

Influence of water on flavour

release

Saskia van Ruth¹, Johannes Frasnelli²

¹ RIKILT, Wageningen, the Netherlands

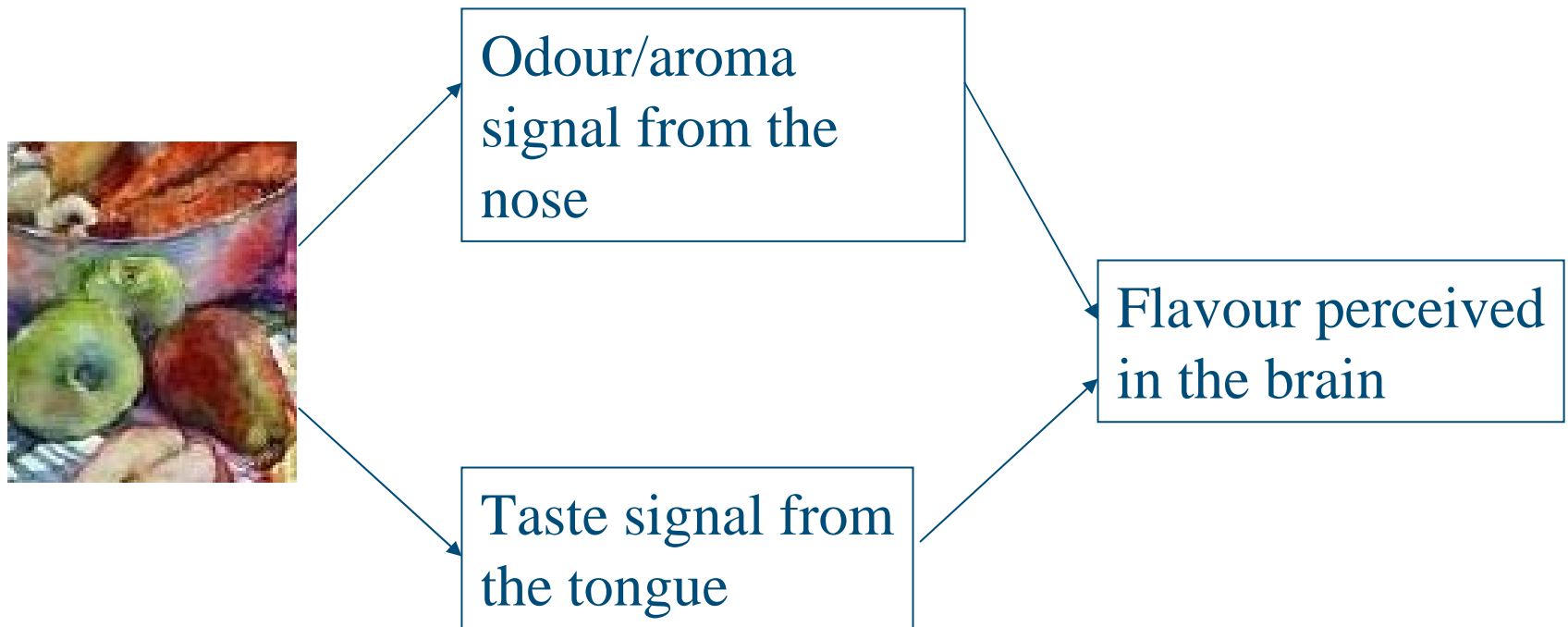
² Dresden University, Germany

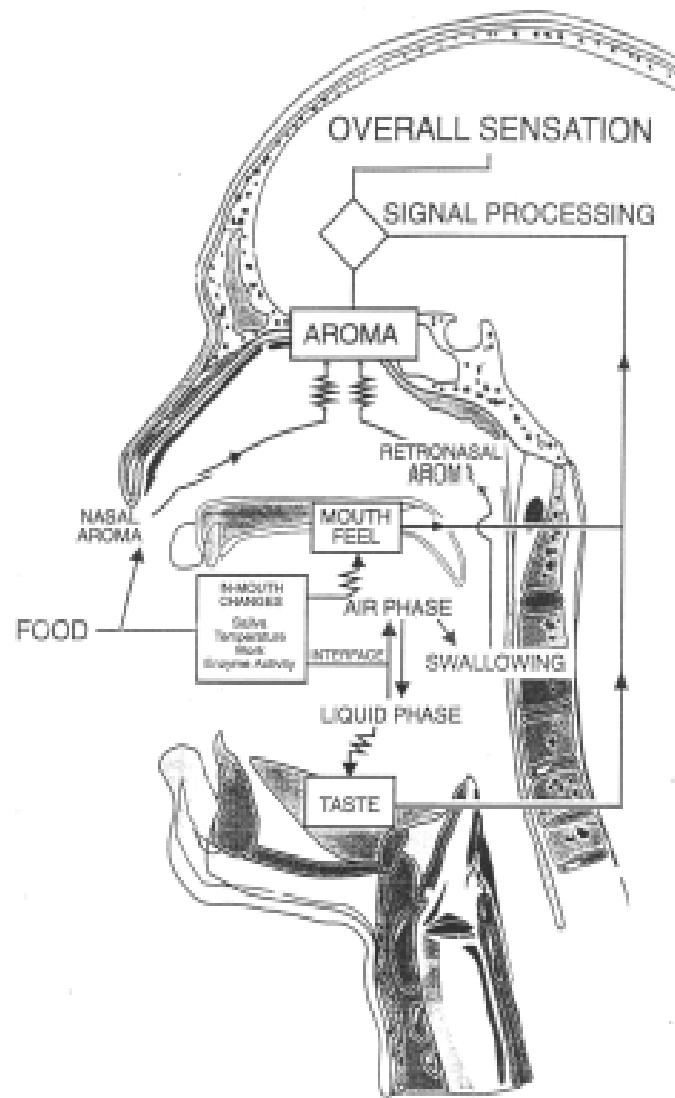


Flavour of foods

Flavour is the combination of taste and odour influenced by sensations of pain, heat and cold, and by tactile sensation (British Standards Institute, 1975)

