

SPECIFIK MIGRATION OF METALS IN FOOD PACKAGE

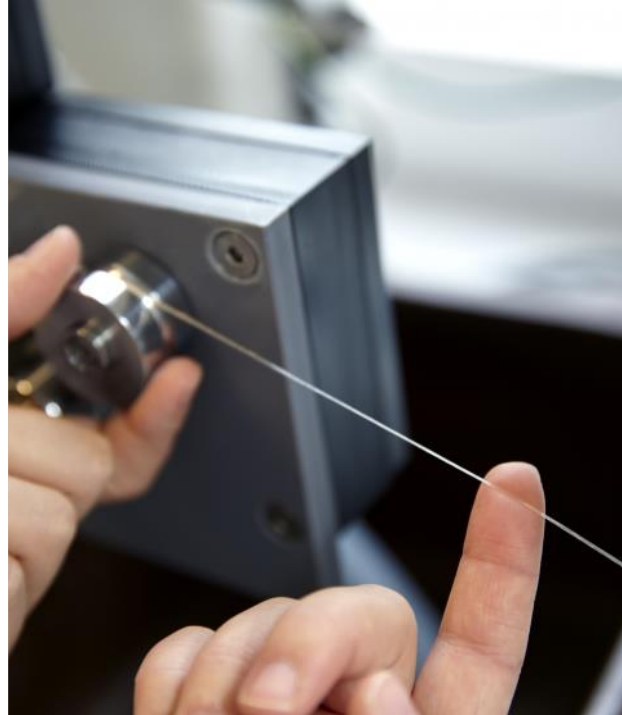
Chatleen Karlsson

Mars 2018

Research Institutes of Sweden

RISE Bioeconomy

Biomaterials/Chemical Analysis



Who is deciding what and how we shall analyse



- Regulation
 - EU, BfR, FDA
- Customer
 - Food packing
 - Toys
 - Household items
 - Cosmetics packing
- Normpack - for safer materials in contact with food
 - The aim is that consumers should be able to rely on the safety of materials in contact with food.
 - Our society is becoming increasingly chemical-based, and the regulations governing are constant changing and updated.
 - Normpack helps companies to find out what requirements apply to their products.
 - Normpack issues certificates for compliance with both Swedish and European regulation.



Normpack is Ann Lorentzon, Kristina Salmén and Hans Steijer

Specific migration of metals

- Definition: *migration of metals* with a certain solvent and in combination with time and temperature
 - The sample is plastic food package or equipment used in the food industry
 - The purpose is to see if any metals is migrating out of the packaging material into the food
- Role of solvent and conditions
 - Solvent should act as a food simulant
 - Temperature and time is decided by the type of package use



Samples



Sample preparation

- The sample is filled, dipped or placed in a cell with solvent
 - SS-EN 1186
 - Sample material and construction
 - Area of sample
 - Volume of solvent
 - Also take notice if print and glue will be included in the analysis
 - Fat food, water based or sour food



Sample preparation

- The sample with its solvent is placed in suitable temperature for a decided time (worst case)
 - Microwave containers-cold long/warm short
 - Baking cups-warm short
 - Coffee mugs-warm short
 - Ice-cream containers-cold long or cold short
 - Long storage like ketchup bottles-medium long
 - Plastic cutlery-medium/warm short



