

Migration from Food Contact Materials (FCM)

Jens Højslev Petersen

"ICoMST 2009"
Copenhagen, 18. August 2009

jhpe@food.dtu.dk
www.food.dtu.dk

DTU Food
National Food Institute



This Presentation

- General legislative requirements for food contact materials (FCM) sold in the EU.
- GMP and requirements for documentation in the FCM production chain.
- Cases 1 and 2: Plasticisers in FCM for meat products
- Case 3: Migration of printing ink components
- Recipe for ensuring safe FCM in practical life

Legislative requirements in the FCM Framework regulation, EC 1935/2004

- **Requirement for Good Manufacturing Practice**
- **Fundamental principles about**
 - “Inertness” of materials and “Pure” foodstuffs
- **No transfer of substances to the foodstuffs in quantities which could**
 - bring an unacceptable change in the composition of the foodstuffs or
 - endanger human health or
 - give rise to deterioration in the organoleptic properties.

Material and Articles in contact with food- many different materials

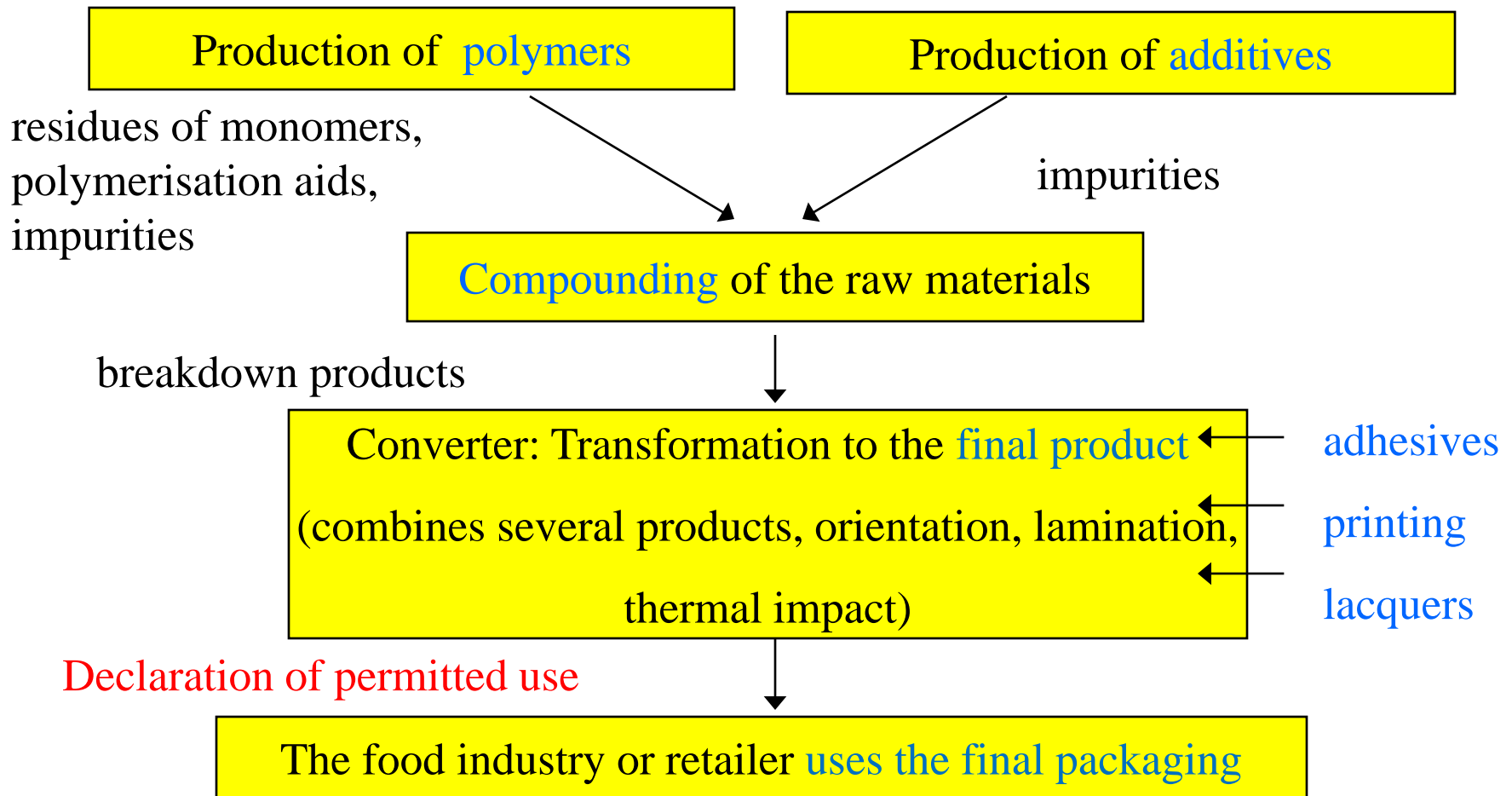
- Plastic
- Regenerated cellulose
- Ceramics
- Metals and alloys
- Paper and board
- Silicones
- Rubber
- Wood
- Cork
- Stones
- Glas
- Coatings + lacquers
- Adhesives
- Printing inks



