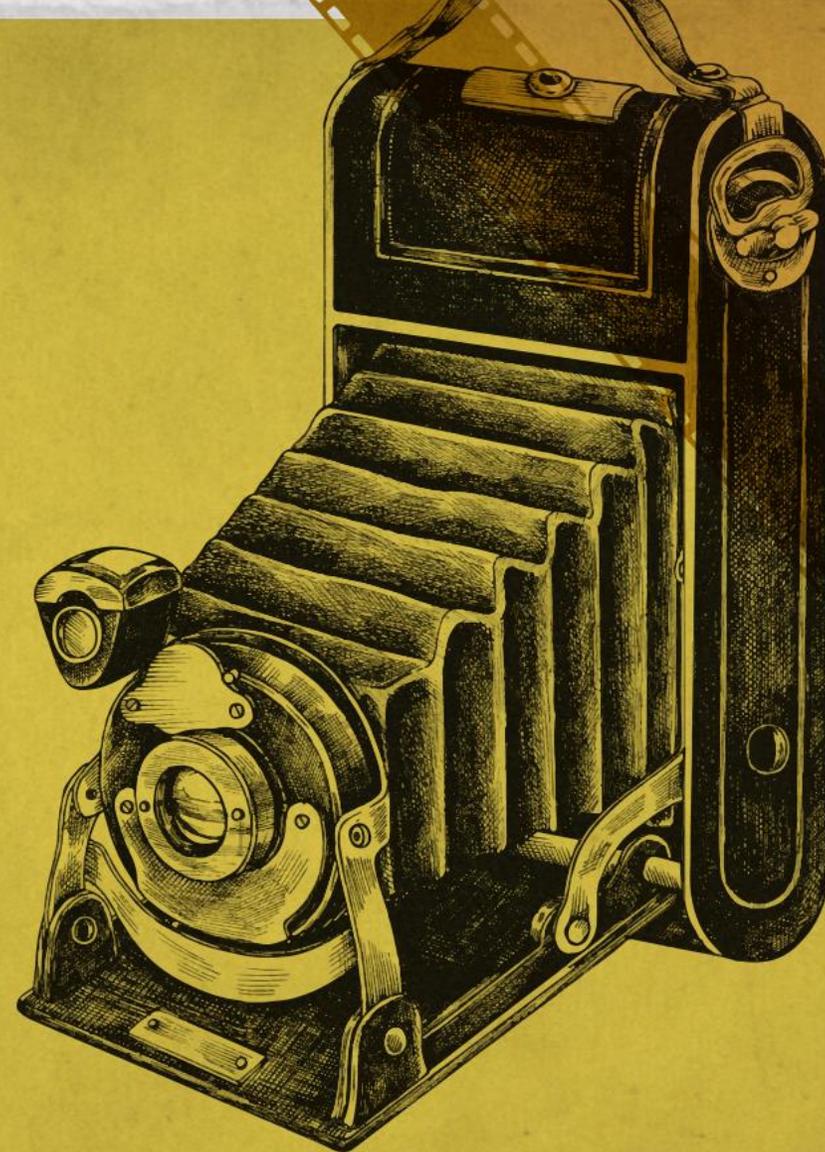
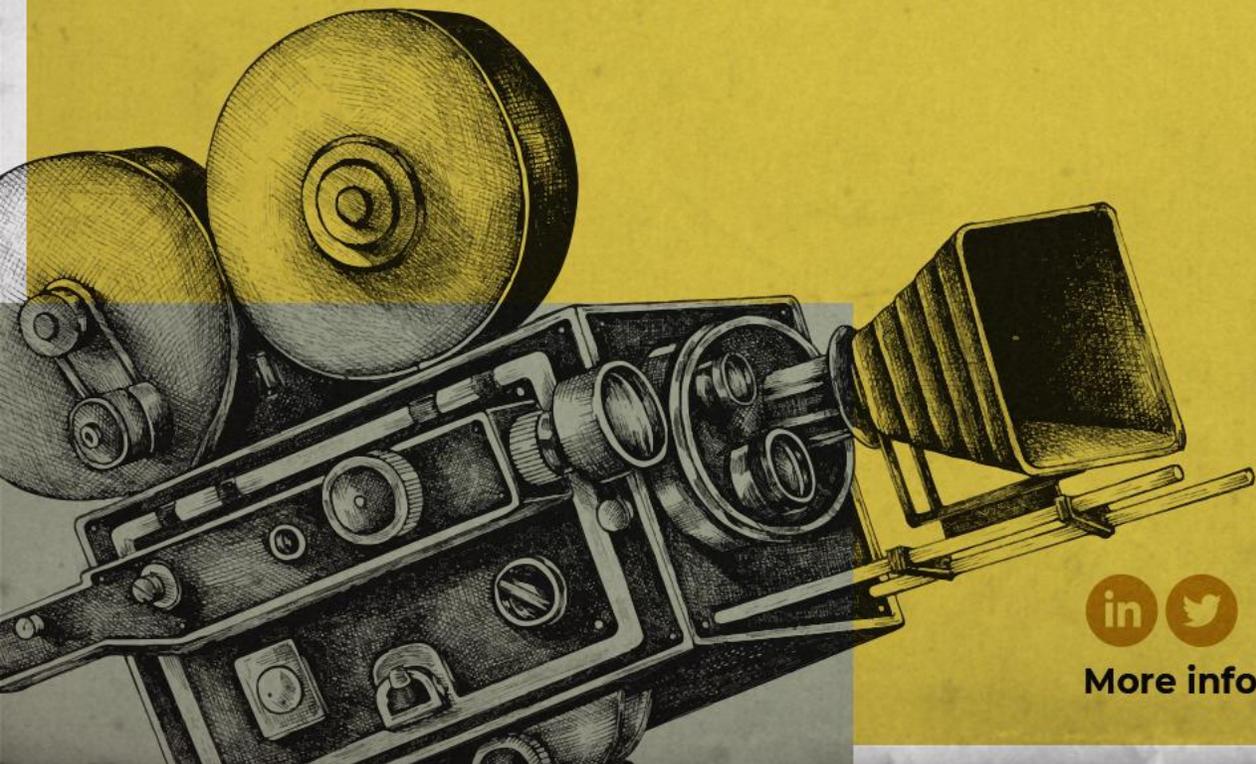
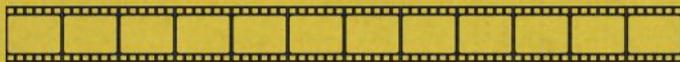


