Progress report

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Alin Ionas (ESR 1)

Supervisor: Adrian Covaci

Universiteit Antwerpen

Projects

1. Simplifying screening of FRs in dust through fractionation

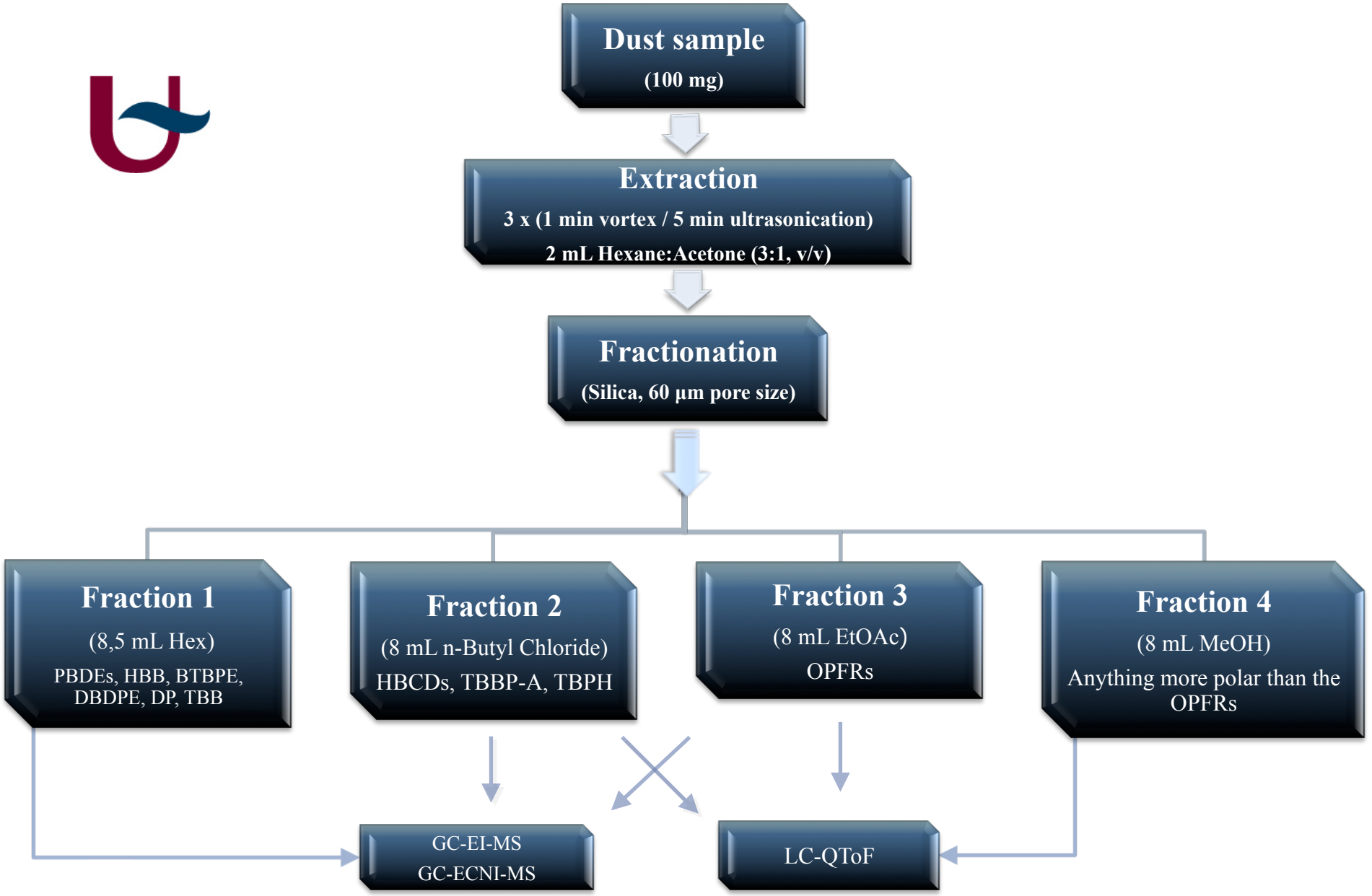
2. Screening of dust from electronics stores, homes and offices for FRs