Flavour perception





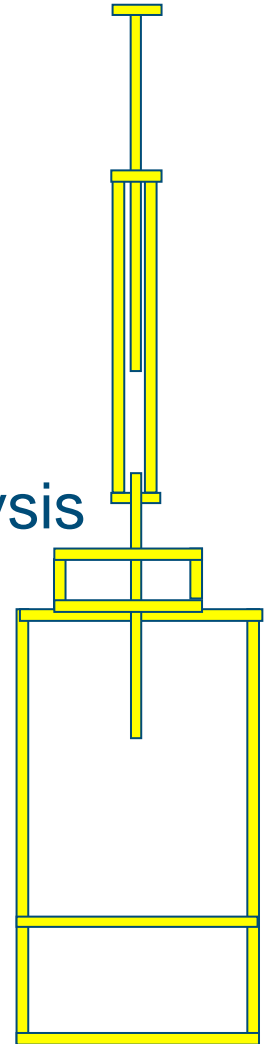
Analysis

■ Static measurements

Thermodynamic component:

- Static headspace gas chromatography analysis

$$K = C_{\text{gas}}/C_{\text{product}}$$

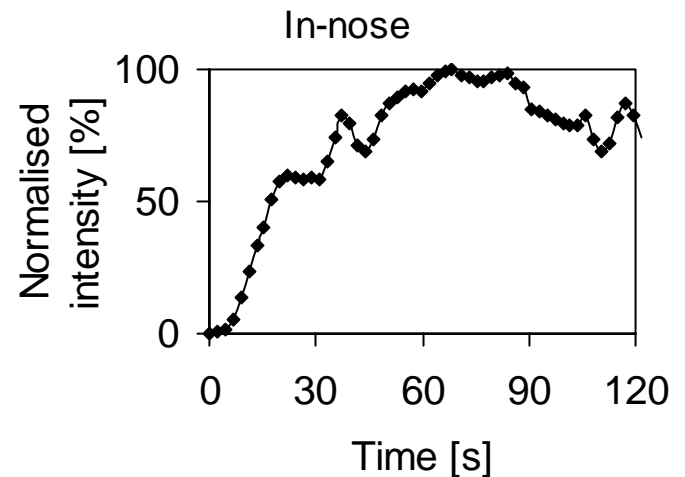


Analysis

■ Dynamic measurements

Thermodynamic + kinetic component

- Gas chromatography
- Direct mass spectrometry



Key features determining flavour release

■ Food composition

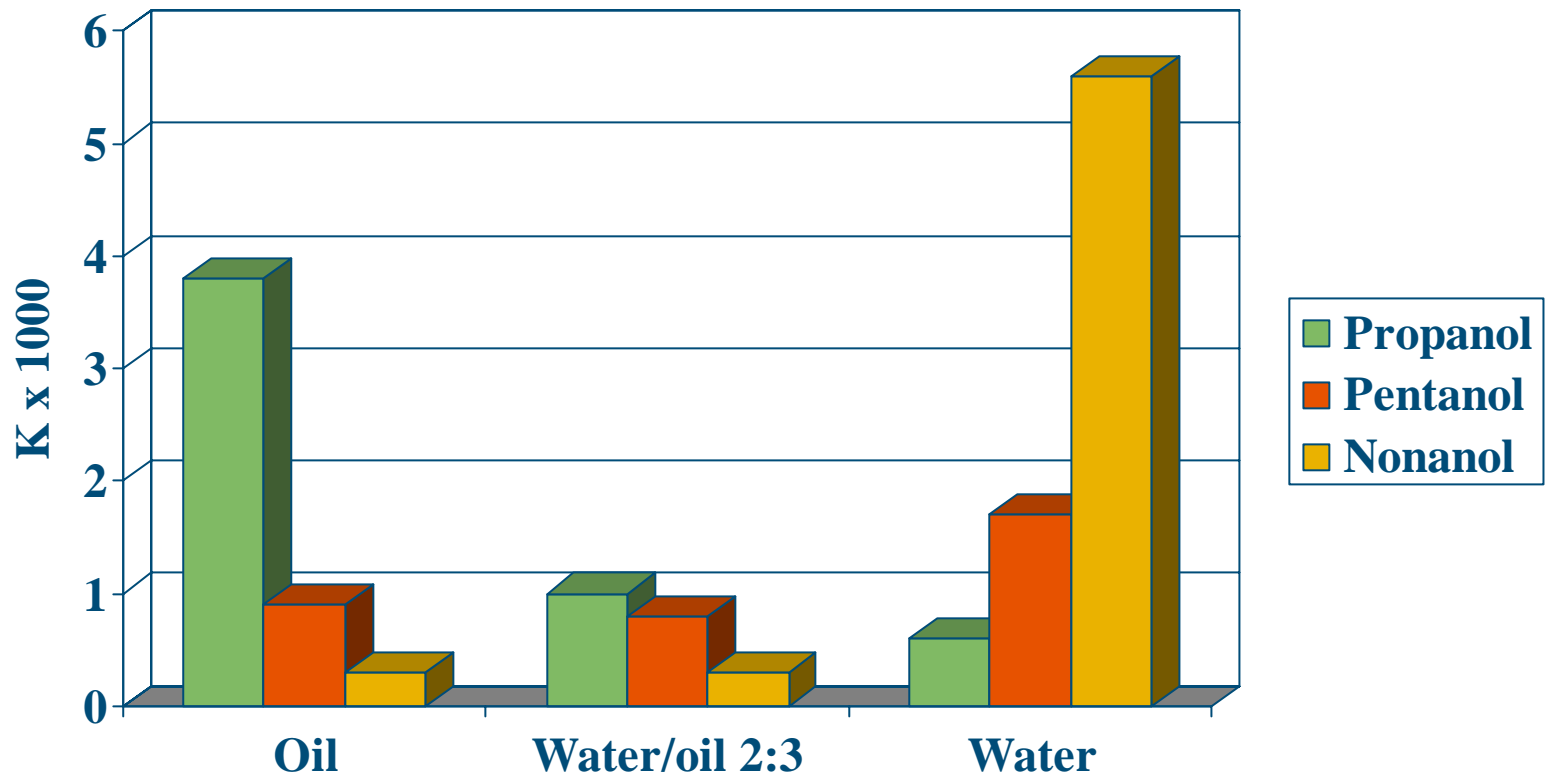
- ***Water content***
- Lipid content
- Protein content
- Carbohydrate content

