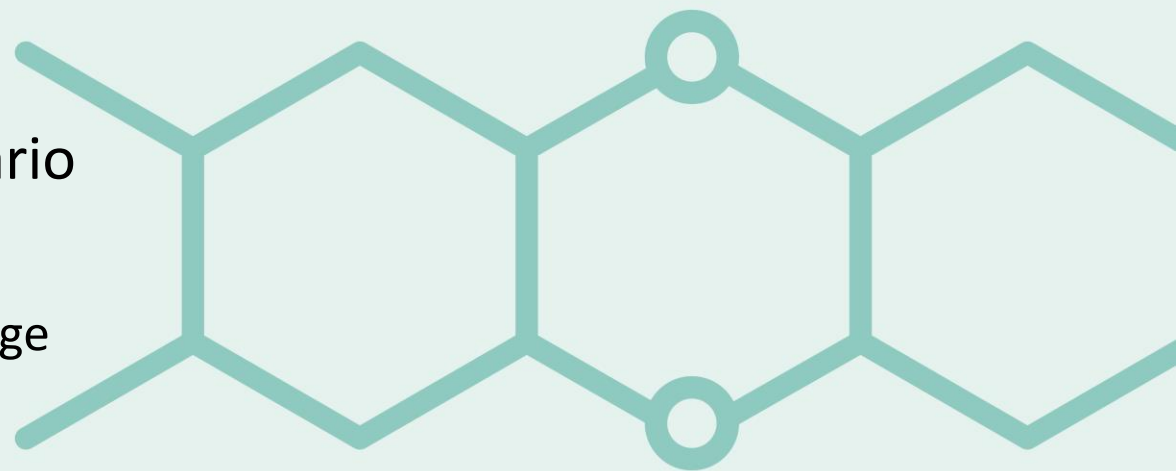


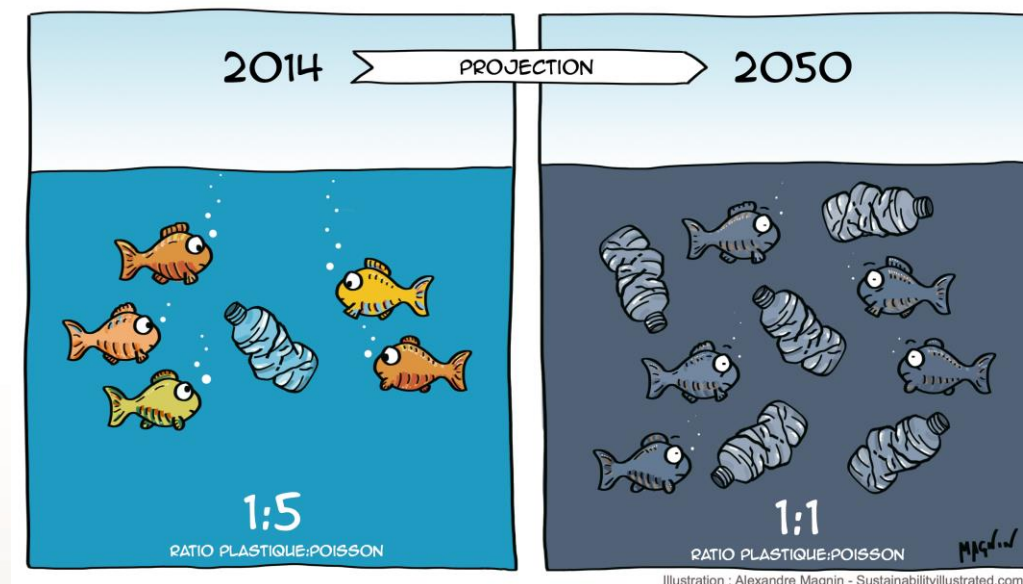
Investigation of potential migratables from paper and board food contact materials intended for takeaway

Mélanie Di Mario
Sciensano
University of Liège



Do you remember your childhood?

Happy Birthday
90's



- 1 July 2021: Ban on single-use plastics in the EU (plates, straws, cutlery, cups, etc.)
- 2 **Reusable** packaging options, limit **overpackaging**
- 3 Decrease the need for **virgin materials**
 - 40% of plastic
 - 50% of paper
- 4 Boosting Europe's **recycling** capacity

Need for greener alternatives

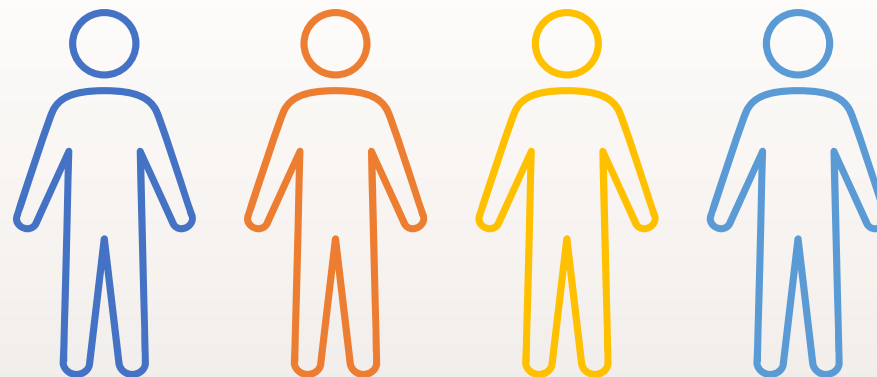
Paper and board FCM



Is there any migration of substances into food?

Are the substances harmful for human health ?

Are paper and board FCM a real alternative?