25TH MAY / 2022 ◊ VALENCIA, SPAIN

FINAL WORKSHOP

The NEMOSINE innovative package for cultural heritage preservation



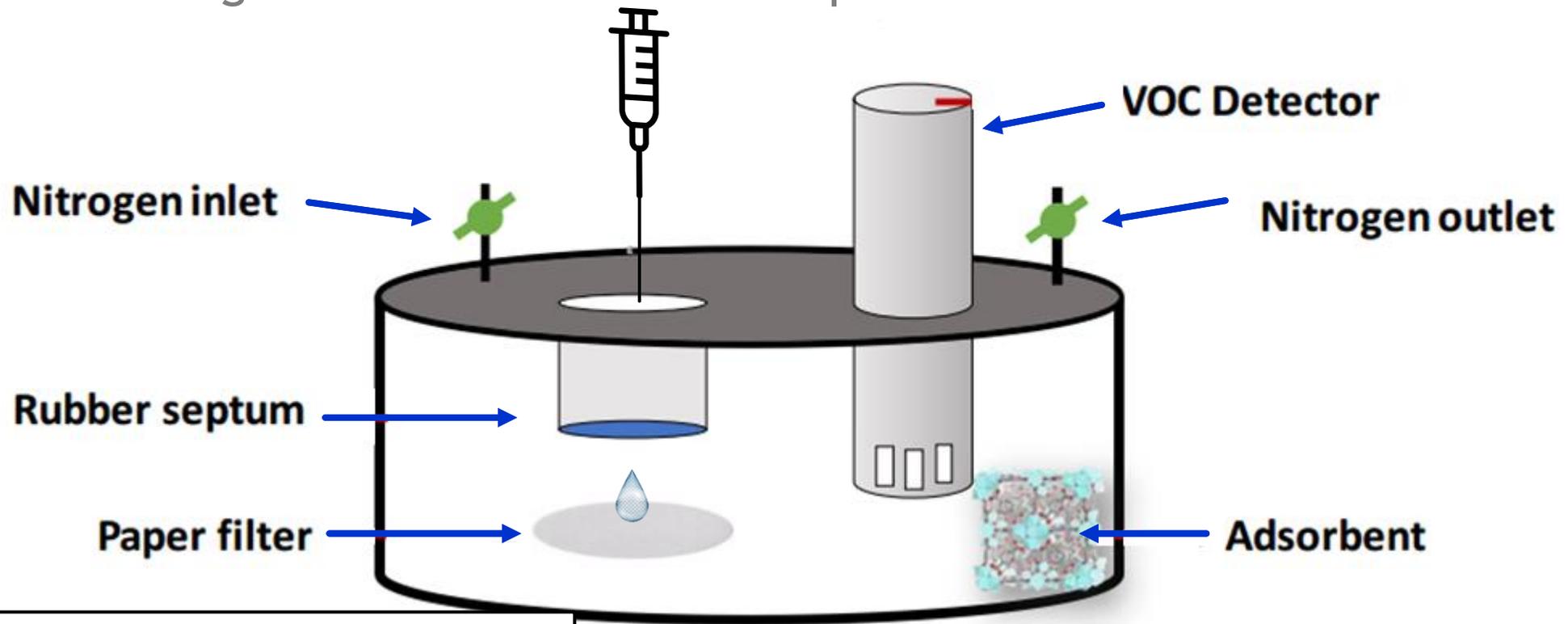
More info at: nemosineproject.eu



NEMOSINE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760801.