■ Oral physiology

- Chewing
- ***Salivation***
- ***Mucous in airways***

Food composition

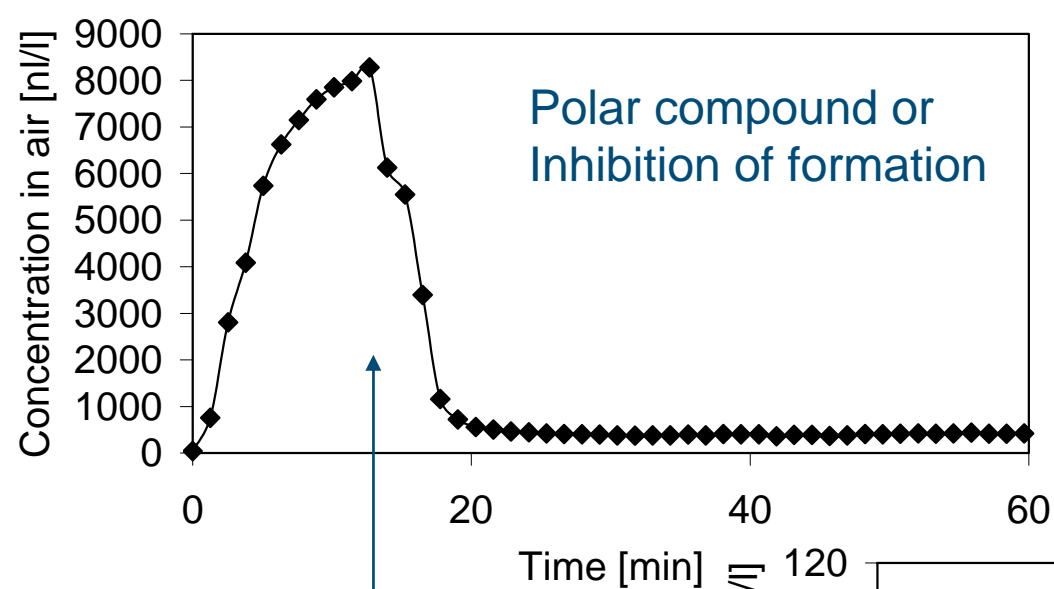
Presence of water: food composition



$$K = \frac{[\text{compound}]_{\text{gas}}}{[\text{compound}]_{\text{product}}}$$

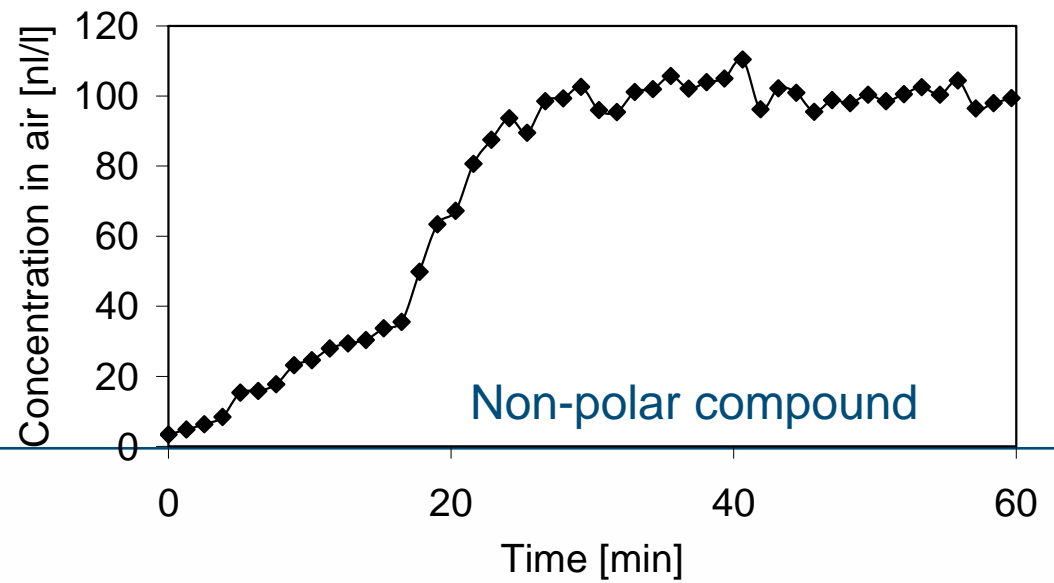
Changes in dried leeks headspace during reconstitution