Objectives



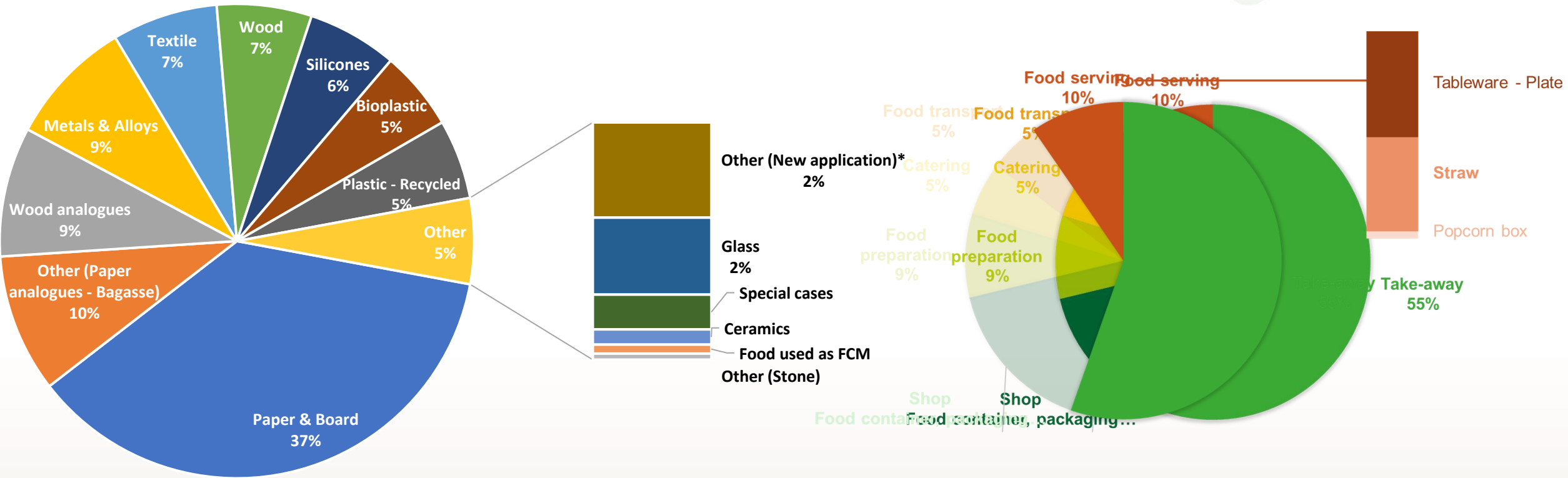
SAMPLING

**EXTRACTION
EXPERIMENTS**

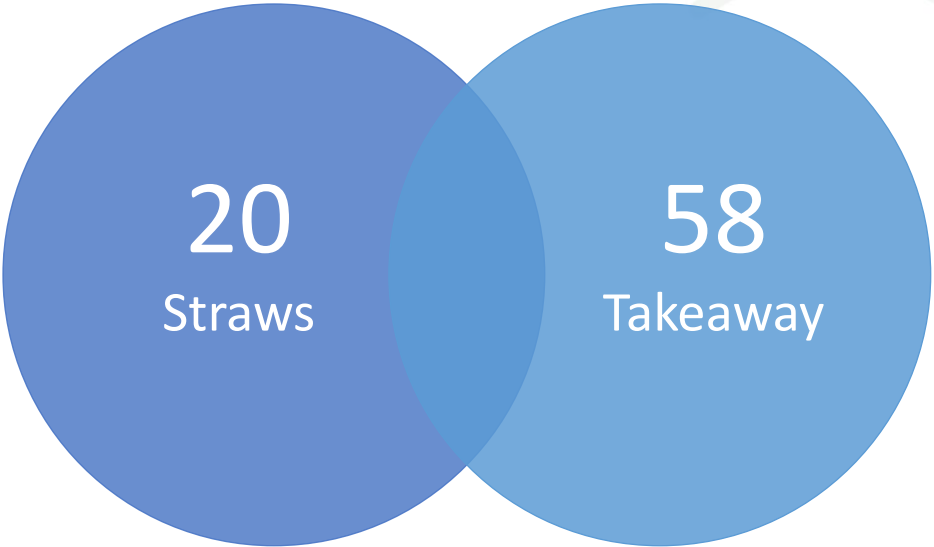
TARGETED ANALYSES

RISK ASSESSMENT

Sampling



Sampling



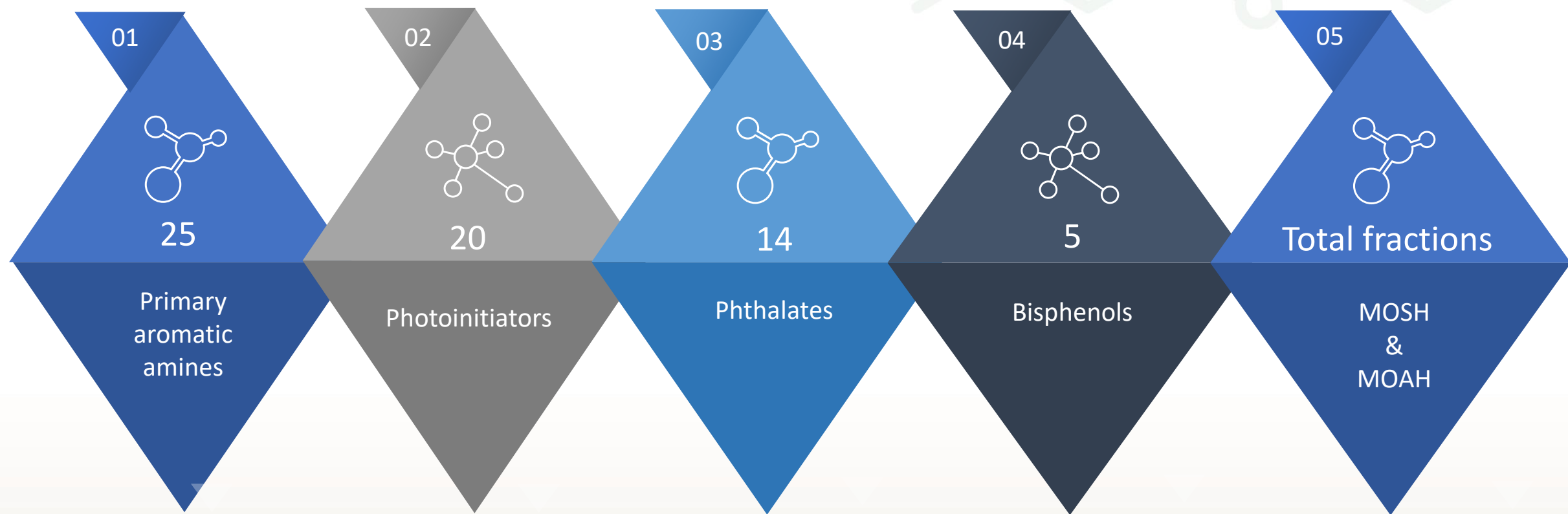
7 fast food
restaurants



78 samples



Targeted substances



Total : **66** compounds

Experimental strategy

EN 645

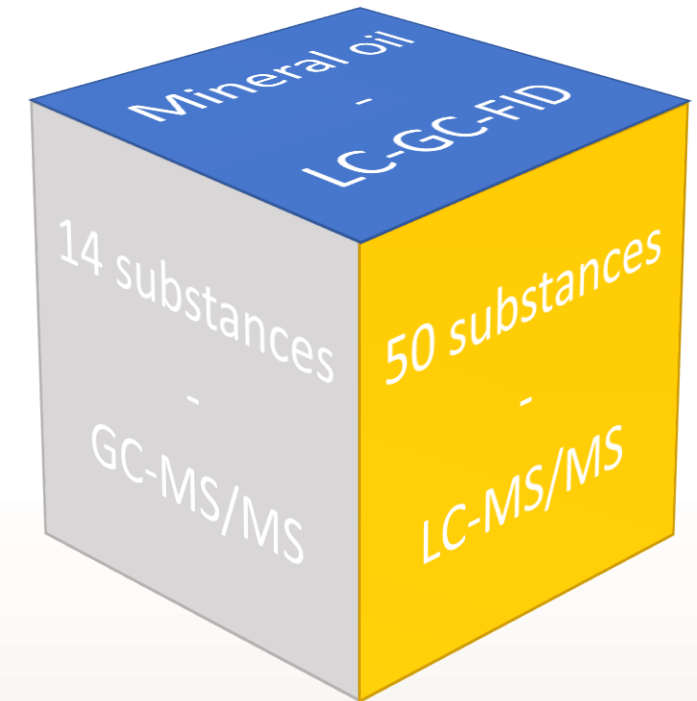
Paper and board intended to come into contact with foodstuffs;
Preparation of a cold water extract

EN 15519

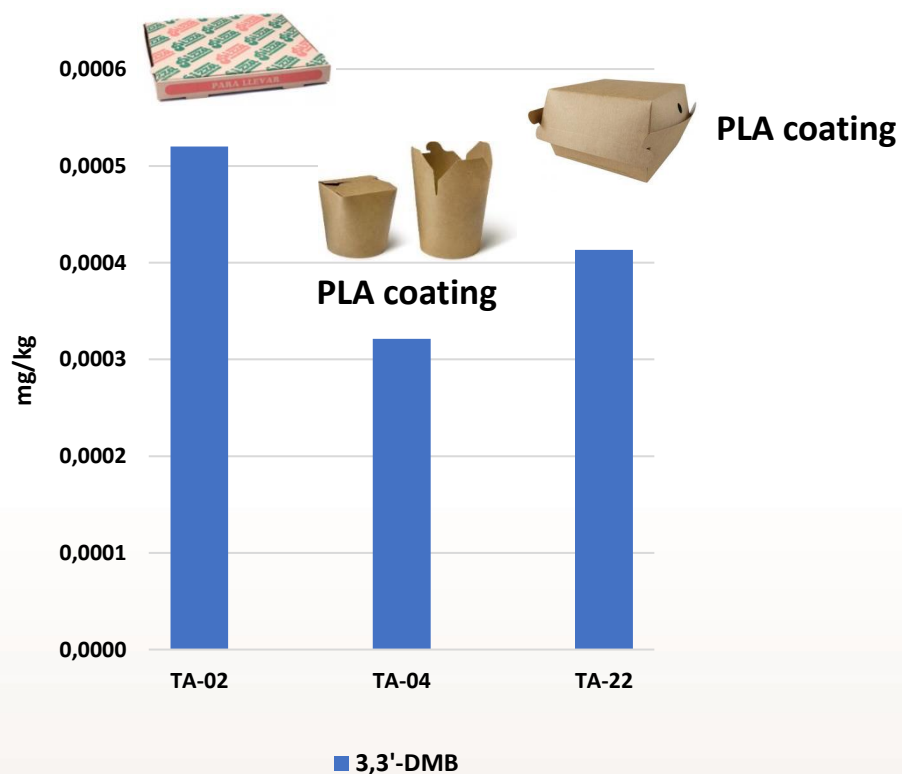
Paper and board intended to come into contact with foodstuffs;
Preparation of an organic solvent extract