Acetic acid adsorption under controlled moisture level

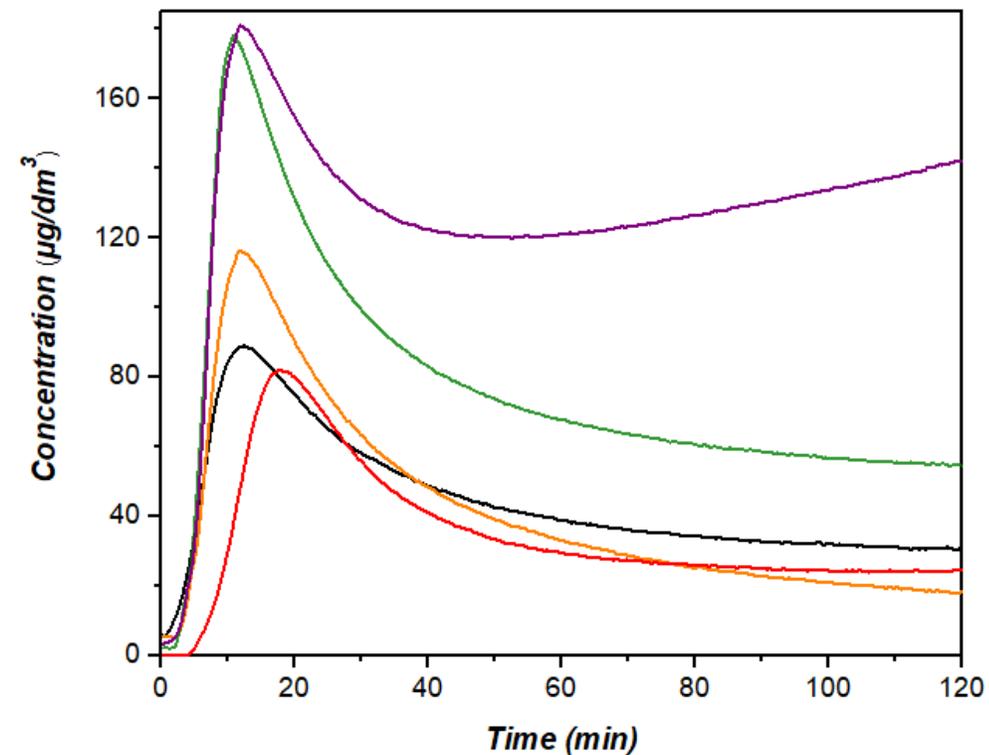
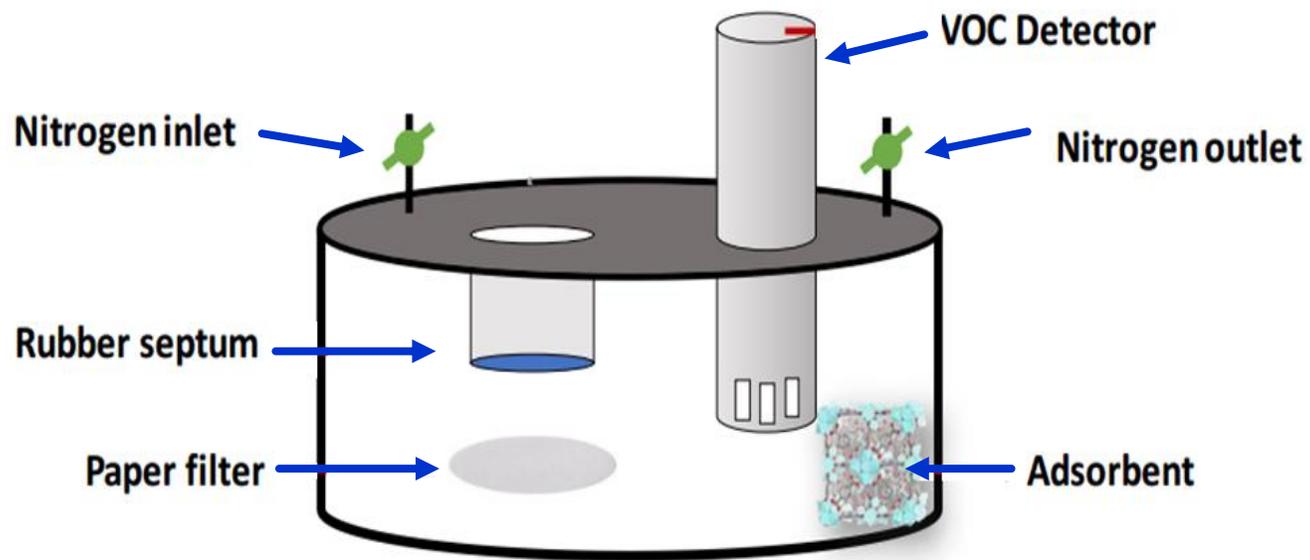
Screening test to understand adsorption behaviour