m/z 43



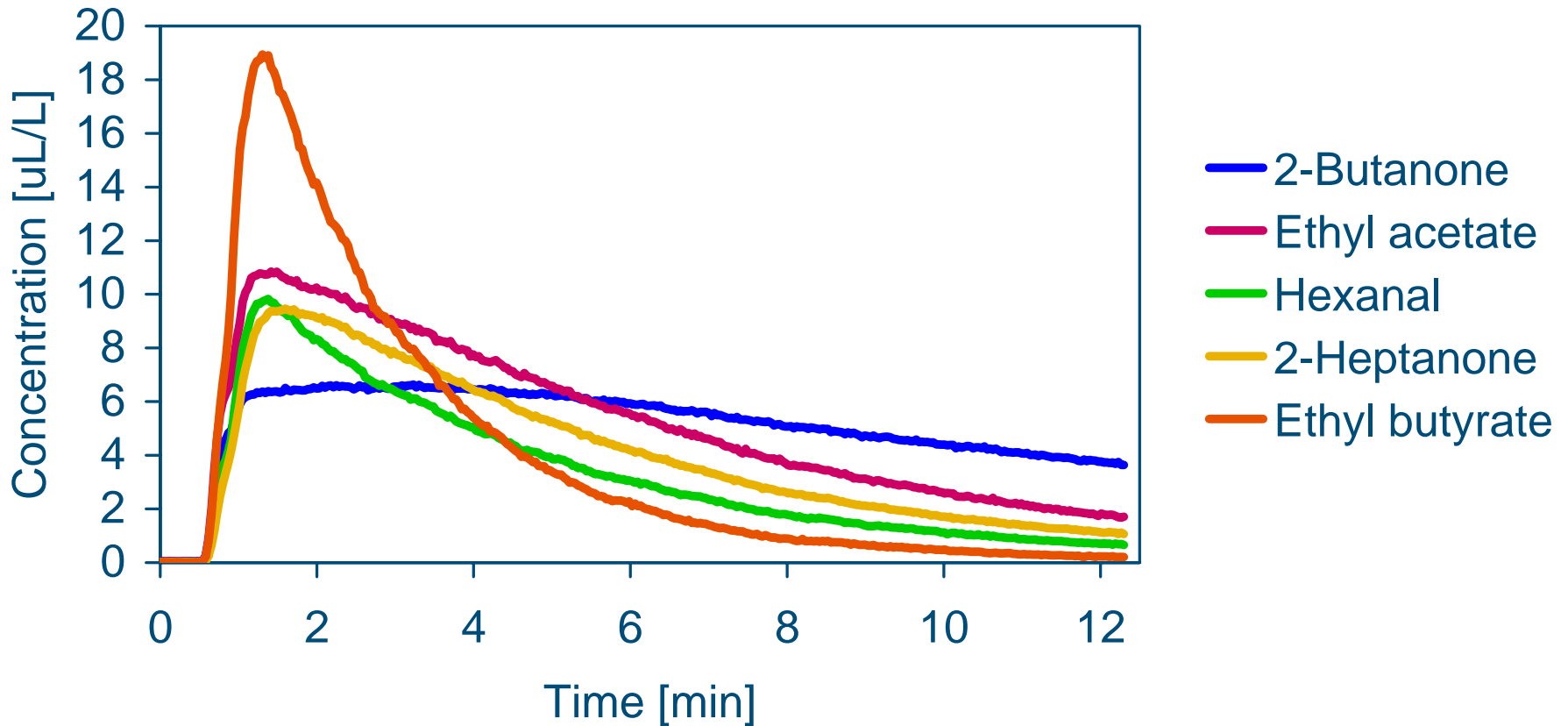
Water added at t=15 min

m/z 73



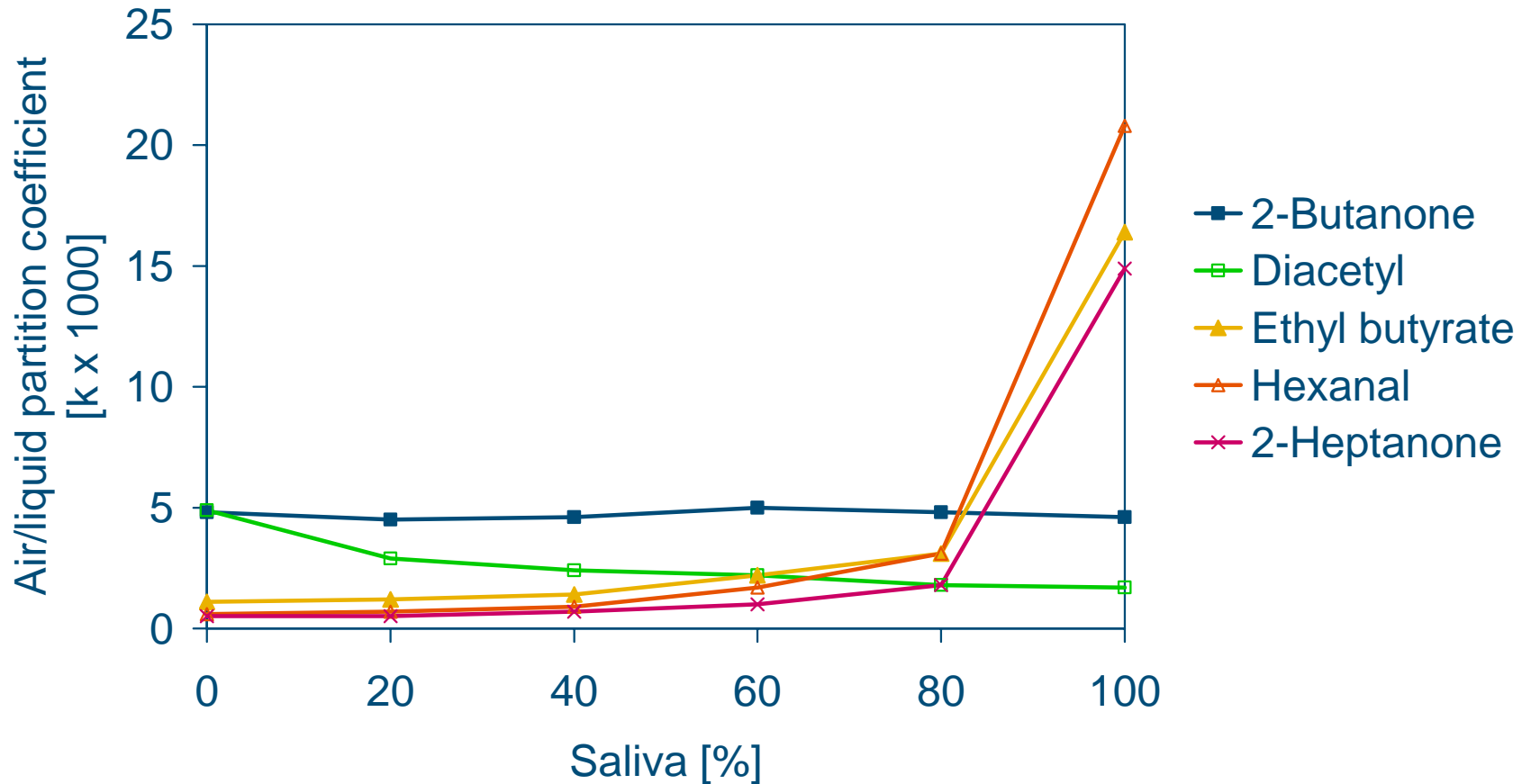
Dynamic release

Release from water

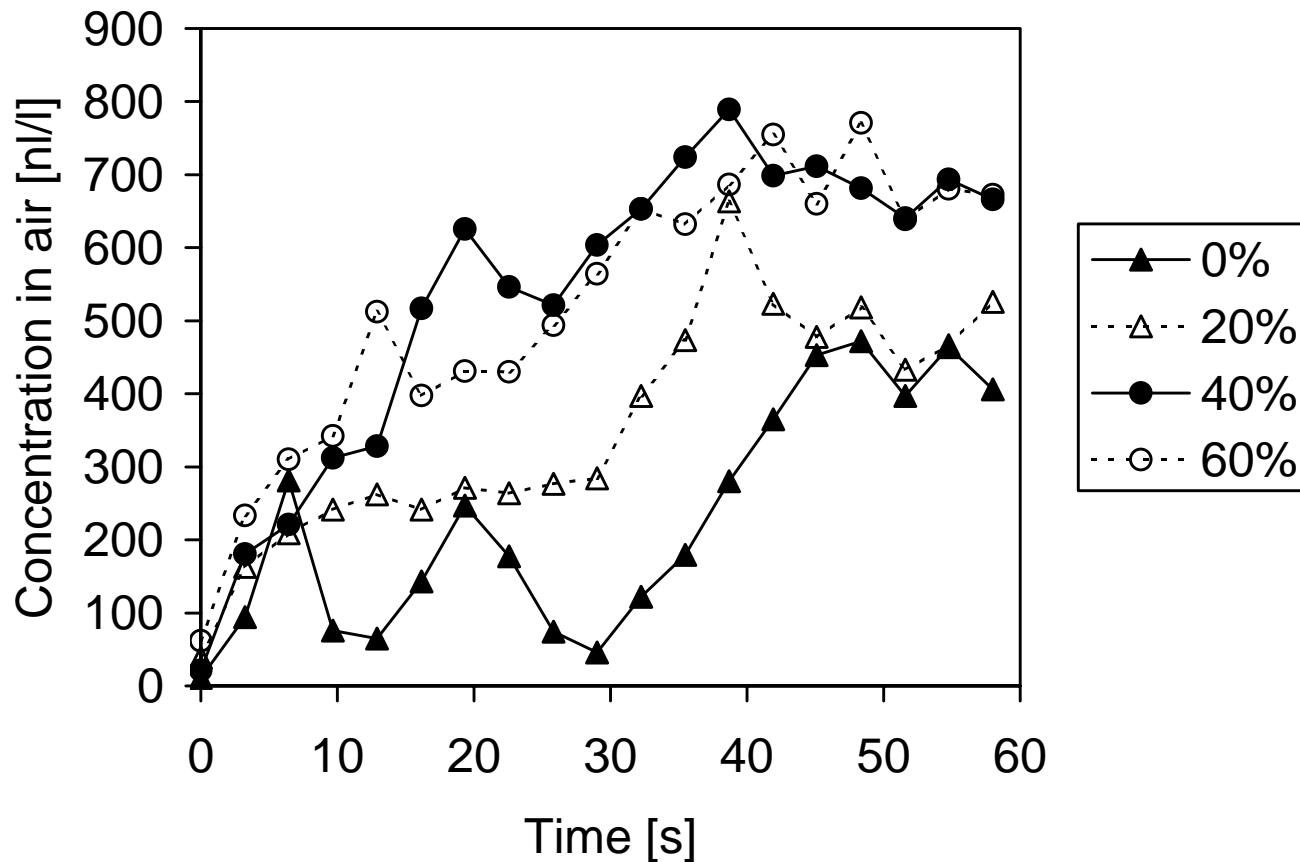


Oral physiology

Saliva volume: static conditions



