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UNIVERSIDAD DE CÓRDOBA

MAIN LOSSES OF SAMPLED VOLATILE COMPOUNDS IN NALOPHAN BAGS: FOCUS ON SULPHUR COMPOUNDS

Pr. Jean-Michel Guillot, France

Dr. Manuel Toledo Padron, Spain

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CHARACTERISTICS OF BAG SAMPLING

MAIN ADVANTAGES

COMPATIBLE WITH EN 13725 (OLD AND NEW VERSIONS)

CHEAP METHOD, EASINESS TO USE…

MAIN DRAWBACKS

RELATIVE WEAKNESS:

BREAKING (FILM/CLAMPING),

POTENTIAL BLAST (FILLING OVERPRESSURE)…

LOSSES AND RECOVERY DECREASE

EXPERIMENTS TO VERIFY DIFFUSION

WITH HUMIDITY

WITH 7 SULPHUR COMPOUNDS

H_2S

$CH_3\text{-}S\text{-}CH_3$ CS_2

$CH_3\text{-}SH$ $CH_3\text{-}S\text{-}S\text{-}CH_3$

$C_2H_5\text{-}SH$ $C_2H_5\text{-}S\text{-}S\text{-}C_2H_5$

- MEASUREMENT WITH CHROMA S

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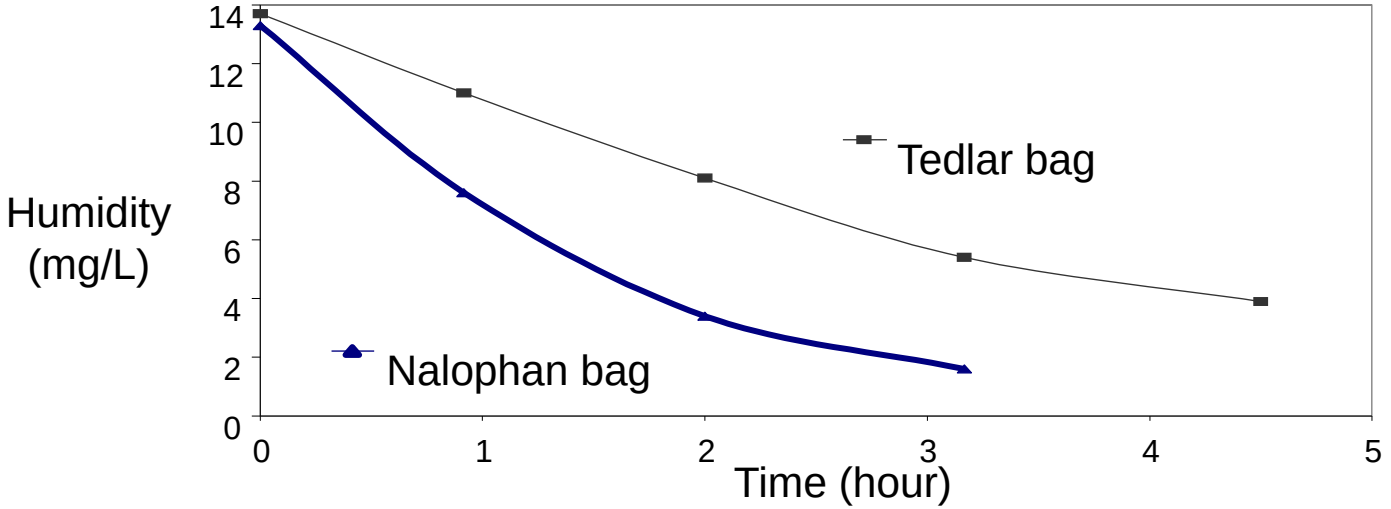
VERY FAST WATER DIFFUSION THROUGH NALOPHAN FILM (POLYETHYLENE TEREPHTALATE)

Example of humidity decrease (water diffusion from internal humid air to dry external atmosphere)