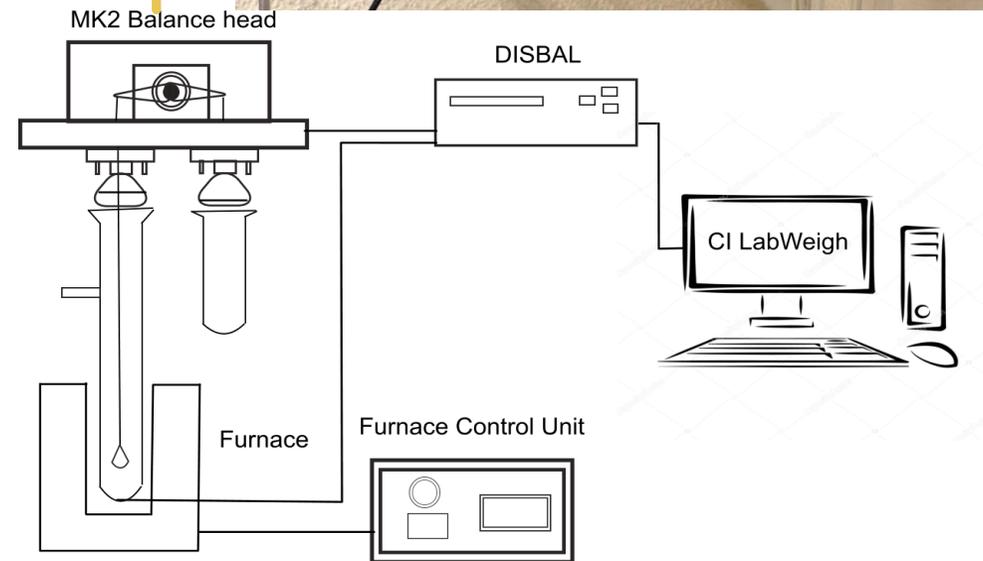
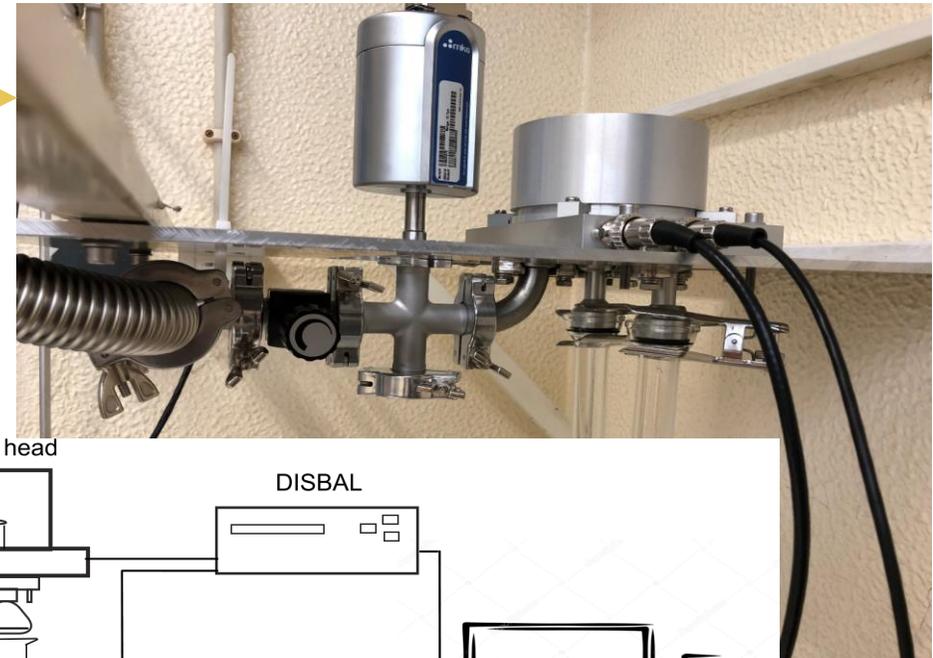
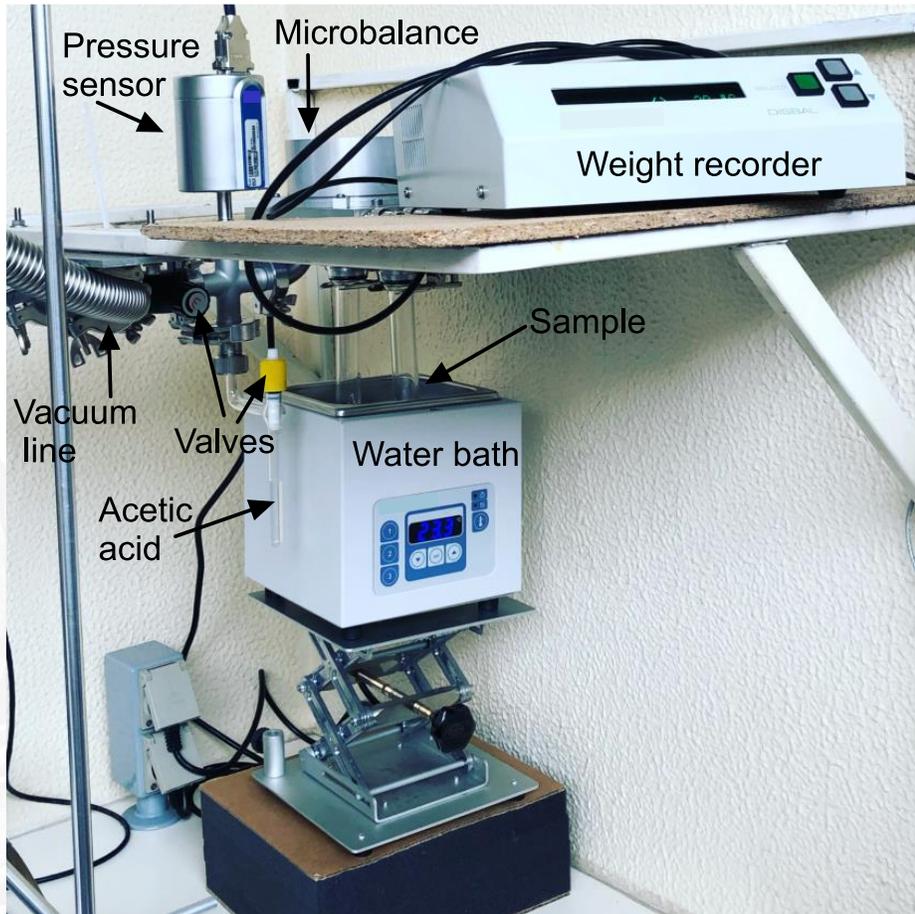
Injection 1 μL in 2.9 dm^3 chamber
 Relative humidity ~ 40-60 %
 Temperature = 25°C