Dynamic release of 2-methylpropanal from French beans with various volumes of saliva

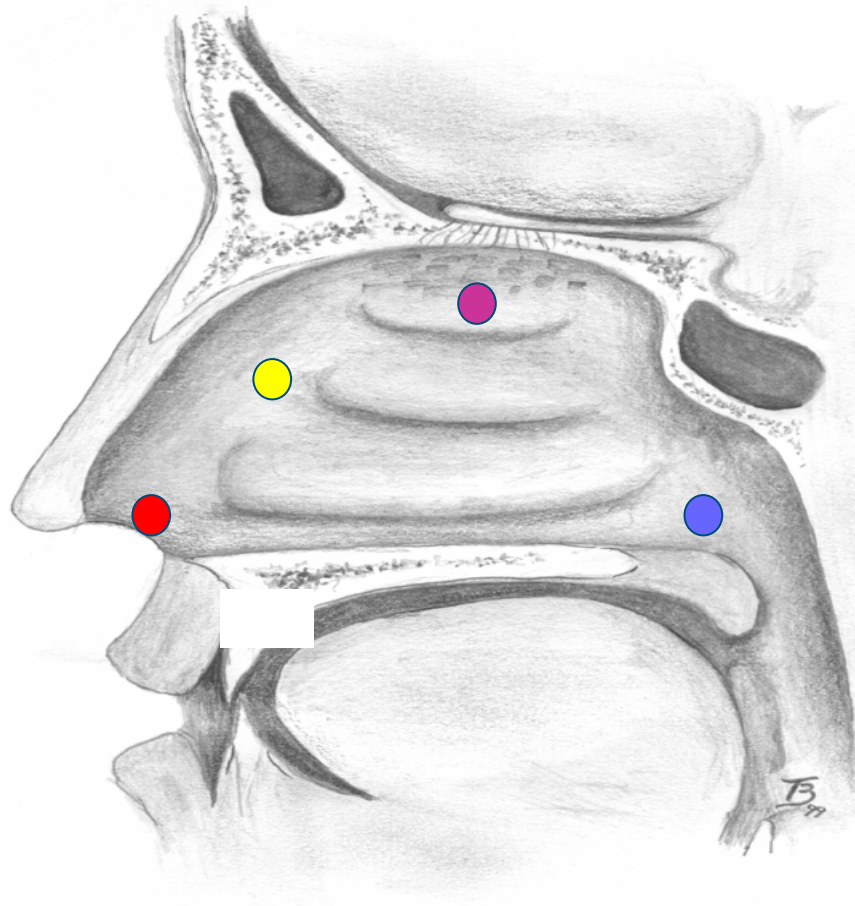


Summary: effect of water content or saliva volume

- Alters matrix characteristics (more water => more polar): increases release of hydrophobic compounds, may reduce release of hydrophilic compounds
- Saliva dilution: lowers concentration in product/saliva phase, thus lowers release
- Affects kinetics:
 - e.g. water in reconstituted food
 - saliva improves efficiency of mastication which generally increases release