Bfr procedure

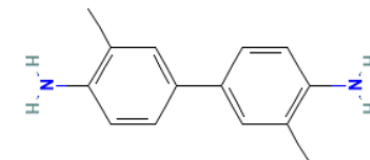
Determination of hydrocarbons from mineral (MOSH & MOAH) or plastics (POSH & POA) in packaging materials and dry foodstuffs by solid phase extraction and GC-FID



Primary aromatic amines



1 amine found out of 25 in
3 samples out of 78 (3.8%)



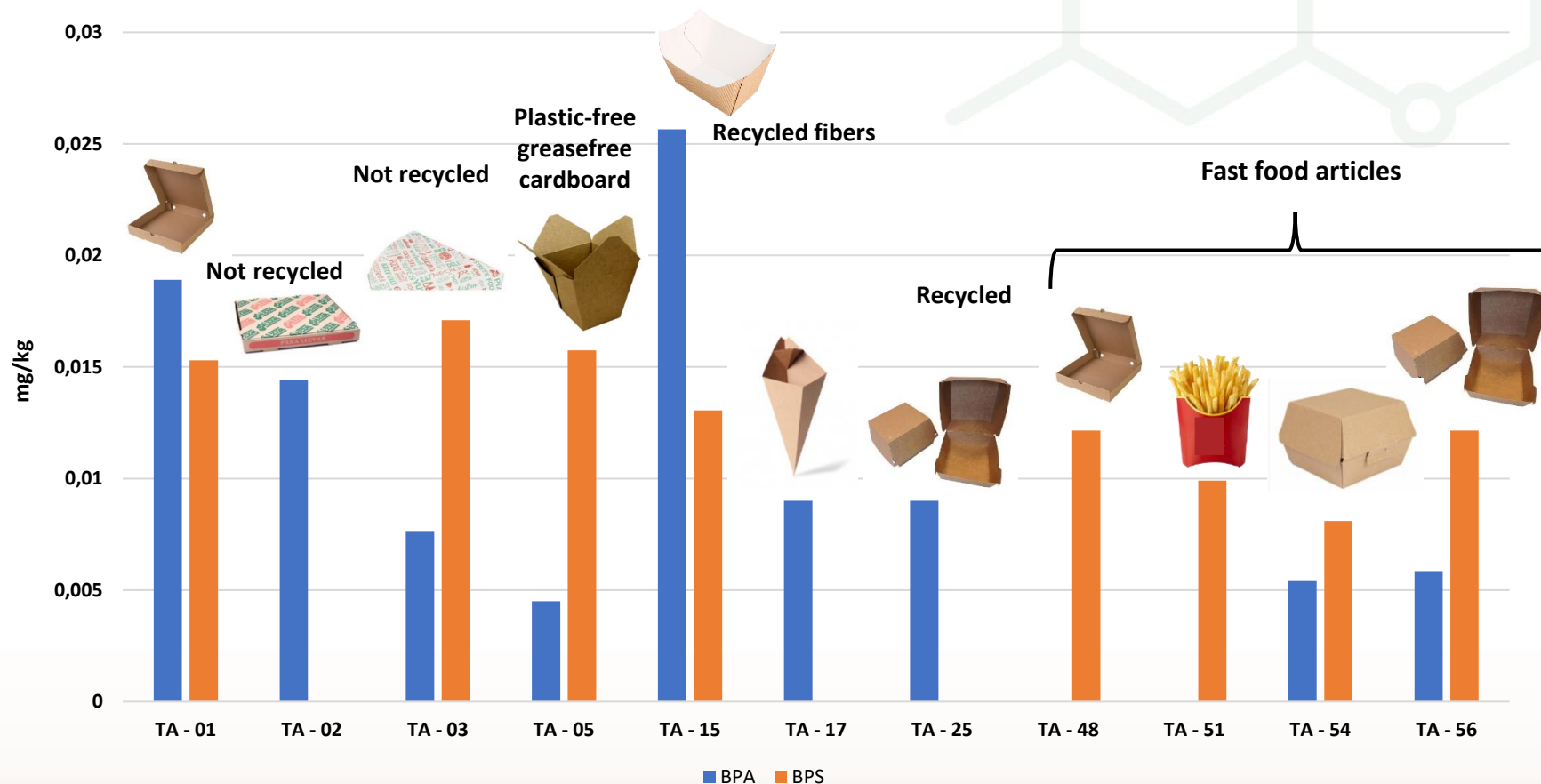
3,3'-DMB is carcinogenic



Can be use in the production of azo dyes and
insoluble pigments in the paper industries

Is used in the production of plastics for coating

Bisphenols

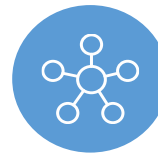
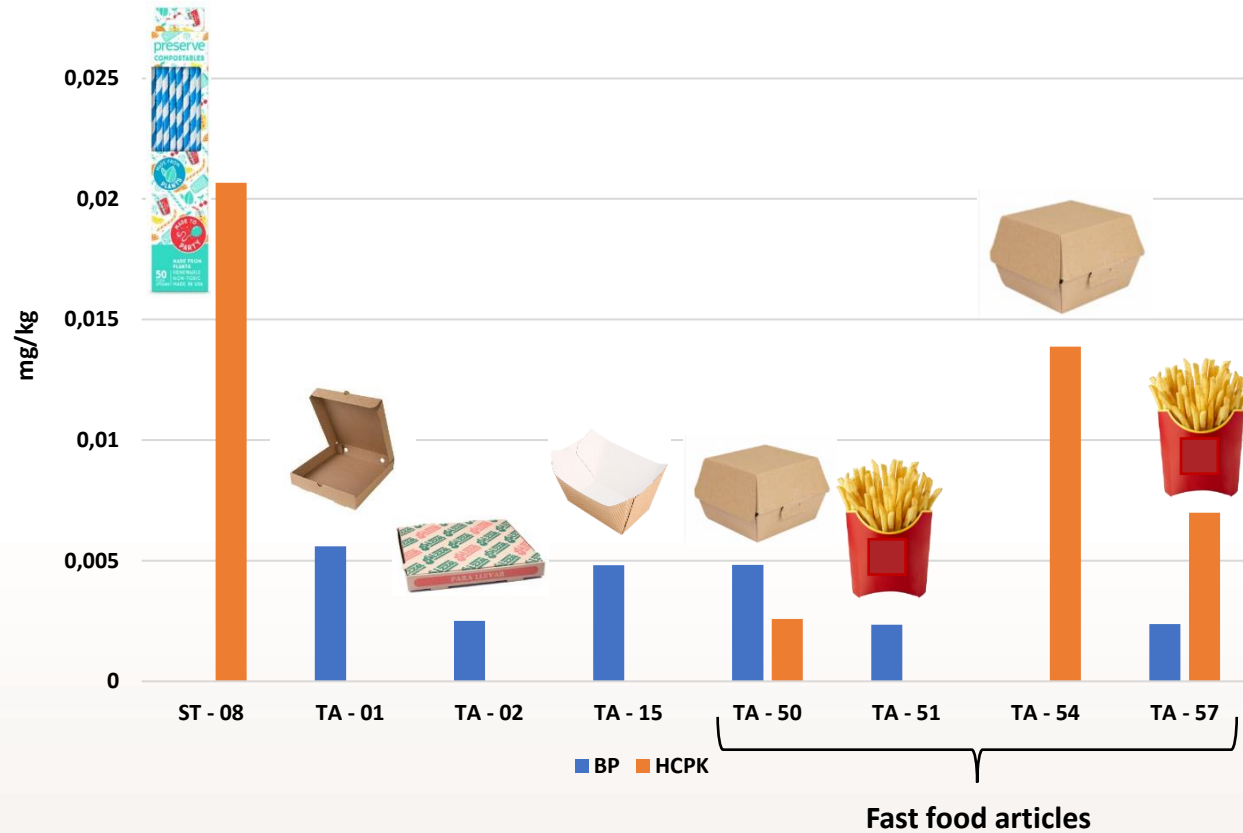