Acetic acid adsorption under controlled moisture level

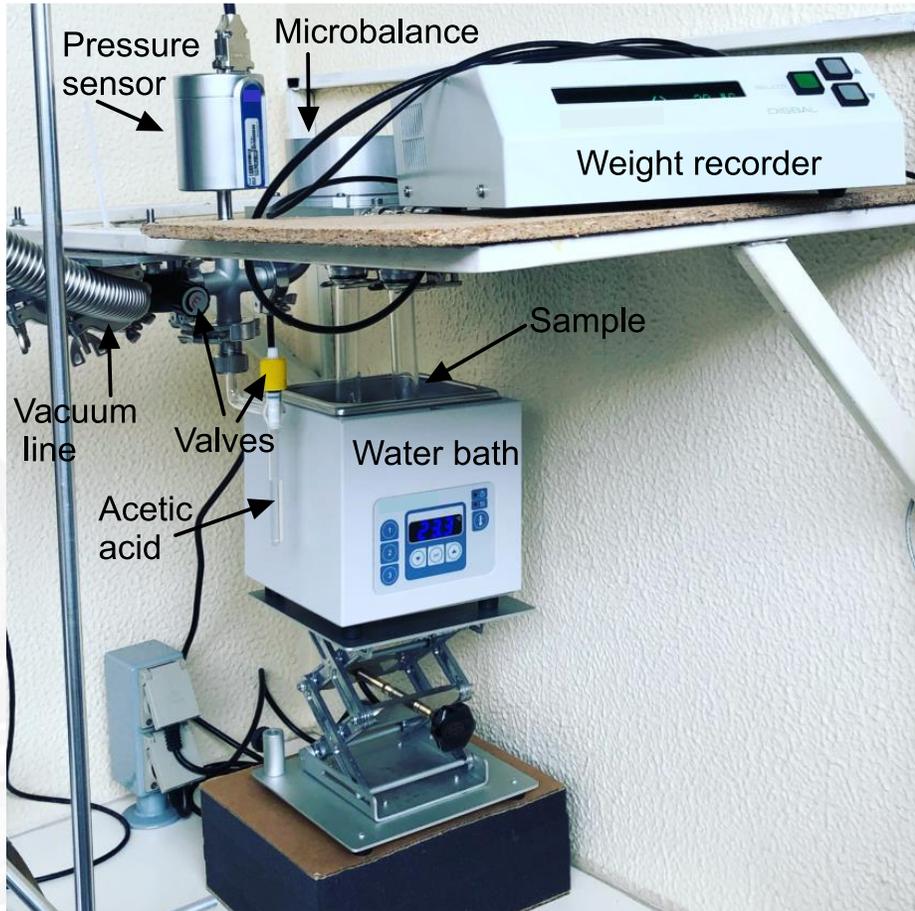
Screening test to understand adsorption behaviour