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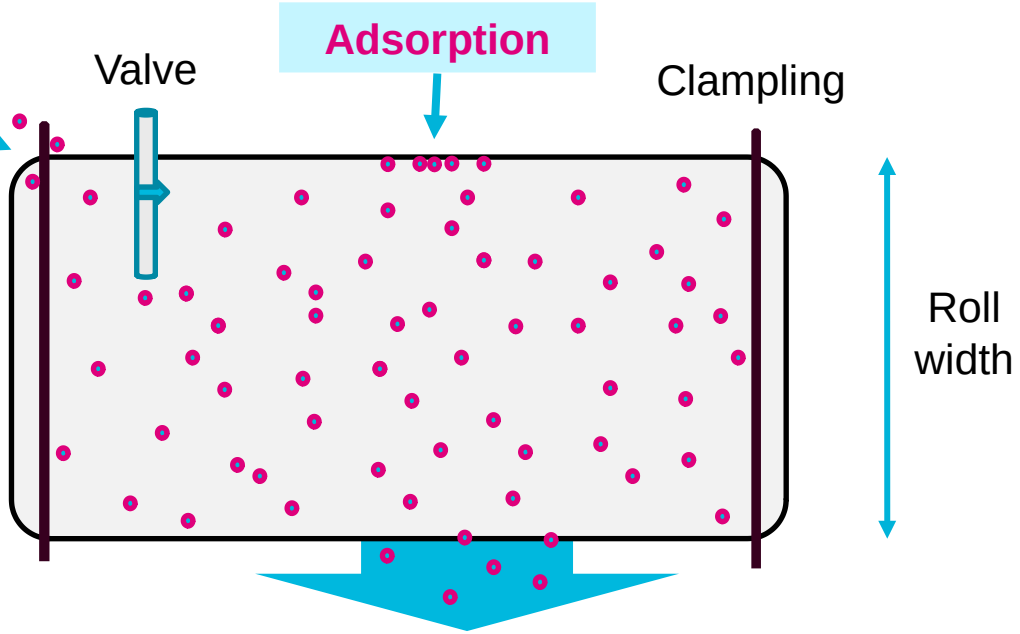
Drawback than can be used to remove water from a sample

Protocol described by Beghi and Guillot, *J. Chromatogr.* A 1185 (2008) 1-5

LOSSES FROM NALOPHAN BAG : HOW ?