2 bisphenols found out of 5
11 samples out of 78 (14.1%)

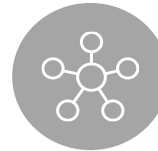


BPS ranging from 0.008 up to 0.017 mg/kg
BPA ranging from 0.004 up to 0.026 mg/kg

Photoinitiators



2 photoinitiators found out of 20
8 samples out of 78 (10.2%)

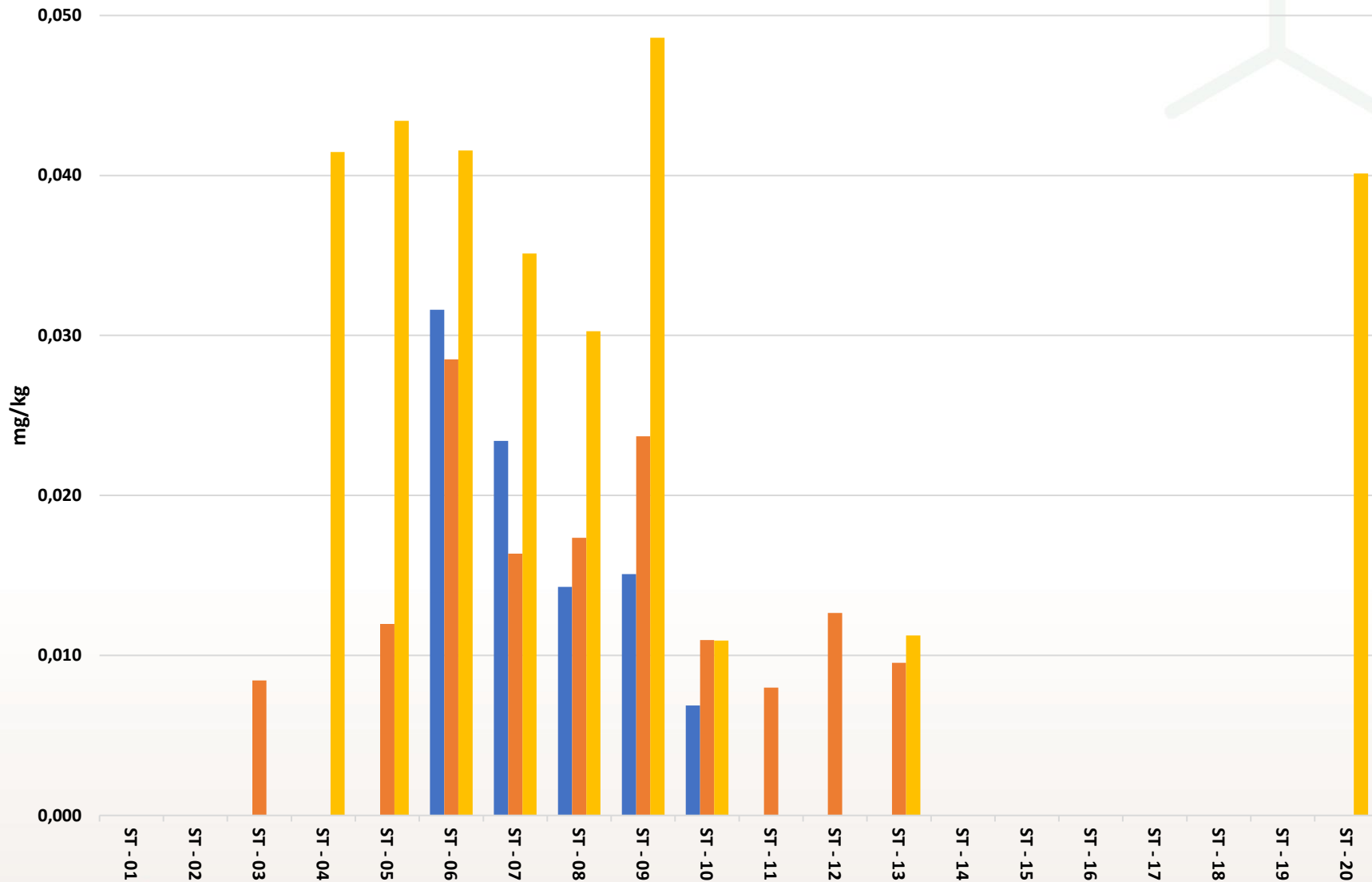


Benzophenone ranging from 0.0023 up to 0.005 mg/kg
HCPK ranging from 0.003 up to 0.02 mg/kg



Photoinitiators are used in the UV curing processes of
inks and lacquers applied to the packaging surface,
mainly cardboard boxes

