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Evaluation of Published Bioaccumulation Data for Per- and Polyfluoroalkyl Substances (PFAS) Across Aquatic Species

Lawrence P. Burkhard and Colleen M. Elonen US-Environmental Protection Agency, ORD, CCTE, GLTED, Duluth, MN, USA.



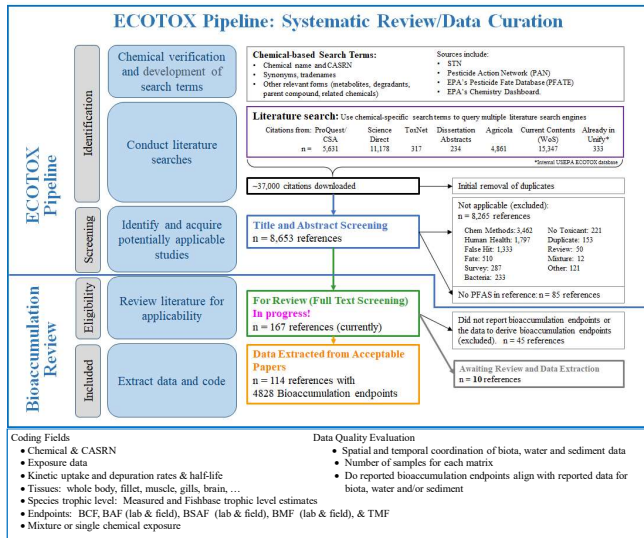
Lawrence Burkhard | Burkhard.lawrence@epa.gov | 218-529-5164

Introduction

PFAS chemicals are of concern to numerous stakeholders across the globe. A literature search for bioaccumulation information for PFAS compounds has been done, and coding of the data is in progress. This poster provides some initial results from the coding to date

Literature Search Strategy

Based upon ECOTOX literature search pipeline: Systematic Review and Data Curation procedures.



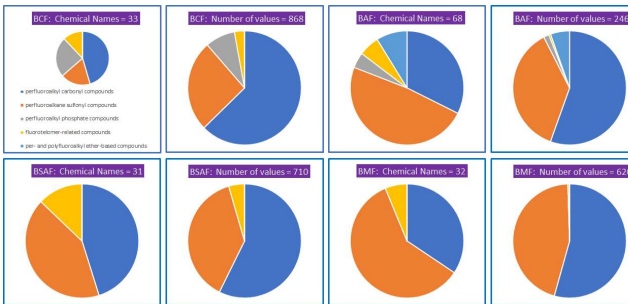
Results: Species Reported in the Literature

(biota - # of species)



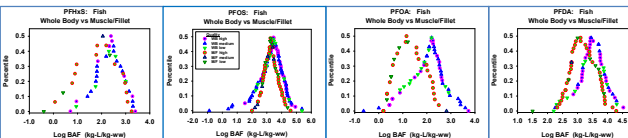
U.S. Environmental Protection Agency
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Results: Number of Chemicals & Bioaccumulation Values by OECD Category

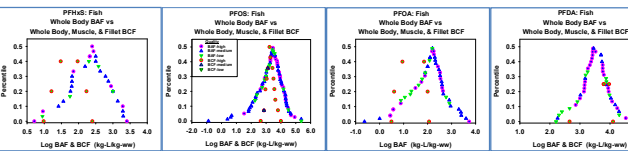


BCF = Bioconcentration factor. BAF = Bioaccumulation Factor. BSAF = Biota-Sediment Accumulation Factor. BMF = Biomagnification factor.

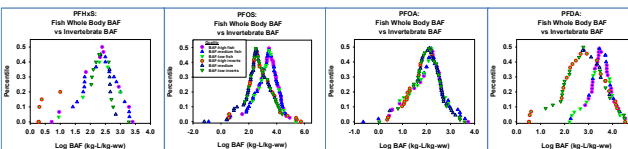
Results: Comparison of BAFs: Whole Body and Muscle/Fillet



Results: Comparison of Whole Body BAFs and Laboratory Measured BCFs



Results: Comparison of Whole Fish BAFs and Invertebrate BAFs



Symbols represent data from the literature. Different symbol shapes represent assessment of the quality of the published data as either of high (circles), medium (upright triangle) or low (inverted triangle) quality.