3 main possibilities

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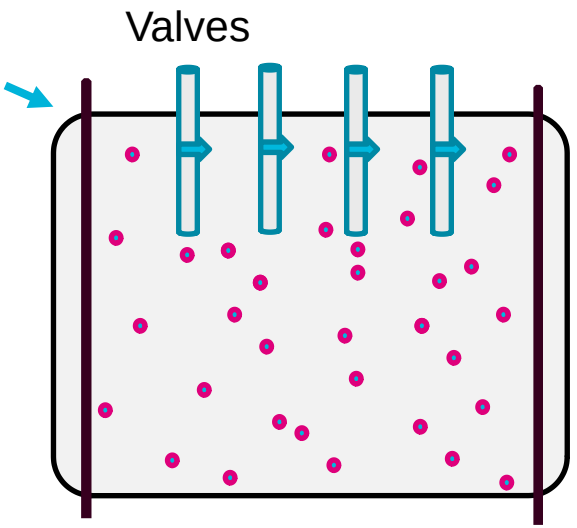
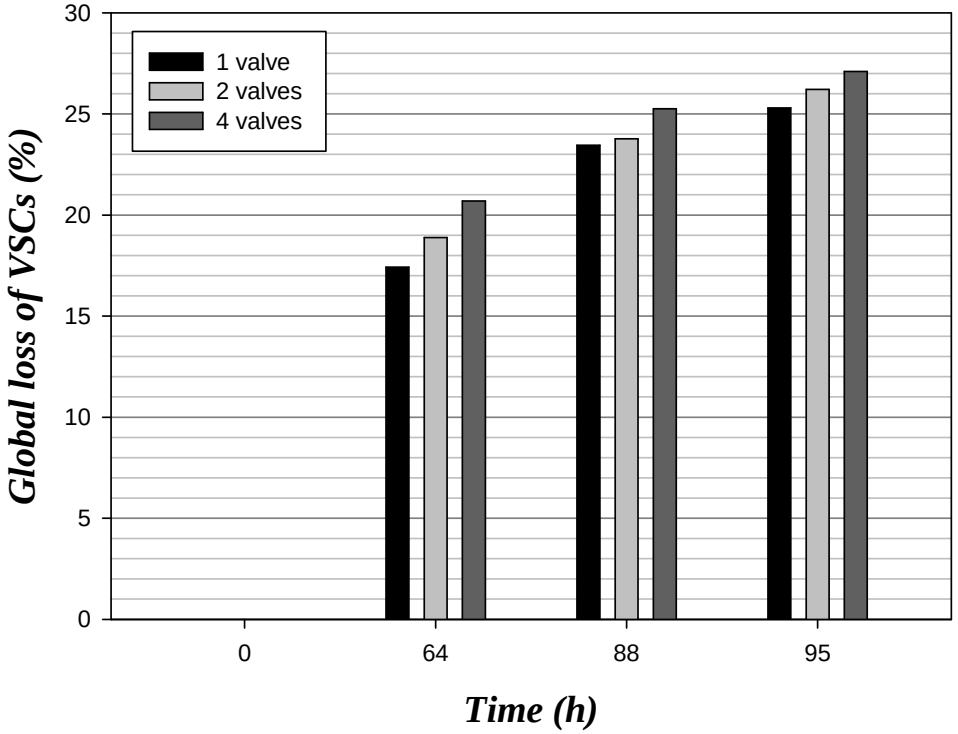
LOSSES FROM VALVES: COMPARISON WITH VALVE NUMBER

Leaks (valve & clamping)





Low impact due to the r
=> Losses from valves are negligible

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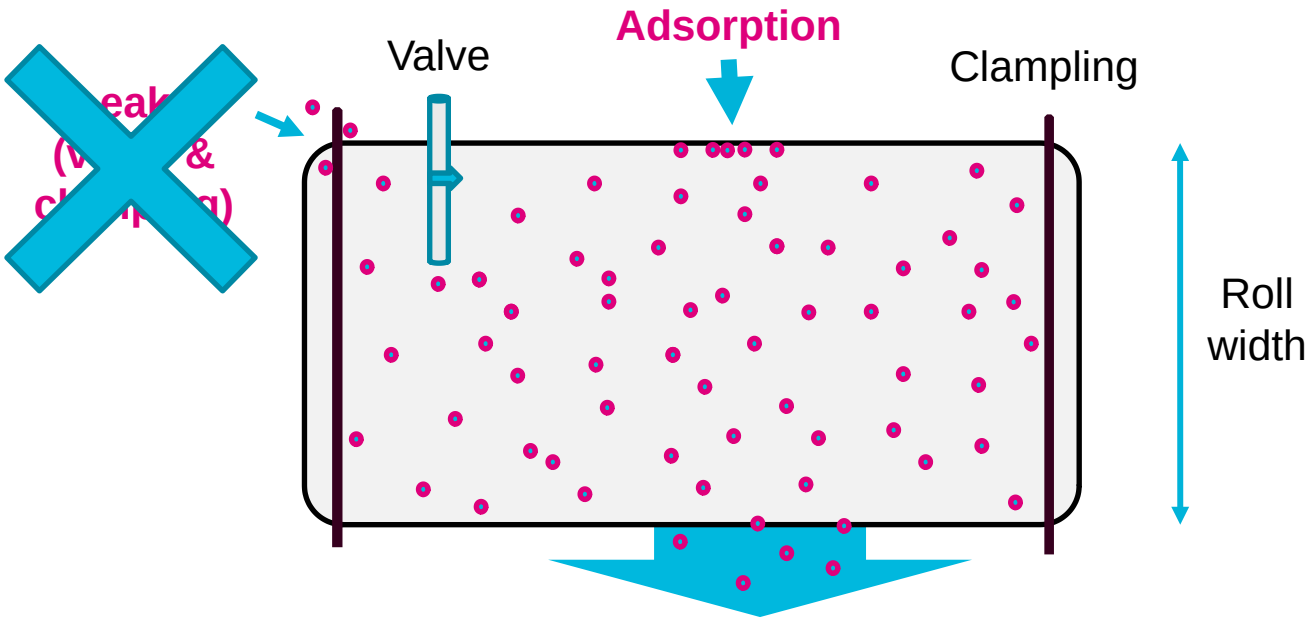
LOSSES FROM NALOPHAN BAG