Phthalates in straws



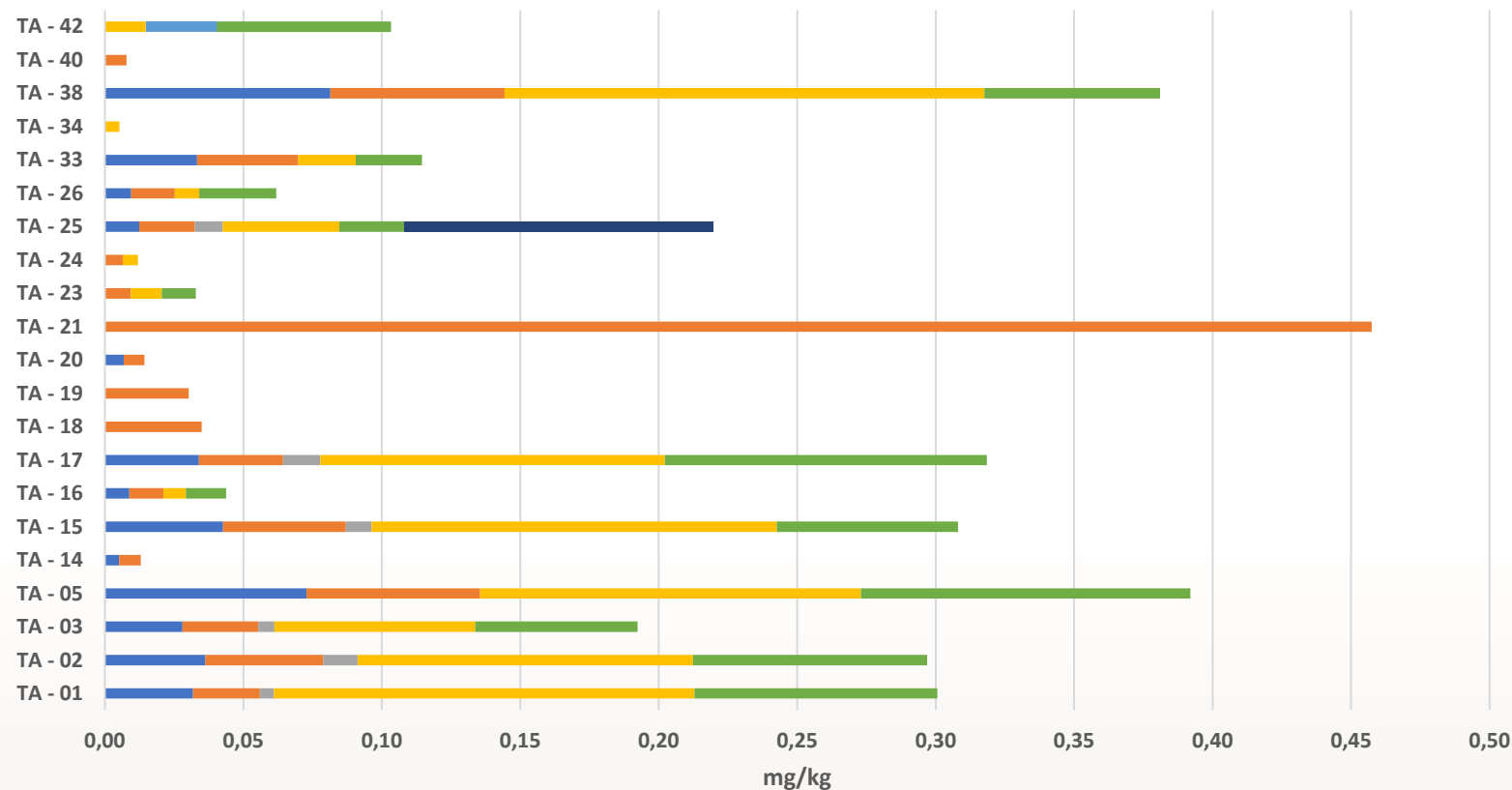
3 phthalates found out of 14
12 samples out of 20 (60%)