Single component adsorption isotherms



Single component adsorption isotherms

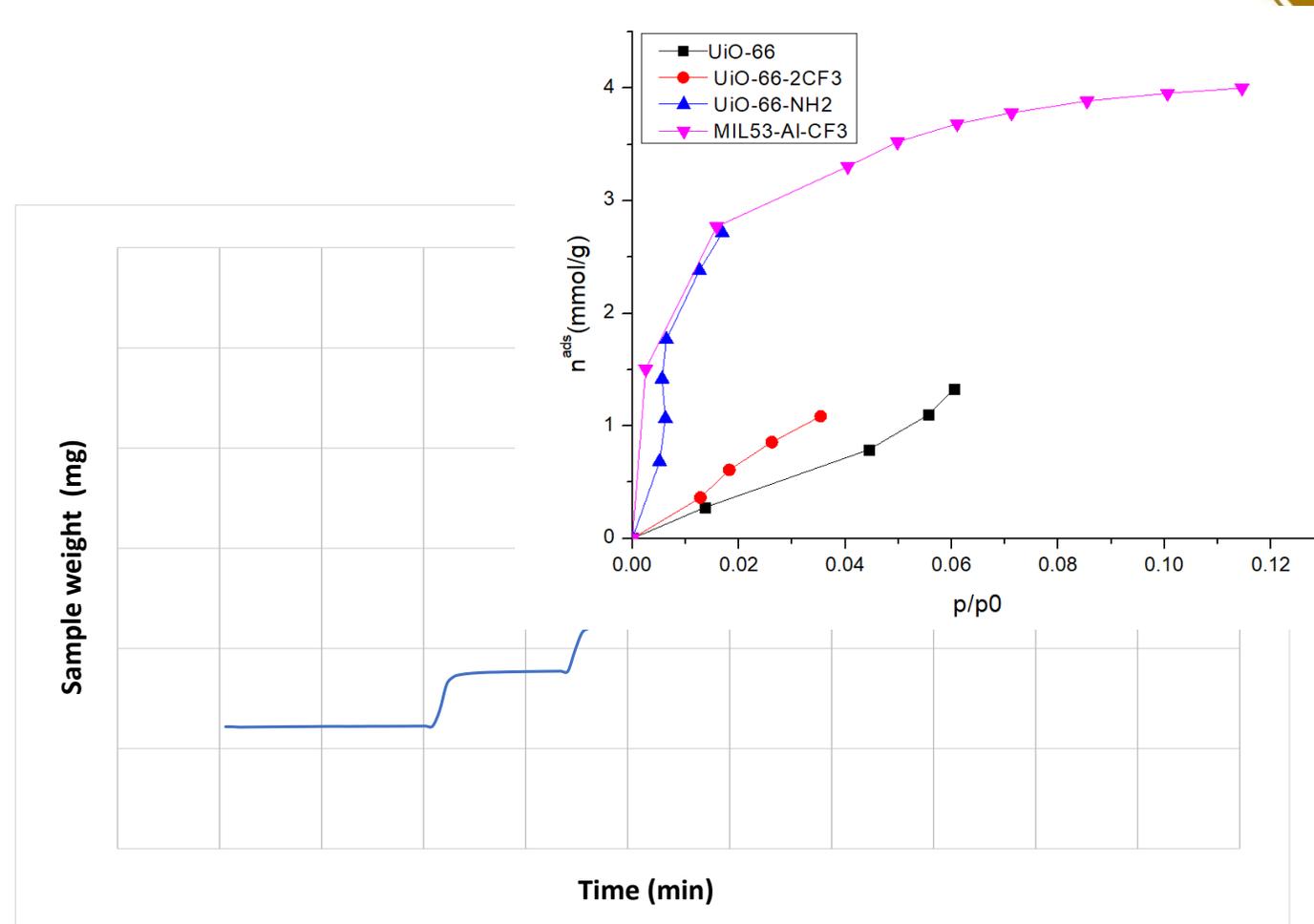
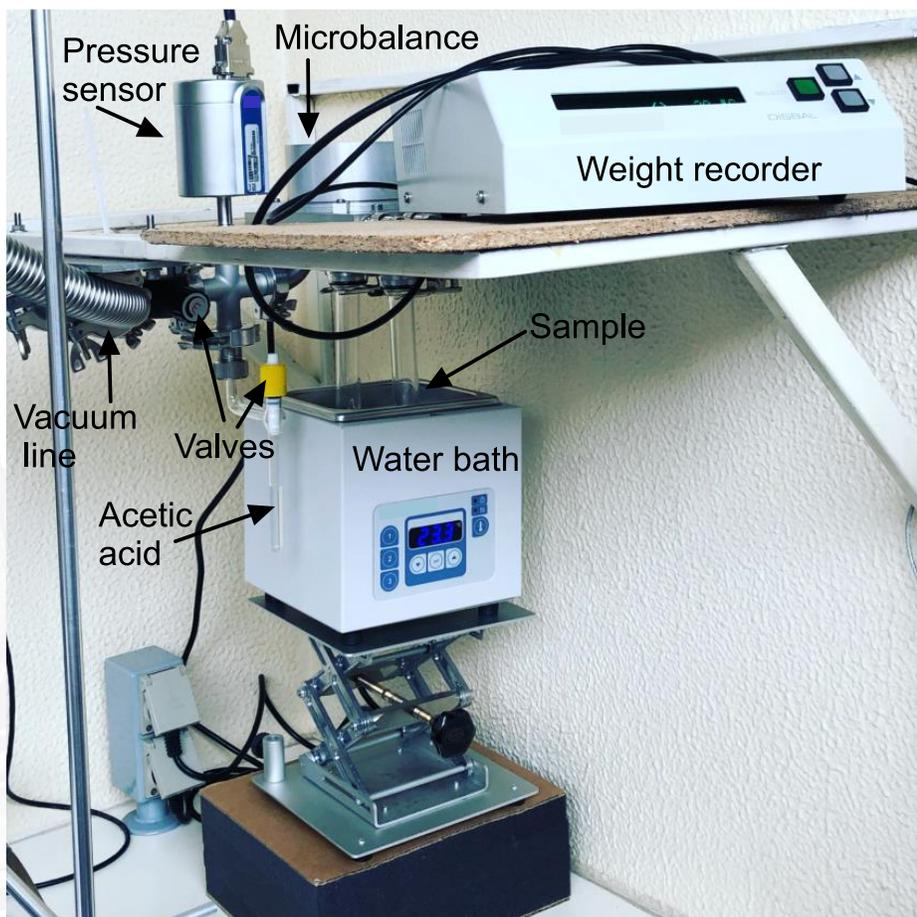


Measurements are performed under controlled temperature and pressure conditions

To access the material acetic acid adsorption capacities and study their hydrophobicity