Without leaks (valve or clamping)

Losses = Adsorption + Diffusion

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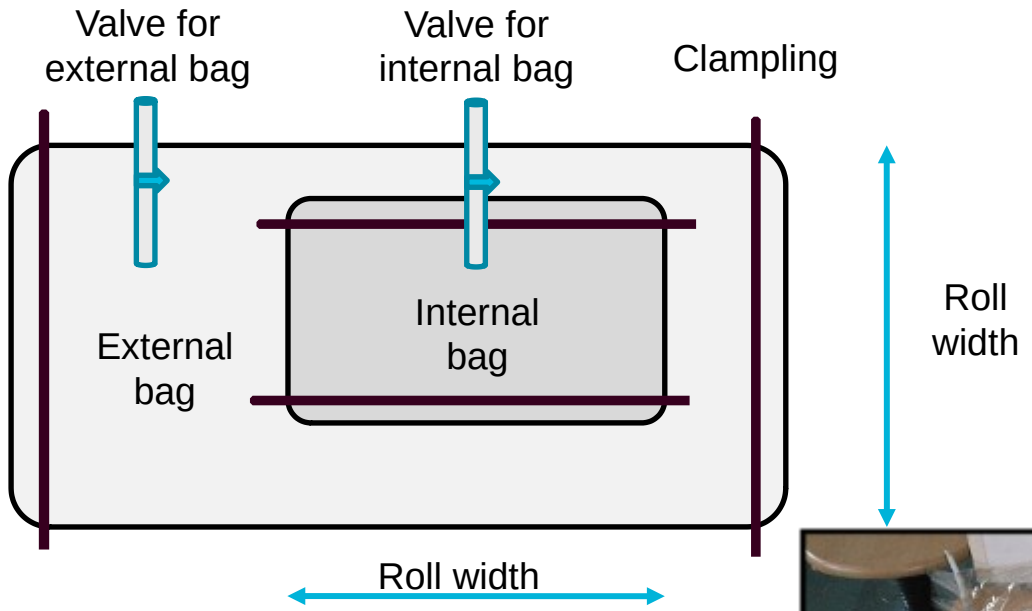
CONCEPT TO STUDY LOSSES