Influence of watery mucous in nasal tract

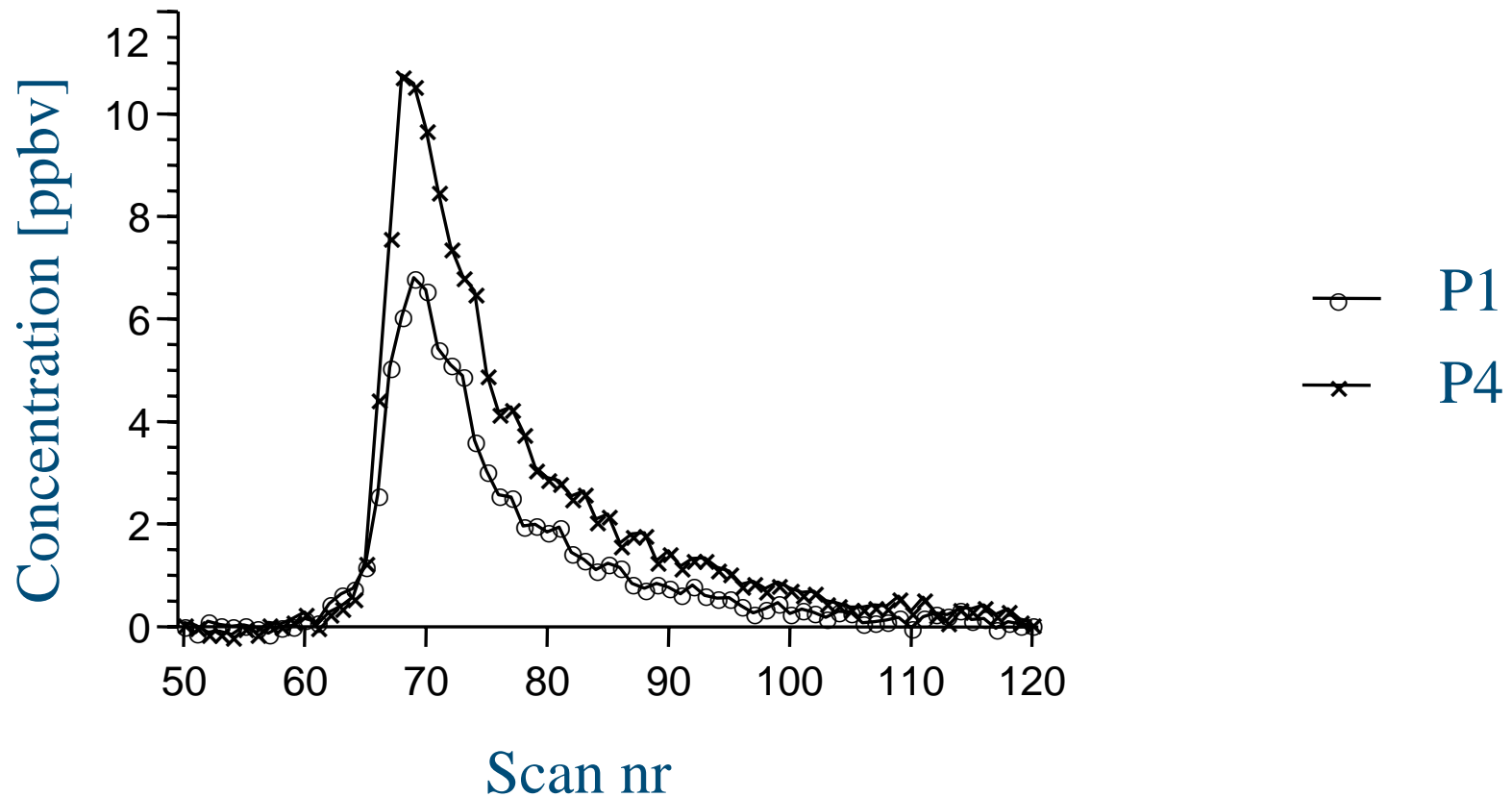
- Strawberry flavour concentrations were determined at four nasal positions during consumption of custard desserts, 10 subjects
- In-nose Proton Transfer Reaction Mass Spectrometry analysis at 4 different positions:
 1. At the nostril
 2. In front of the middle turbinate
 3. In the area of the olfactory cleft
 4. In the nasopharynx