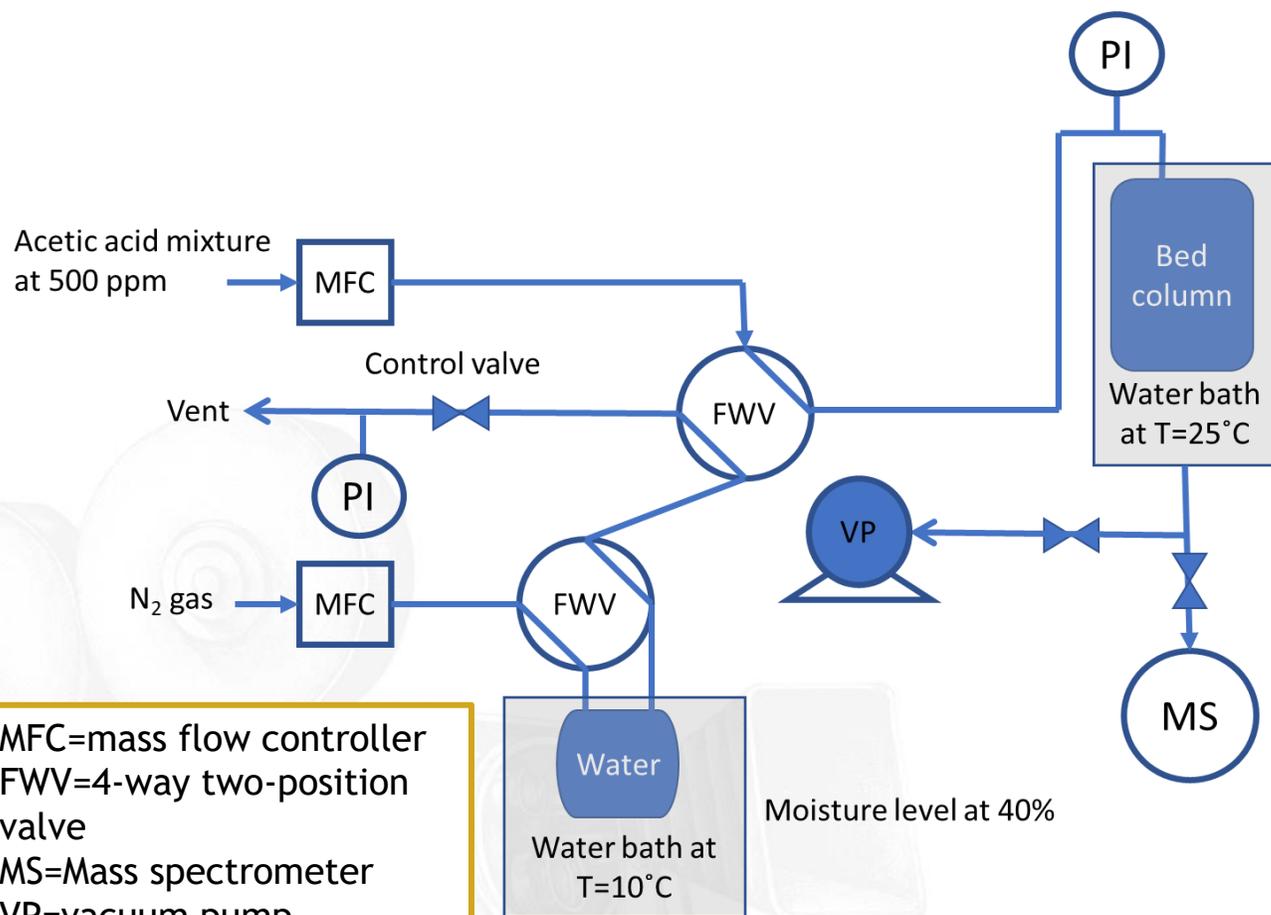
More recently: study of adsorption of other volatile organic compounds released by the aging of cellulose acetate materials and films

Single component adsorption isotherms



Dedecker, Kevin, et al. "Metal-Organic Frameworks for Cultural Heritage preservation: the case of acetic acid removal." *ACS applied materials & interfaces* 10.16 (2018)

Mass spectrometer setup with multiple gas inlets



MFC=mass flow controller
FWV=4-way two-position valve
MS=Mass spectrometer
VP=vacuum pump
PI=pressure sensor