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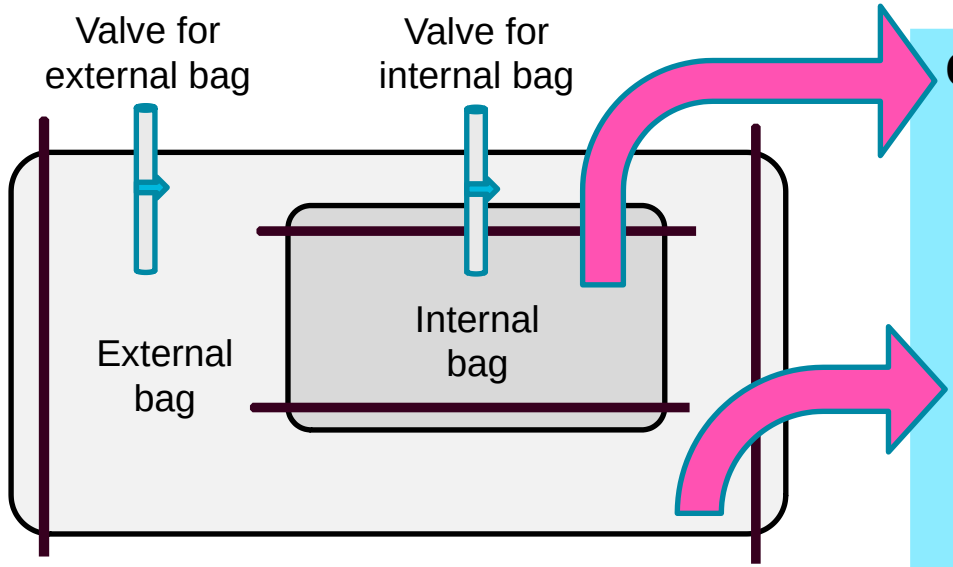
CONCEPT TO STUDY LOSSES



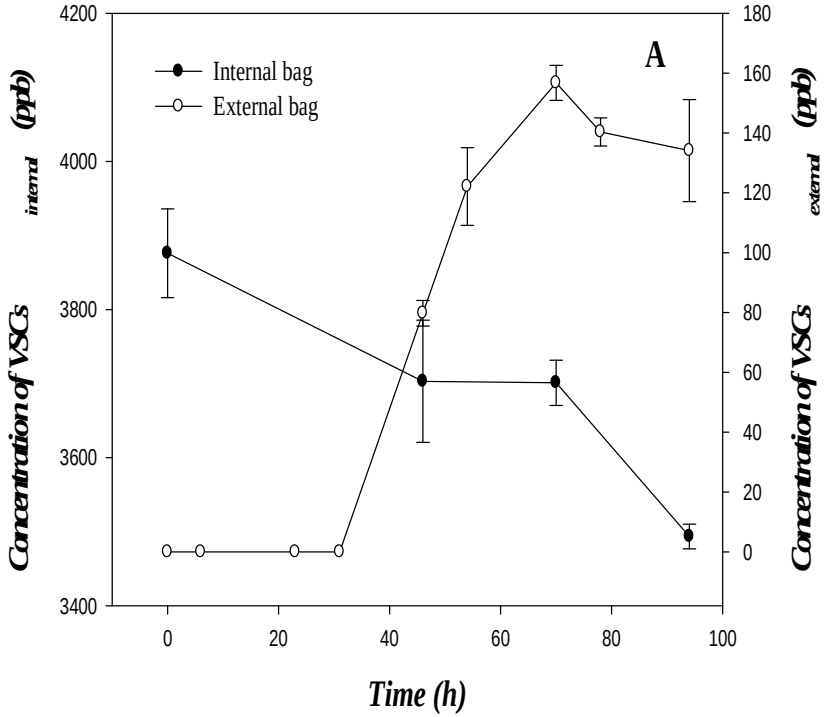
Concentration decrease into internal bag :
Total losses