■ DBP
■ DiBP
■ DEHP

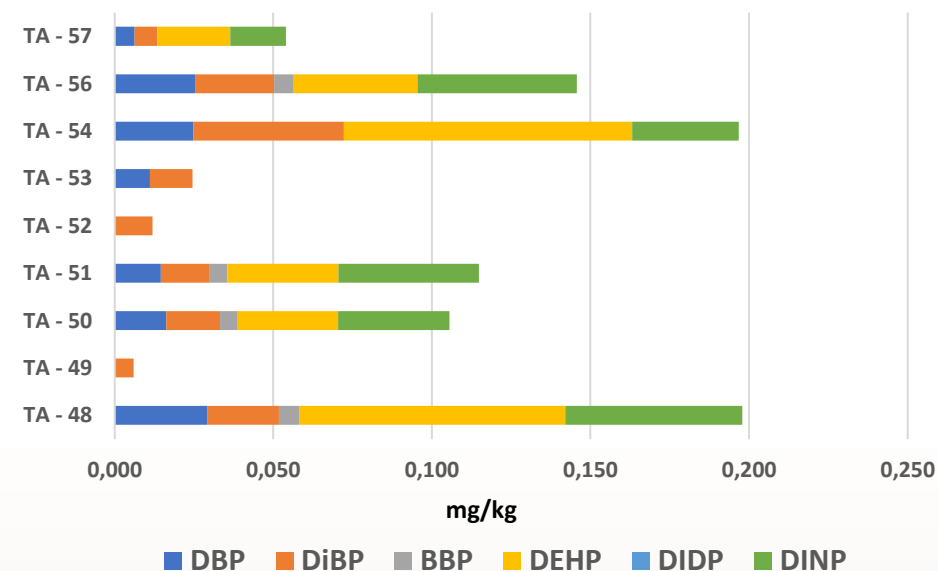
Phthalates in takeaway articles



Concentrations of phthalates in takeaway samples



Concentrations of phthalates in fast food samples

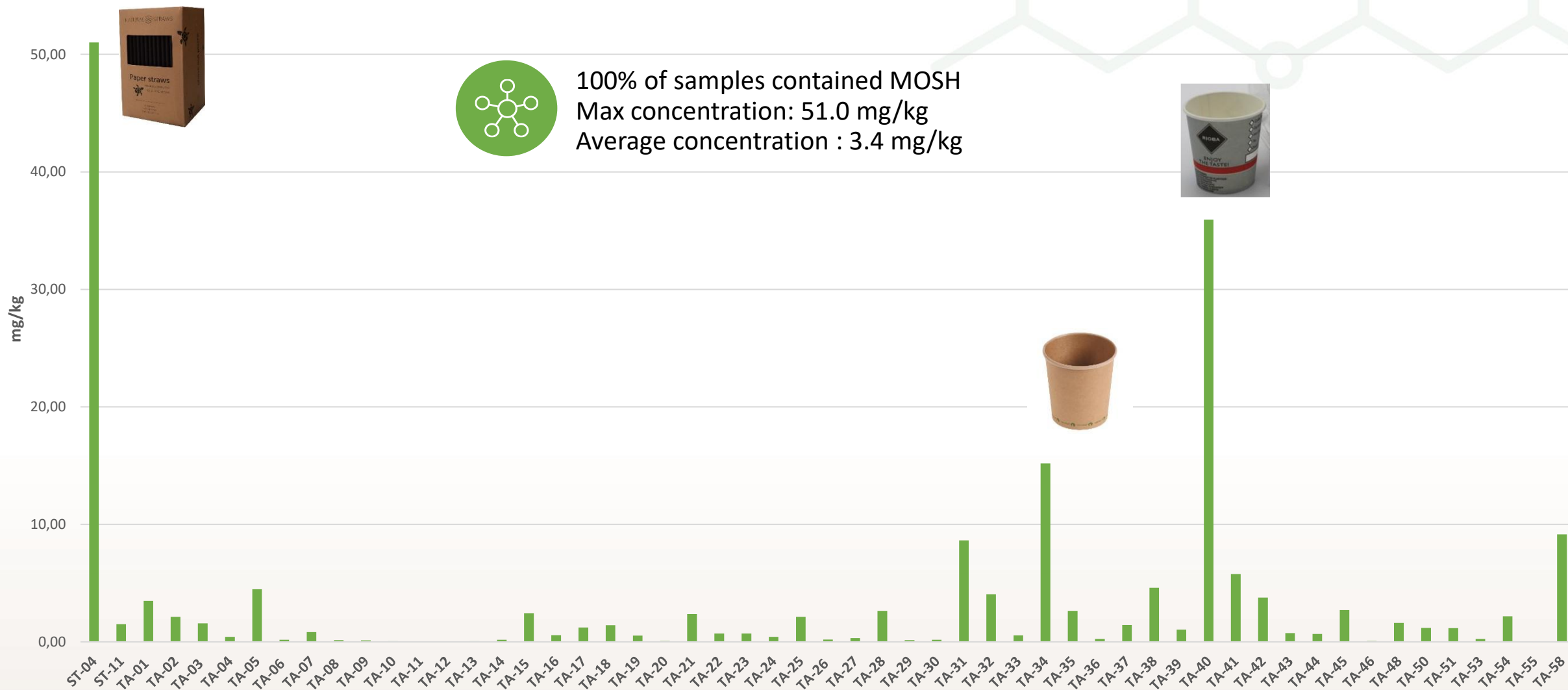


DBP DiBP BBP DEHP DIDP DINP DINCH

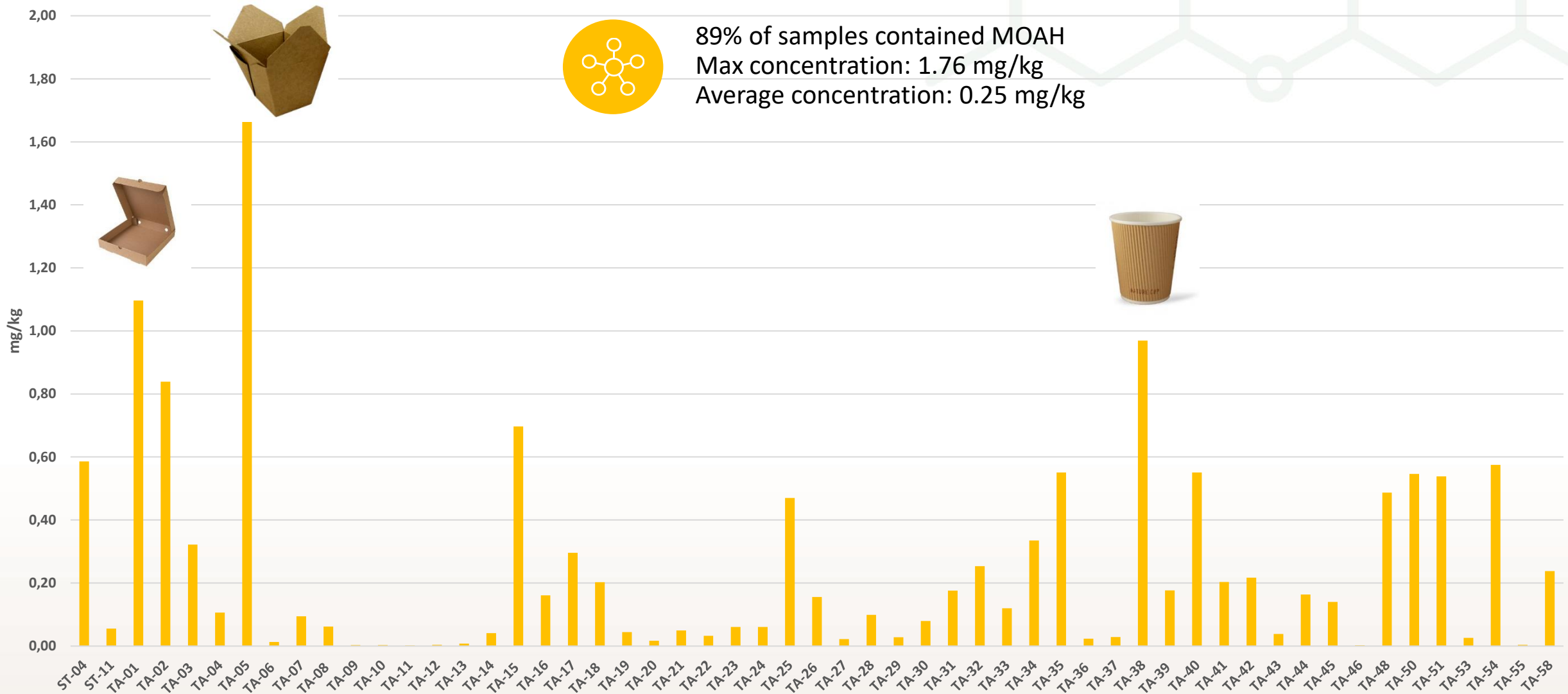


7 phthalates found out of 14
38 samples out of 20 (51.7%)

Mineral oil - MOSH



Mineral oil - MOAH



Targeted populations



Children
(3-10 years old, 23 kg)

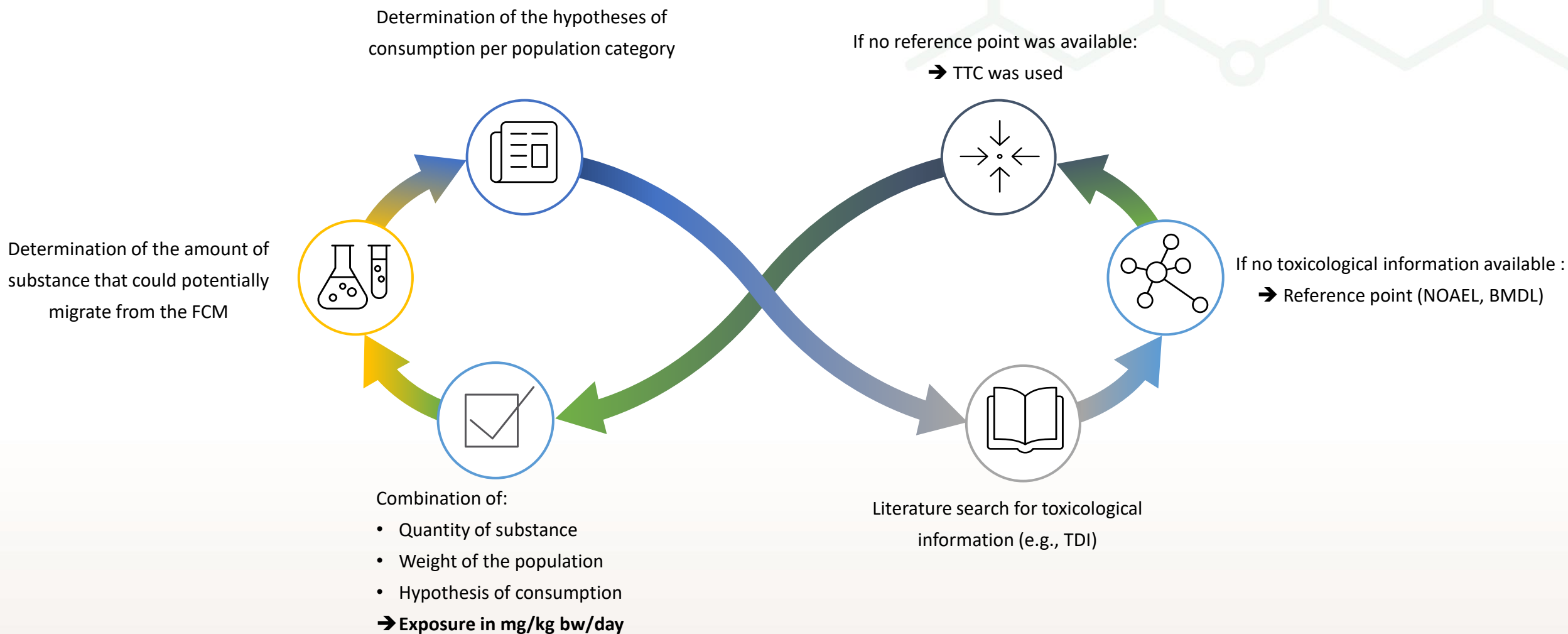


Teenagers
(14-18 years old, 61 kg)



Adults
(18-64 years old, 70 kg)