Conclusions

- Many species have measured bioaccumulation endpoints
- Most measurements are for carbonyl and sulfonyl compounds:
 - Primarily PFCAs and PFSA (OECD structure category 102 and 202)
- Differences exist between BAFs for based on whole body and muscle/fillet residues
- Differences exist between BAFs for based on whole body and BCFs measured in the laboratory
- Differences exist between invertebrate and fish BAFs

Results: All Measured BAFs and BCFs (L/kg) Reported in the Literature

	Log BCF Whole Body (L/kg)	Log BCF Muscle/Fillet (L/kg)	Log BAF Whole Body (L/kg)	Log BAF Muscle/Fillet (L/kg)
	average ± sd (n)	average ± sd (n)	average ± sd (n)	average ± sd (n)
Carboxylic Acids - OECD Structure Category: 102				
PFBA	1.18±0.08 (2)	-0.13±0.47 (4)	0.49±0.09 (3)	-0.78±0.11 (2)
PFPA		-0.83±0.22 (2)	2.31±2.89 (9)	
PFHxA	1.00±0.02 (2)	0.13±0.55 (4)	1.36±1.39 (16)	0.55±1.36 (9)
PFHpA		0.33±0.27 (2)	1.34±1.25 (12)	1.60±1.4 (9)
PFOA	1.45±0.83 (3)	1.20±0.76 (3)	2.04±0.93 (50)	1.28±0.84 (27)
PFNA	3.13±0.06 (2)	3.06±0.34 (2)	2.52±1.1 (46)	2.56±0.78 (25)
PFDA	3.88±0.13 (2)	3.51±0.76 (3)	3.49±0.59 (46)	3.15±0.60 (44)
PFUnDA	3.69±0.30 (4)	3.79±0.46 (3)	4.00±0.89 (24)	4.02±1.02 (27)
PFdODA	4.08±0.18 (4)	4.16±0.46 (3)	4.57± — (1)	4.79±0.45 (15)
PFTrDA	4.34±0.46 (2)	4.51±0.85 (2)		4.59±0.16 (3)
PFTEdA	4.60±0.56 (4)	4.76±0.55 (3)		4.38± — (1)
PFHDA	3.68±0.01 (2)			
PFODA	2.57±0.09 (2)			
Sulfonic Acids - OECD Structure Category: 202				
PFBS	1.37±0.11 (2)	-0.09±0.32 (3)	1.83±1.24 (4)	1.09±1.05 (10)
PFHxS	2.20±0.22 (3)	1.22±0.25 (3)	2.31±0.73 (31)	1.81±1.15 (17)
PFHpS			3.3±1.11 (80)	2.20± — (1)
PFOS	3.30±0.43 (11)	3.18±0.22 (4)		3.27±0.61 (50)
PFDS	2.63± — (1)		1.30± — (1)	
PFECIS			2.79±0.19 (4)	
Sulfonamides - OECD Structure Category: 203.01				
PFOSA			3.43±0.51 (7)	2.59±0.67 (19)
Sulfonamidoacetic acids - OECD Structure Category: 203.05				
MePPSOAA			4.10±0.16 (2)	
EtPPSOAA			2.94±0.96 (3)	
Perfluorooctane sulfonyl amide ethanol, phosphate esters (SAMPAPs) - OECD Structure Category: 203.02				
L-SAMPAP	1.42± — (1)			
Phosphonic acids - OECD Structure Category: 302				
PFHpPA	1.47±0.36 (2)	1.44±0.14 (2)		
PFOPPA	1.92±0.13 (2)	1.75±0.12 (2)		
PFDPa	2.21±0.13 (2)	1.87±0.04 (2)		
Phosphonic acids - OECD Structure Category: 303				
C6C6 PPPIA	5.13±0.71 (2)	5.51±0.16 (2)		
C6C8 PPPIA	7.36±1.24 (2)	7.03±0.88 (2)		
C8C8 PPPIA	8.30±0.89 (2)	7.44±1.43 (2)		
C6C10 PPPIA	8.53±1.01 (2)	7.78±1.43 (2)		
C8C10 PPPIA	5.79±0.07 (2)	5.40± — (1)		
C6C12 PPPIA	6.31±0.98 (2)	5.35±1.56 (2)		
n2 fluorotelomer alcohol, phosphate esters (PAPs) - OECD Structure Category: 402.04				
6:2 diPAP			1.78± — (1)	
Fluorotelomer alcohols - OECD Structure Category: 402.03				
8:2 FTOH			2.50±0.42 (2)	
Fluorotelomer sulfonate - OECD Structure Category: 402.07				
4:2 FTSA			4.14± — (1)	1.49± — (1)
6:2 FTSA	1.02±0.76 (2)		4.86±0.41 (2)	3.70±0.56 (4)
8:2 FTSA				
PFCAs, salts and esters - monoethers - OECD Structure Category: 502.01				
F-53B			4.24±0.11 (4)	3.87±0.04 (4)
6:2 Cl-PFESA			2.91± — (1)	
8:2 Cl-PFESA			4.69± — (1)	
HFPO-DA			0.61± — (1)	
PFCAs, salts and esters - diethers - OECD Structure Category: 502.02				
HFPO-TA			1.05± — (1)	

The views expressed in this poster are those of the authors and do not necessarily reflect the views or policies of the U.S. EPA.