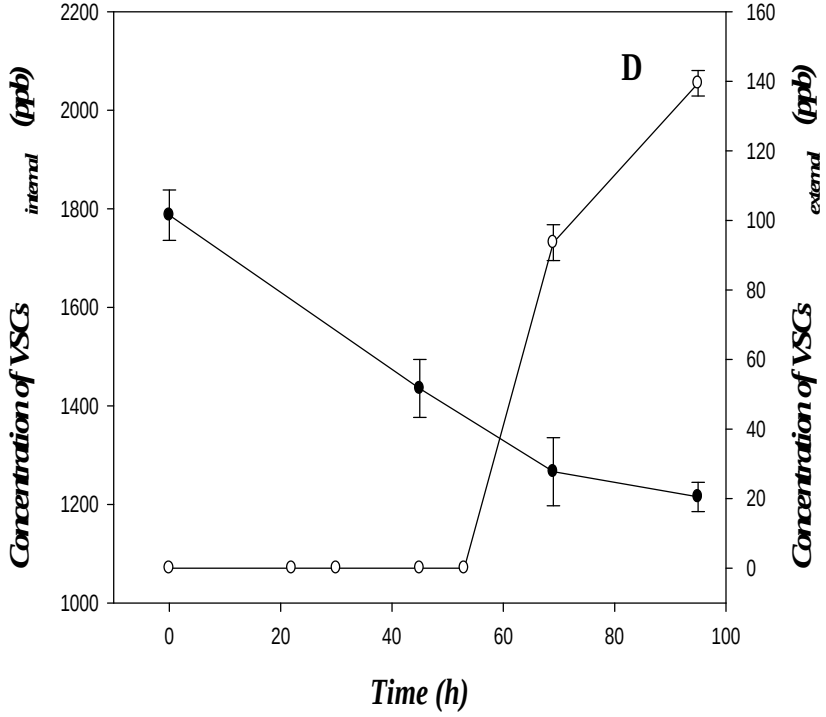
Concentration increase into external bag :
Diffusion losses

Difference Total – Diffusion :
Adsorption losses

WITH SULPHUR COMPOUNDS

TWO DIFFERENT INITIAL LEVELS: 3900 &1800 PPB FOR THE GLOBAL MI





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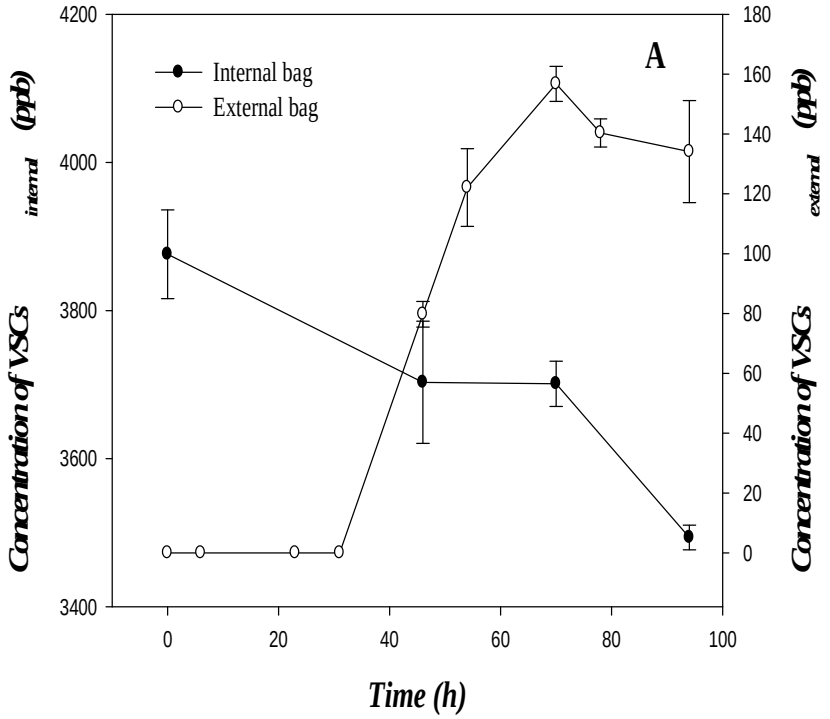
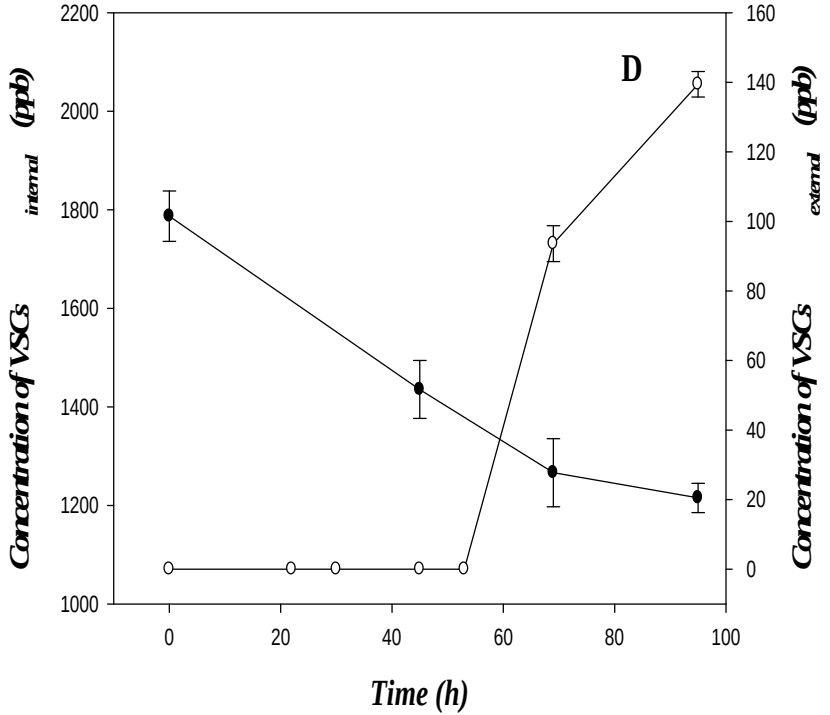
WITH SULPHUR COMPOUNDS
DECREASE ACCEPTABLE FOR EN13725