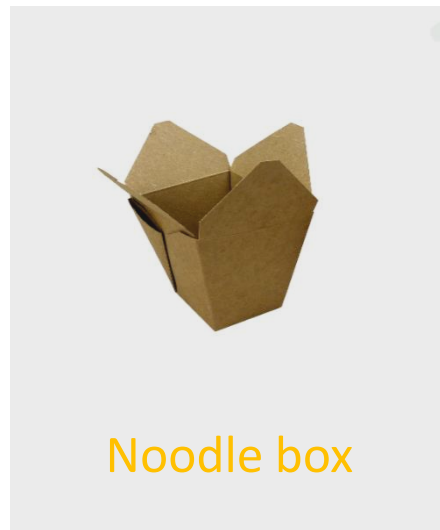
Evaluation according to the RACE tool



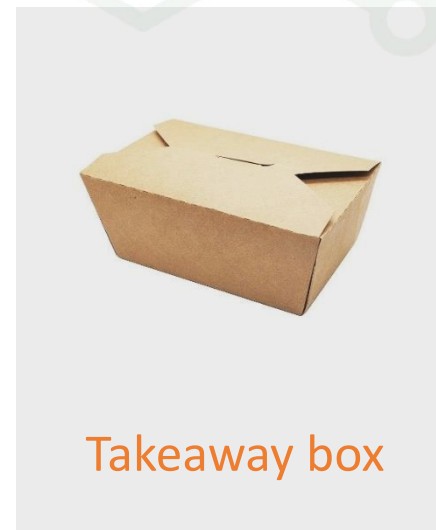
Risk assessment : DBP, DiBP, DEHP



Pizza boxes



Noodle box



Takeaway box

Children

Potential risk

Potential risk

Potential risk

Teenagers

No risk

No risk

Potential risk

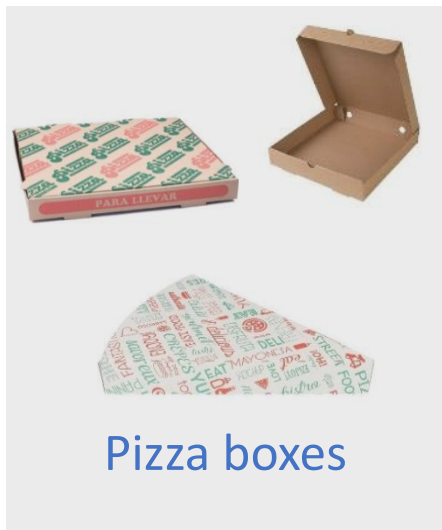
Adults

No risk

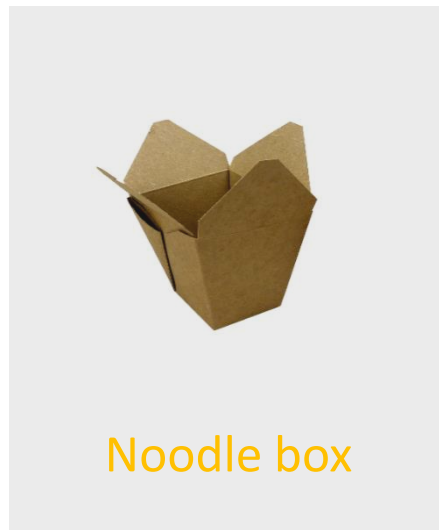
No risk

No risk

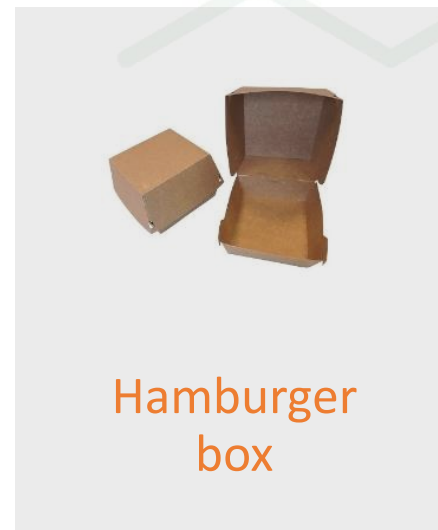
Risk assessment : BPA



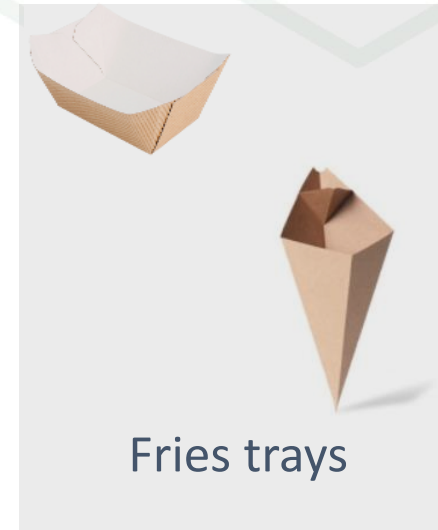
Pizza boxes



Noodle box



Hamburger
box



Fries trays

Children

Potential risk

Potential risk

Potential risk

Potential risk

Teenagers

Potential risk

Potential risk

Potential risk

Potential risk

Adults

Potential risk

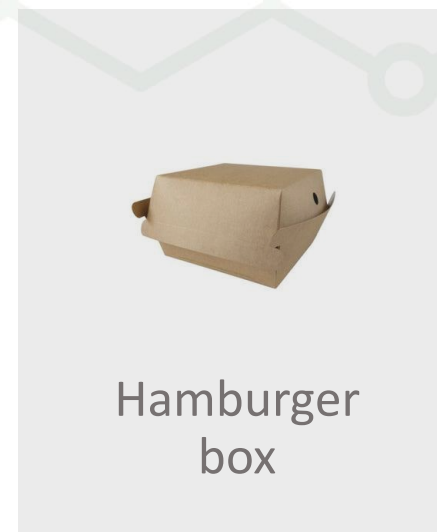
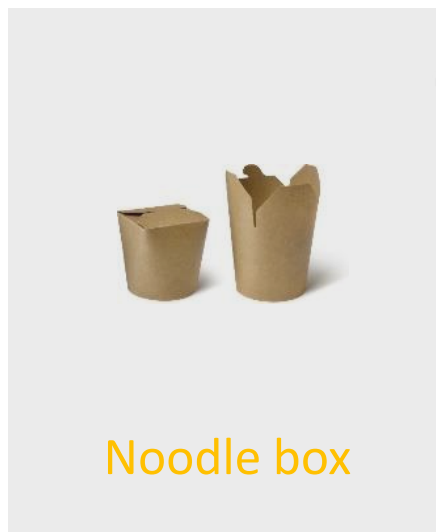
Potential risk

Potential risk

Potential risk

TDI: $0.0002 \mu\text{g kg}^{-1} \text{ bw day}$

Risk assessment : 3,3-DMB



Children

Potential risk

Potential risk

Potential risk

Teenagers

Potential risk

Potential risk

Potential risk

Adults

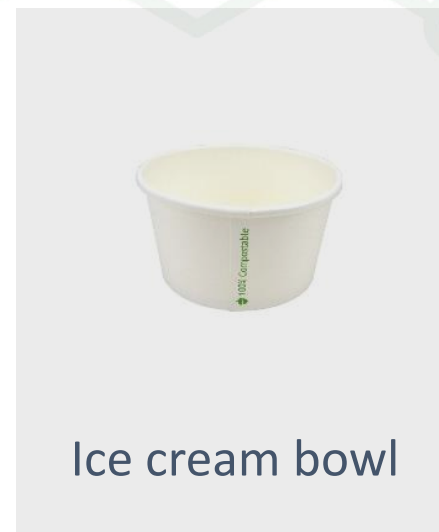
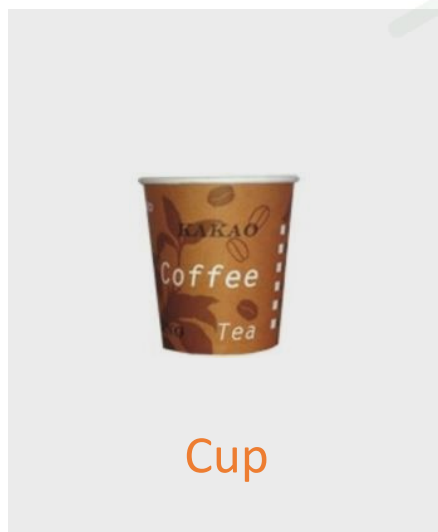
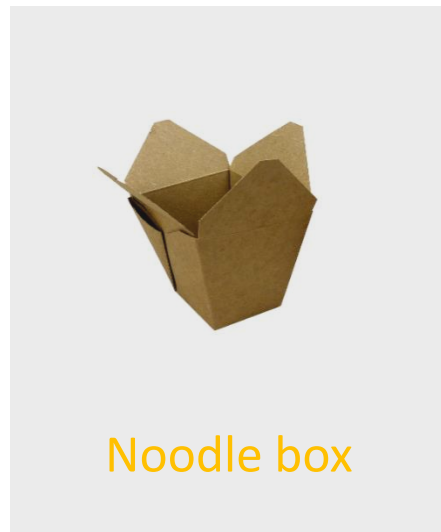
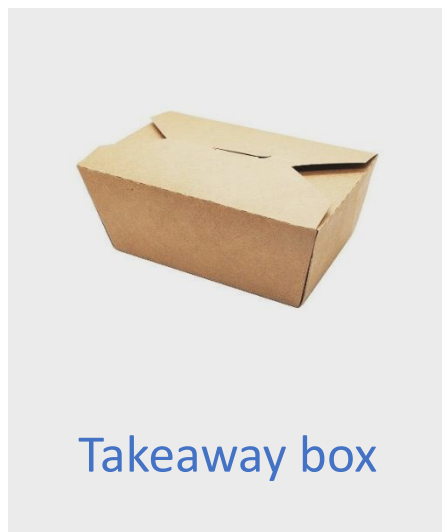
Potential risk