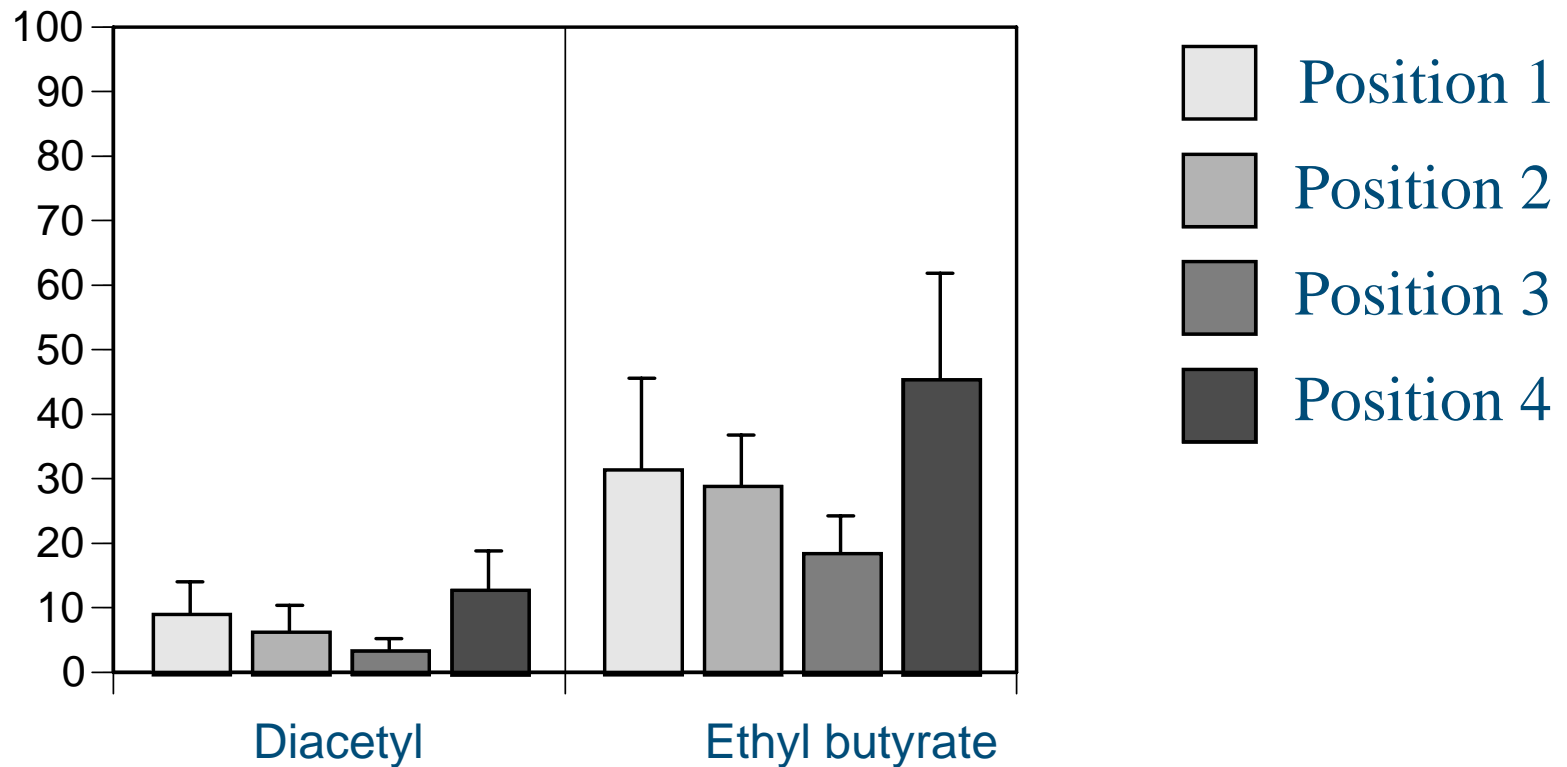
- Position 1
- Position 2
- Position 3
- Position 4



Diacetyl: position 1 (nostril) and 4 (throat)

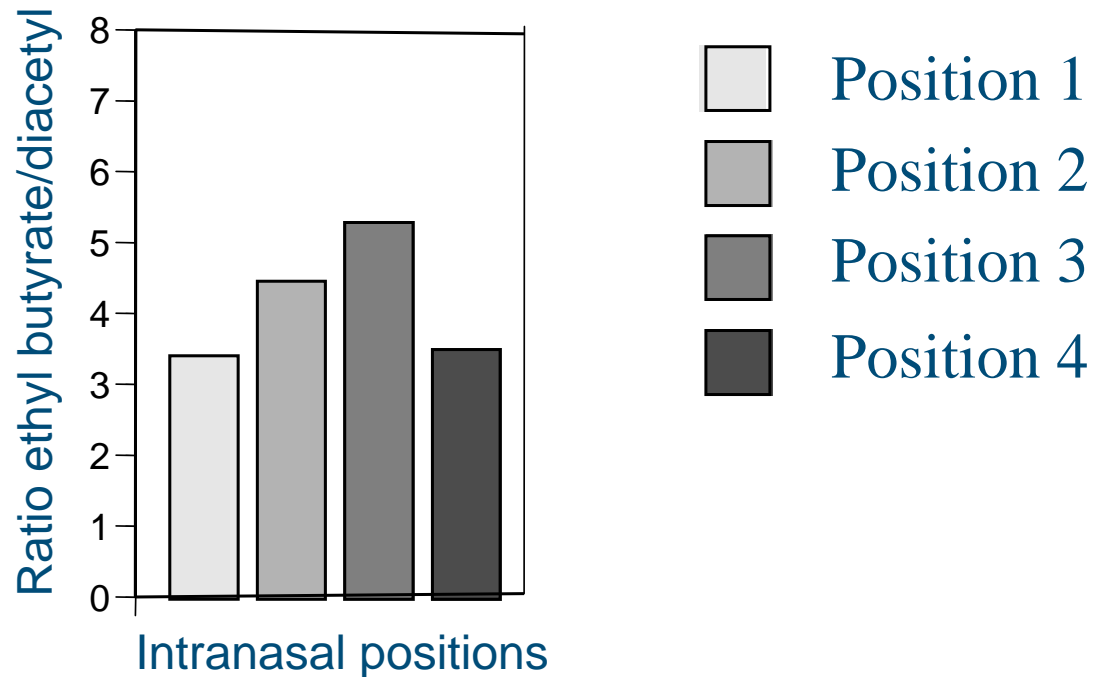


Max intensity diacetyl and ethyl butyrate



=>Absorption to mucous

Ratio ethyl butyrate/diacetyl



Conclusions

Influence of water on the availability of volatile flavour compounds for perception:

- Water in food affects flavour release considerably
- Salivation influences the thermodynamics and kinetics of flavour release during consumption
- Watery mucous in the nasal airways results in retention of volatile flavour compounds

Thanks to

- Catherine O'Connor
- Mike Geary
- Romain Drillaud
(University College Cork, Ireland)

© Wageningen UR



RIKILT
INSTITUTE OF FOOD SAFETY
WAGENINGEN UR