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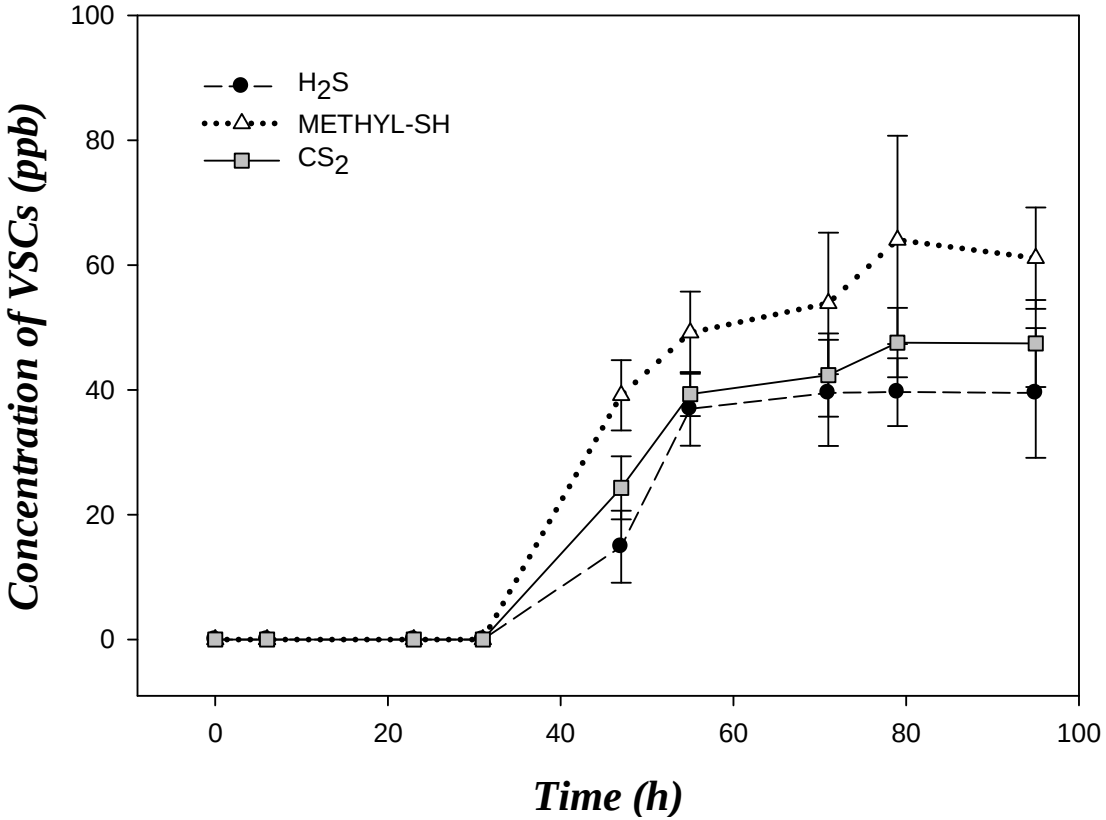
Losses 5% : Negligible