Potential risk

Potential risk

TTC: $0.0025 \mu\text{g kg}^{-1} \text{ bw day}$

Risk assessment : MOSH



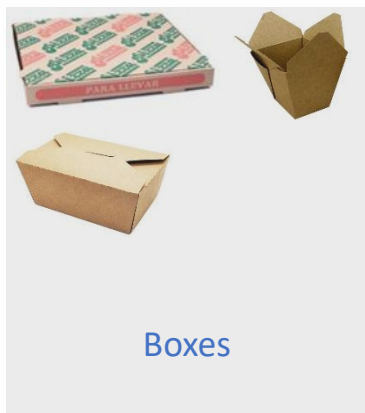
Children	Potential risk	Potential risk	Potential risk	Potential risk	Potential risk
Teenagers	Low concern for public health	Low concern for public health	Low concern for public health	Low concern for public health	Potential risk
Adults	Low concern for public health	Low concern for public health	Low concern for public health	Low concern for public health	Potential risk

NOAEL : 236 mg kg⁻¹ bw day

Risk assessment : MOAH



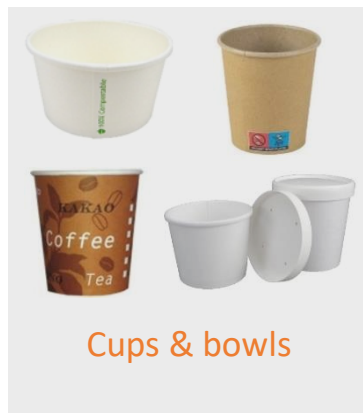
Scenario 1 : 10%



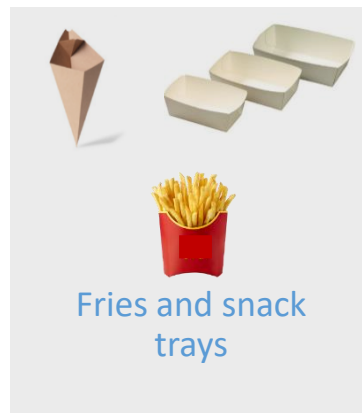
Boxes



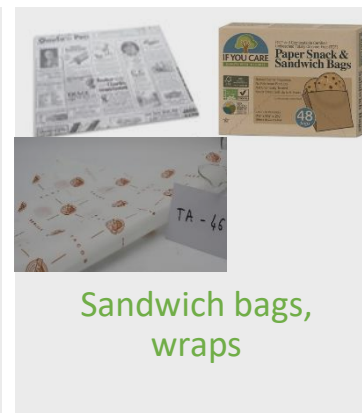
Straws



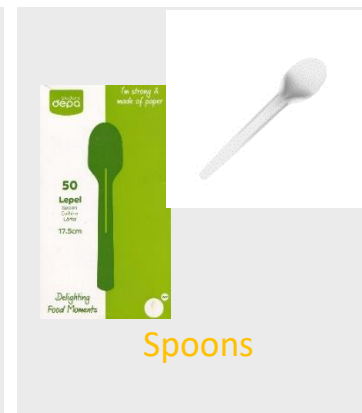
Cups & bowls



Fries and snack
trays



Sandwich bags,
wraps

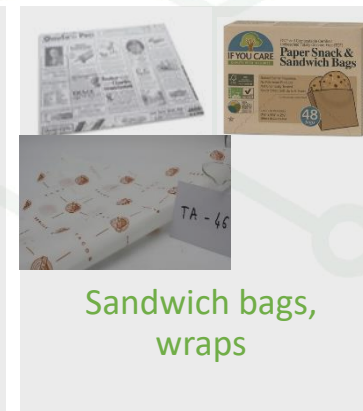
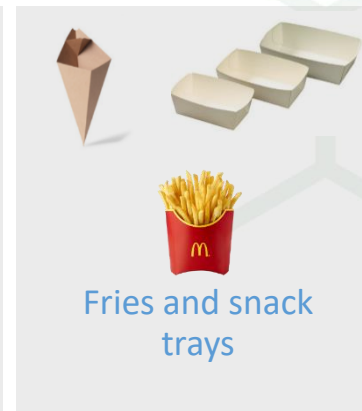
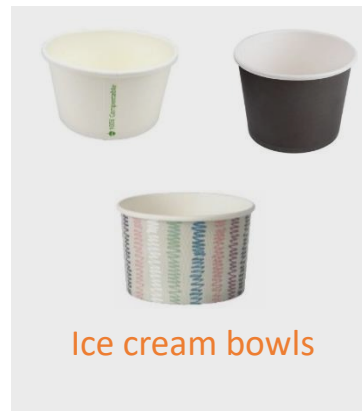
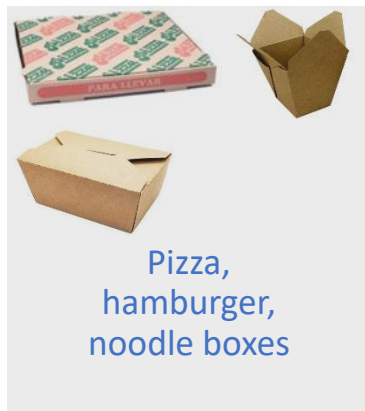


Spoons

Children	Potential risk	Potential risk	Potential risk	Potential risk	Potential risk	Potential risk
Teenagers	Potential risk	Potential risk	Potential risk	Potential risk	Potential risk	Potential risk
Adults	Potential risk	Potential risk	Potential risk	Potential risk	Potential risk	Potential risk

BMDL10 : 0.49 mg kg⁻¹ bw day

Scenario 1 : 1%



Children Potential risk

Potential risk

Potential risk

Potential risk

Potential risk

Potential risk

Teenagers Potential risk

Potential risk

Potential risk

Potential risk

Potential risk

Potential risk

Adults Potential risk

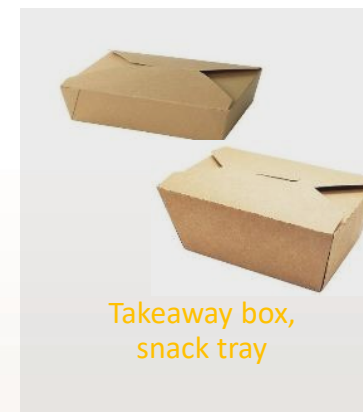
Potential risk

Potential risk

Potential risk

Potential risk

Potential risk



Children Potential risk

Potential risk

Teenagers Low concern

Low concern

Adults Low concern

Low concern

Conclusion

Thank you