Good Manufacturing Practice (GMP)

- Framework regulation require ensuring of safety and inertness by GMP (EC 2023/2006)
- EC 2023/2006 specify minimum requirements for
 - Quality assurance system
 - Process design and operation
 - Premises and equipment
 - Qualification of staff
 - Documentation
 - Quality Control
- Annex on printing inks and recycled plastics
- Applies from 1. August 2008

GMP from Raw Material to Final Packaging

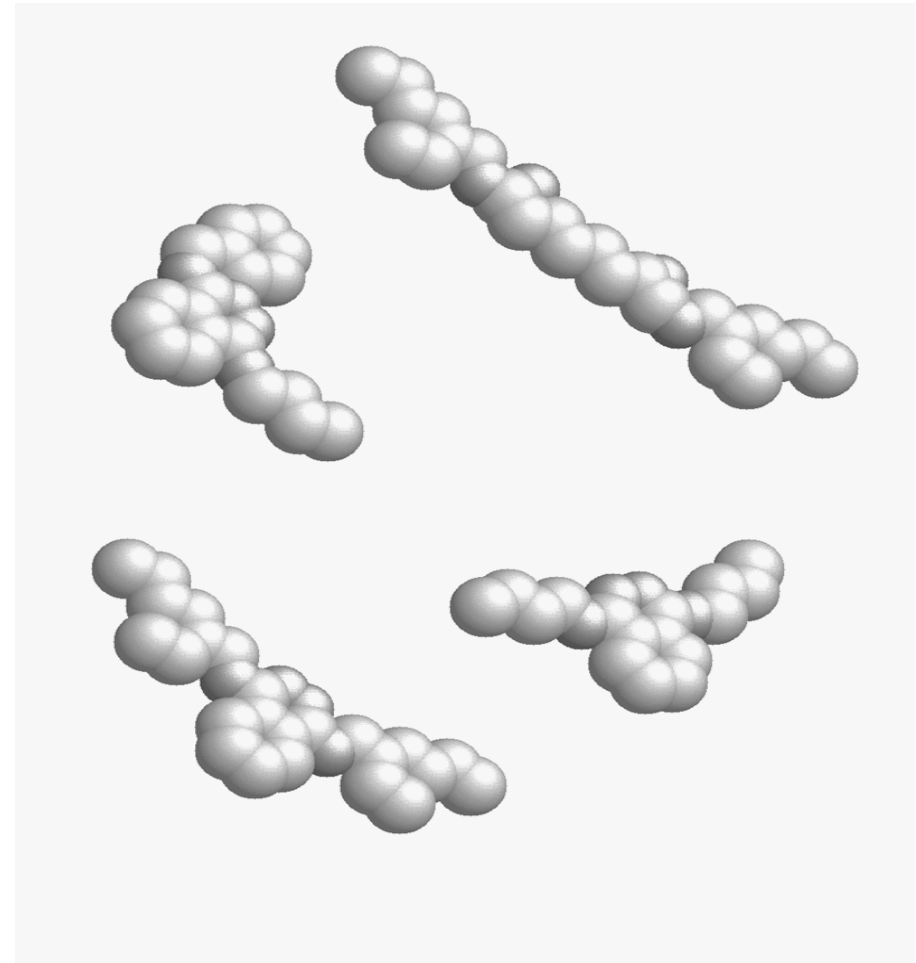


Cases about plasticisers in FCM

Adipates and Phthalates

DEHA common in plasticised PVC Cling film

Phthalates can be found in gaskets in metal lids, tubes used in food industry, in gloves, in conveyor belts etc.