with uncertainty of olfactometry

FASTER DIFFUSION (3 SMALLER COMPOUNDS)



Similar behaviour For 3 compounds:

- no strong influence of initial level
- no significant value during first hours due to detection limits

Complete study:

Toledo et al. *Biosys. Eng.* 88 (2019) 217-228

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CONCLUSIONS

Sampling with Nalophan bags

- Losses (no real impact of valves)
- Losses by diffusion are clearly shown by double bags
- Acceptable recovery in the frame defined by EN13725 conditions (typically 36h of storage time) for studied sulphur compounds
  - Acceptable for sensorial measurement with high uncertainty
  - Less acceptable for precise chemical measurement

Higher permeation rate

- Small molecules: H_2S, CH_3-SH, CS_2

Looking for better materials (films)

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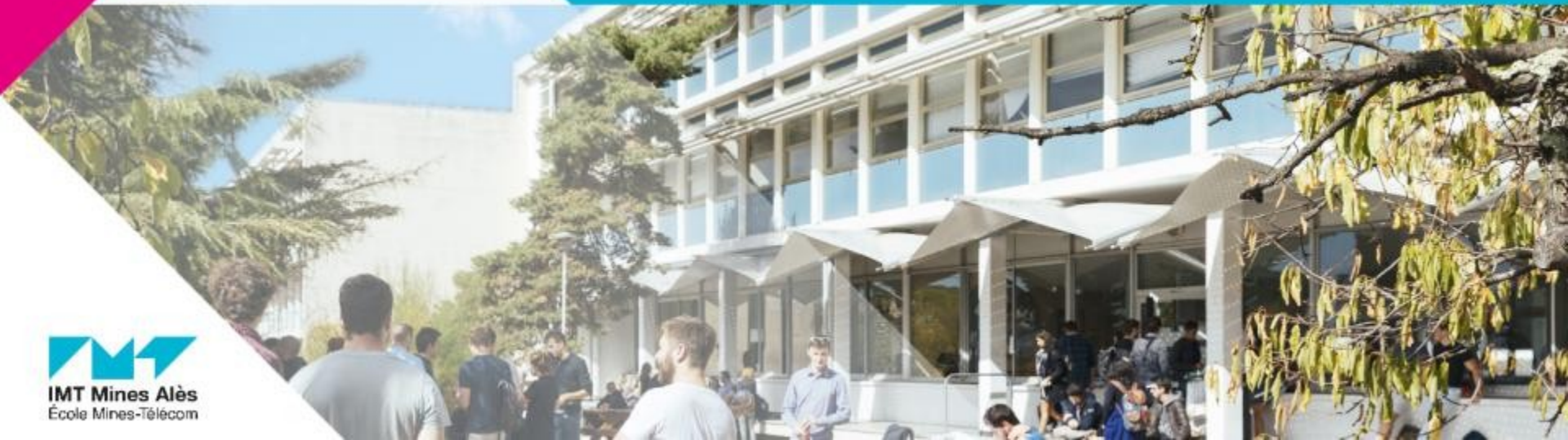
THANK YOU



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