3. Analysis of US dust (California) in collaboration with the Silent Spring Institute (SSI)

4. Analysis of FRs and plasticizers from children's toys

1. Simplifying screening of FRs in dust through fractionation

- Objective: separation of different classes of FRs in clear-cut fractions to avoid coelutions and allow easier detection
- Extraction type: SPE (tested: florisil, silica, alumina, Oasis HLB)
- After some fine-tuning, the PBDEs, NBFRs, HBCDs and OPFRs were separated in different fractions


Dust sample
(100 mg)
Extraction
3 x (1 min vortex / 5 min ultrasonication)
2 mL Hexane:Acetone (3:1, v/v)
Fractionation
(Silica, 60 µm pore size)
Fraction 1
(8,5 mL Hex)
PBDEs, HBB, BTBPE, DBDPE, DP, TBB
Fraction 2
(8 mL n-Butyl Chloride)
HBCDs, TBBP-A, TBPH
Fraction 3
(8 mL EtOAc)
OPFRs
Fraction 4
(8 mL MeOH)
Anything more polar than the OPFRs
GC-EI-MS
GC-ECNI-MS
LC-QToF

2. Screening of FRs in dust from electronics stores, homes and offices for FRs

- 21 dust samples in total, 5 of which from electronic stores
- The same fractionation procedure was applied; analysis was purely qualitative
- Data analysis is still in progress; identified so far:
  - PBDEs, DBDPE, BTBPE, HBB, HCB, Cl-NonaBDE
  - TBPH, TBBP-A, HBCDs
  - TEP, TBP, TCEP, TBEP, EHDPP, TPhP, TCP & related

3. Analysis of US dust

- 35 dust samples from homes received from SSI for multi-residue analysis
- 2 different SPE based extraction/clean-up methods (Florisil, Silica) were applied and employed 3 types of instrumental analyses
- The results are currently being processed

3. Analysis of US dust

- The list of compounds analysed is quite comprehensive:
  - CB 153, CB 180
  - TC, CC, TN, pp-DDE, pp-DDD, pp-DDT
  - BDE 28, 47, 66, 100, 99, 85, 154, 153, 183, 197, 203, 196, 209
  - HBB, HCDBCO, TBB, BTBPE, TBPH, DBDPE, TBBPA-dbpe, TBBPA, alpha-TBECH, beta-TBECH, gamma-TBECH, delta-TBECH, ATE, BATE, DPTE, alpha-TBCO, beta-TBCO, OBIND
  - BB 80, BB 103, BB 153, BB 180, BB 209
  - syn-DP, anti-DP
  - alpha-HBCD, beta-HBCD, gamma-HBCD
  - TEP, TnPP, TiBP, TnBP, TCEP, TCPP, TBEP, TEHP, TPhP, EHDPP, TCP, TDBPP, TDCPP

4. Analysis of FRs and plasticizers from children's toys

- 46 toy samples were collected and categorised by material
  - Soft plastic toys
  - Hard plastic toys
  - Rubber toys
  - Wooden toys

- Different extraction procedures were developed for each type of material

4. Analysis of FRs and plasticizers from children's toys

- Main issue: extracting the organic contaminants from the hard plastic matrix
- Current solution: freezing samples in liq. N_2 and pulverising them in a mixer mill (Retsch MM 400) → got ~60% recovery so far
- Efficiency of the method is assessed by using the ERM-EC590 and 591 reference materials for BFRs in polymeric matrices (LDPE and LDPP)
- For other matrices: less problems with the extraction

4. Analysis of FRs and plasticizers from children's toys

- 29 samples analysed so far
  - 3 contained BFRs:
  - 5 contained OPFRs:

Analyte	PentaBDEs	DecaBDE	HBCD
Count	1	3	1

Analyte	TCEP	TCPP	TBEP	TPhP	EHDPP
Count	3	3	1	3	1

- Just one sample had high enough DecaBDE concentrations to impart flame retardancy: 0.14 mg/g sample

Future perspectives

- Fine-tune the methods for analysing toy samples and investigate the feasibility of using a handheld XRF to screen plastic matrices for FRs and Sb.
- Prepare abstracts for the Dioxin 2012 Symposium
- Prepare poster for the ISEAC-37 Symposium
- Report on the unexpected halogenated compounds identified in eel samples from Burrishoole, Ireland (Eeliad)

Thank you for your attention