Analysis of the solvent

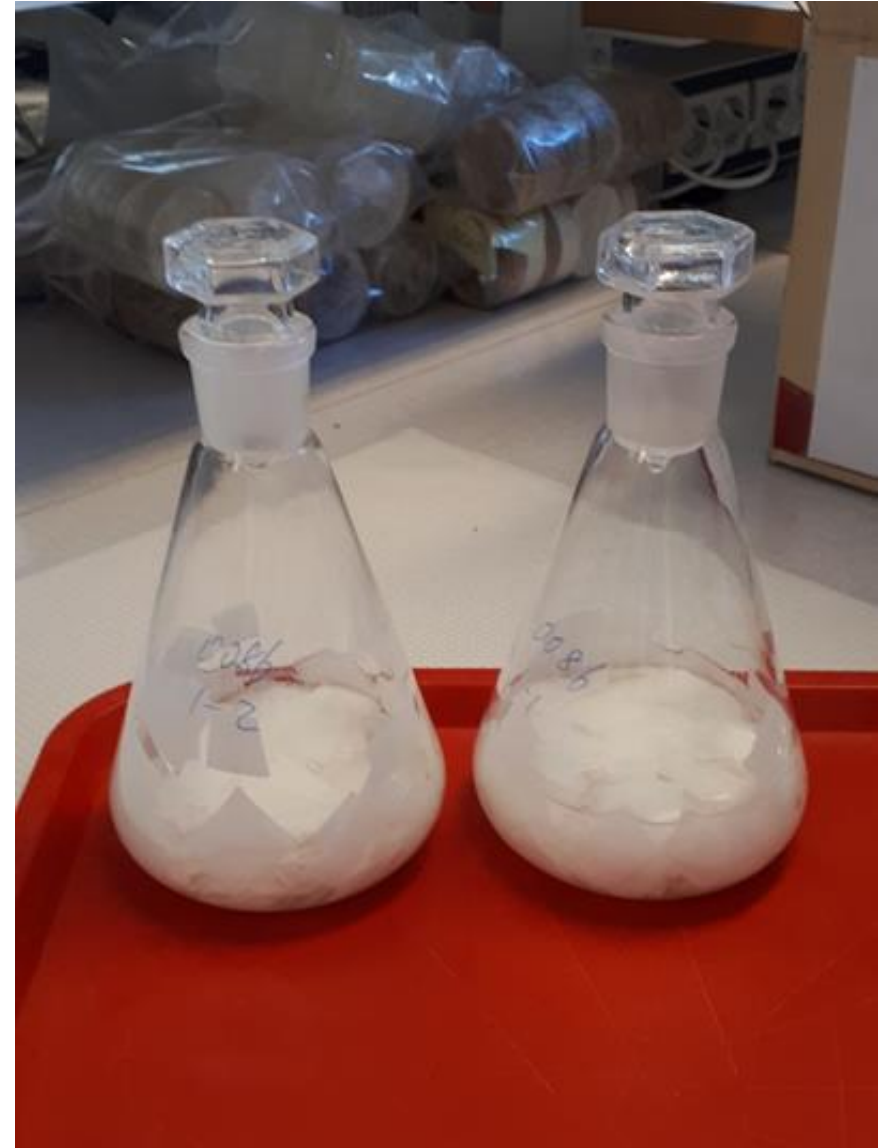
- The solvent is decanted and analysed by ICP-OES
 - ISO 11885
 - Water with acetic acid
 - Accredited: Ba, Co, Cu, Fe, Li, Mn, Zn (legislation EG no 10/2011)
 - Also Al and Ni for future legislation
- Report limits
 - Reporting limit to customer is regulated by legislation EG no 10/2011
 - Our quantification limits must be lower than reporting limit
 - This is controlled by use of control samples and proficiency test
 - Result is reported to customer as mg metal/kg simulant and mg metal/m² sample

Quantification and reporting limits in plastic

Metals	Ba	Co	Cu	Fe	Li	Mn	Zn	Ni	Al
L 10/2011 (mg/kg)	1	0.05	5	48	0.6	0.6	25		
L2017/ 752 (mg/kg)								0.02	
L2016/1 416 (mg/kg)							5		1
Our LOQ	0,001	0,001	0,0005	0,002	0,0001	0,0002	0,001	0,003	0,02
We report (mg/kg)	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01

Water extractions

- Cold or warm water extraction by paper samples
 - Paperboard used for cold storage, napkins or baking paper
 - Sample is cut in pieces and extracted with water, hot or cold
 - The water is filtrated and conserved with acid
 - Water is analysed with ICP-OES
 - Ar, Ba, Cd, Cr, Pb, Sb, and Se
 - Metals is reported as mg extractable amount /kg dry sample.
 - Limits is regulated i.e by BfR XXXVI



Quantification and reporting limits in water extraction of paper

Metals	As	Ba	Cd	Cr	Pb	Sb	Se
BfR XXXVI(µg/l)			16		120		
EN 71-3 (µg/l)	250	10000	(750)	600	(900)	600	5000
Our LOQ (µg/l)	32	0,1	3,6	1,4	4,9	7,9	32
We report (µg/l)	50	10	5	5	50	100	100

What kind of problems do we have with our ICP-OES?

- The reporting limits is getting lower for some elements
- We can not analyse metals in organic solvents
- We can not analyse mercury
- Contamination from scissors, glass wear, filter papers, aluminium foil
- Al is disturbing As and Pb



TACK!

Chatleen Karlsson

chatleen.karlsson@ri.se

+46 8 676 7029

Research Institutes of Sweden

RISE Bioeconomy

Biomaterials/ Chemical analysis

