of the rules
 - State legislature passed subsequent amendment moving the compliance date to January 1, 2025
 - Rules are in the rulemaking process (public review and comments, revisions)
- Prohibits intentionally added PFAS in any product as of January 1, 2030 unless the state has granted an exemption due to unavoidable use

Washington State PFAS reporting and restrictions

HB 1694 (2022)

- Authorizes Washington Department of Ecology to issue regulations requiring the reporting of information regarding chemicals in products, with emphasis on PFAS
- State can request information on use of PFAS in products and then issue regulations restricting use
- Current restrictions:
 - Aftermarket stain and water resistance treatments (e.g., waterproofing spray): 1/1/2025
 - Carpets and rugs: 1/1/2025
 - Indoor textiles and furniture: 1/1/2026
 - Outdoor textiles and furniture: Reporting only as of 1/1/2024
- No current restrictions on use of PFAS in apparel, but it is our understanding that the state has sent information requests for PFAS in apparel and outdoor gear, foreshadowing regulation

California Proposition 65

WARNING: This product can expose you to chemicals including [name of one or more chemicals], which is [are] known to the State of California to cause cancer, and [name of one or more chemicals], which is [are] known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

- PFOS and PFOA listed as reproductive (developmental) toxins 11/10/17
- PFOS and its salts and transformation and degradation precursors listed as carcinogen 12/24/21
- PFNA and its salts listed as male reproductive toxicant 12/31/21
- PFOA listed as carcinogen 2/25/22
- PFDA, PFHxS, PFNA and PFUnDA (and their salts) are under consideration for listing as reproductive toxicants
- No safe harbor levels have been set for listed PFAS
- Enforcement has not been widespread—no clear trends yet



EU & UK Overview

- No current comprehensive ban or restrictions on PFAS as a chemical family
- Certain PFAS substances restricted or prohibited via REACH or the EU Persistent Organic Pollutants (POPs) regulation
 - REACH Annex XVII:
 - Perfluorinated carboxylic acids (C9-14 PFCAs, including PFNA, PFDA, PFUnDA, FPDoDA, PFTrDA, PFTDA)
 - REACH SVHC List:
 - HFPO-DA
 - PFBS
 - PFHpA
 - PFHxS
 - POPs
 - PFOS, PFOA, PFHxS

Proposed ban on PFAS



TESTING UPDATE



1. Total Organic Fluorine: *EN 14582:2016 or ASTM D7359:2018*

- Screening method - indicates presence of any fluorine
- Scope is “Characterization of Waste”
- Total combustion of Test Sample
- Does NOT differentiate between inorganic & organic fluorine
- Does NOT provide info on the specific fluorine compounds present
- Total fluorine content is not PFAS content, presence of non-PFAS fluorinated compounds
- NOT sufficient to demonstrate legal compliance with legally regulated PFAS
- Typical “Reporting Limit” of “Textile Method” as globally adopted by most commercial laboratories is generally 20 mg/kg
- Testing industry is attempting to improve test method to be able to determine “Total Organic Fluorine”

PRODUCT TESTING APPROACH FLUORINE

2. Analysis of Targeted PFAS: EN ISO 23702-1 for Leather; EN 17681 for Textiles

- Quantitative analysis for a limited list of specific PFAS substances
- NO reference standards for most PFAS
 - Lists = very selective & cover typically EU requirements (and additional voluntarily restricted PFAS)
- Low reporting limits, down to lower ppb ($\mu\text{g}/\text{kg}$) level, are achievable
- PFAS not specifically analyzed may be present
- NOT guaranteed that PFAS have not been used in production or that PFAS are not present in the sample as contamination

PRODUCT TESTING APPROACH TARGETED PFAS

PRODUCT TESTING

HOW TO CONTROL THE PRODUCTS

1. Check Total Organic Fluorine:

- if < 20 mg/kg (reporting limit), sample is PASS
- if > 20 mg/kg and < 100 mg/kg sample also PASS, PFAS considered as “Acceptable Contamination”

2. If Total Fluorine > 100 mg/kg:

- Sample is FAIL if PFAS have been applied for finishing

3. If no PFAS-based finishing has been applied:

- Provide evidence by Certificates from Chemical Suppliers (e.g., SDS or similar)
- Provide evidence by “Analysis of Targeted fluorinated compounds” that no restricted PFAS have been applied and that the source of “Total Organic Fluorine” is different from those banned PFAS

Q&A



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