Case 1: Fresh meat products packed in retail shops with own butcher

- PVC cling-film plasticised with 16-21% DEHA. PS-trays
- Standard manual and machine packaging equipment
- Specific migration limit (SML) for DEHA: 18 mg/kg



DEHA in fresh pork meat. Covered once with DEHA plasticised PVC film

Sample type	Fat (%)	Duration of contact (days)	DEHA-level (mg/kg)
Slices of pork leg	2	4	1-2
Neck loin	16	4	3-7
Minced meat	19	1	17-26

DEHA in worked-up samples having contact one to four times with fresh PVC-film

Sample type	Duration of contact (days at 5°C)	DEHA-level (mg/kg)
Neck loin	4	11
Neck chop	3+4	18
Minced meat	3+3+1	39
Meatballs (warm)	3+3+1 +1 (at 65°C)	75

Suitability of alternative types of cling film on the market

Comparing performance of PE, Polyolefin/EVA, PS and PVC clingfilm

- mechanical properties,
- migration potential,
- shelf life (colour, microbiology, lipid oxidation),
- total appearance of meat packaging

Polyolefin/EVA film are real alternatives to PVC !

Modification of packaging equipment necessary.

Case 2: Phthalates in FCM

- New legislation minimise the legal use of certain phthalates in FCM – especially for fatty foods.
- FCM legislation now more in line with legislation for toys (potential endocrine disruptors)



Outcome of the EFSA re-evaluation of some phthalates, 2005

Type of phthalate	Tolerable daily intake in mg/kg bw/day	Remarks
Di-(2-ethylhexyl) (DEHP)	0,05	
Benzylbutyl (BBP)	0,5	
Di- <i>iso</i> -nonyl (DiNP)	0,15	Group TDI with DiDP
Di- <i>iso</i> -decyl (DiDP)	0,15	Group TDI with DiNP

What parameters to control for enforcement

<i>From July 2008</i>	SML	Qm	In single use FCM			In repeated use FCM		
Substance	(mg/kg food simulant)	(% in the plastic)	Fatty food	Infant food	Non-fatty food	Fatty food	Infant food (non-fatty)	Non-fatty food
DEHP	1.5	0.1	Qm			Qm	SML	
DBP	0.3	0.05	Qm			Qm	SML	
BBP	30	0.1	Qm		SML	SML		
DiNP	9	0.1	Qm		SML	SML		
DiDP	9	0.1	Qm		SML	SML		

Results of official control samples from producers and importers (of FCM or Food)

Sample type	No of samples	No with DBP or DEHP > Qm	Frequency of violations (%)
Gloves	14	1	7
Conveyor belts	6	6 (2 types)	100
Lids (un-used)	4	0	0
Lids (imported, in use)	19	8 (4 types of food)	42 (21)
Bottles, containers, cutlery, kitchen- and tableware	24	0	0
Total	67	15 (6)	22 (9)

Future work on plasticisers

- In 2009 our activities will continue in this field.
- We still miss a few types of FCM -samples.....
- Focus on FCM for children



Recent problems related to non-authorized printing ink substances

Photoinitiators

- ITX (Isopropylthioxanthone)
- Methyl-benzophenone

Plasticisers

- NETSA (N-ethyl-toluene-sulphonamide)

Mechanisms:

- set-off,
- transfer via headspace and
- migration through “functional barrier” plastics

Case 3: Testing multilayer plastics for potential migration of printing inks and NIAS

- 26 Multilayer plastics for fatty foods (like processed meat).
- Extraction of printed as well as unprinted areas of the film
- Number of substances in significant amounts identified using GC and LC-MS methods in average
 - 3 substances per film
 - 1.5 ink related substances per printed film
- Single sided migration test: e.g. Tri(2-ethylhexyl)mellitate and NETSA but below “level of concern”
- No relevant producer-information was available for inks

Recipe for ensuring safe FCM in practical life

Recognise that all stakeholders in the production chain of a FCM or a packed foodstuff are responsible and must take responsibility for their part. Knowledge about the legislation is obligatory

(http://ec.europa.eu/food/food/chemicalsafety/foodcontact/eu_legisl_en.htm) !

- Have in place procedures to ensure traceability and issue valid documentation for compliance with legislation
- Ensure as much transparency as possible between links in the production chain (confidentiality may be a problem)
- Compliance documentation must be available up-streams in the production chain for control by the **Food Inspectors**