Moisture level at 40%





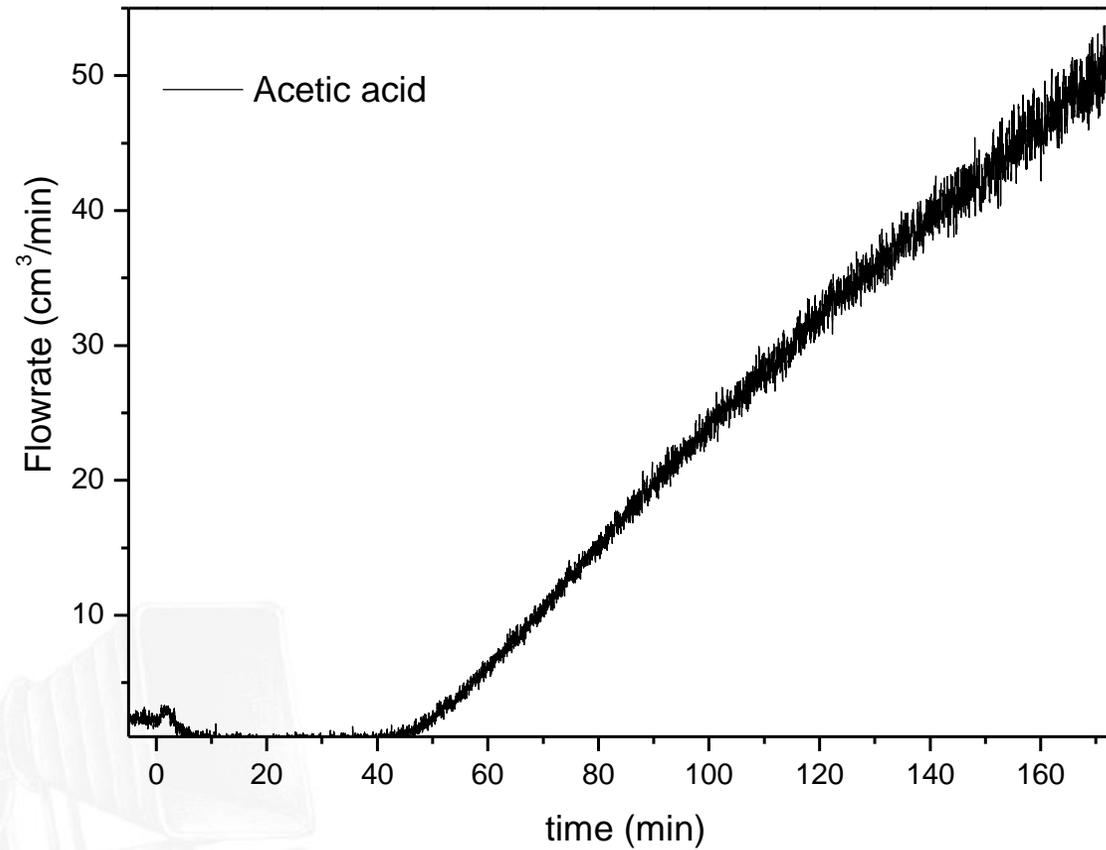
FINAL WORKSHOP:

The NEMOSINE innovative package and solutions for 20th century cultural heritage preservation.



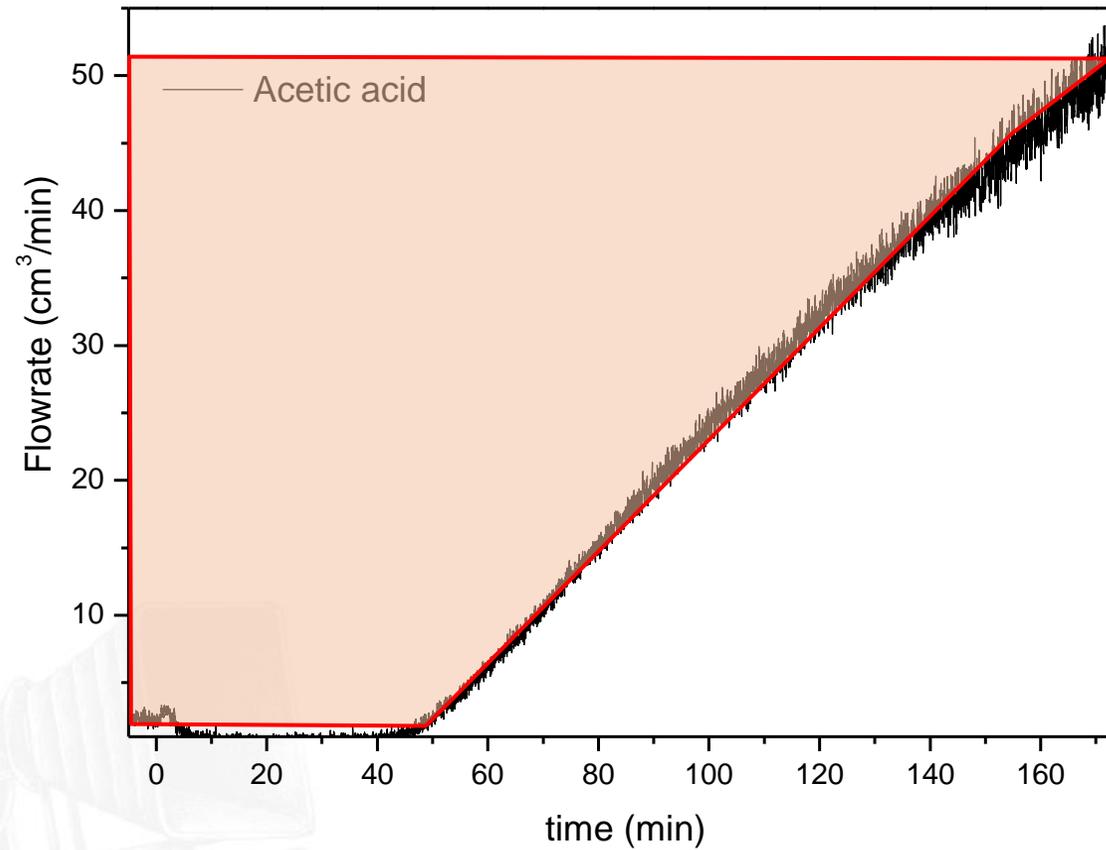
NEMOSINE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760801.

Breakthrough curves

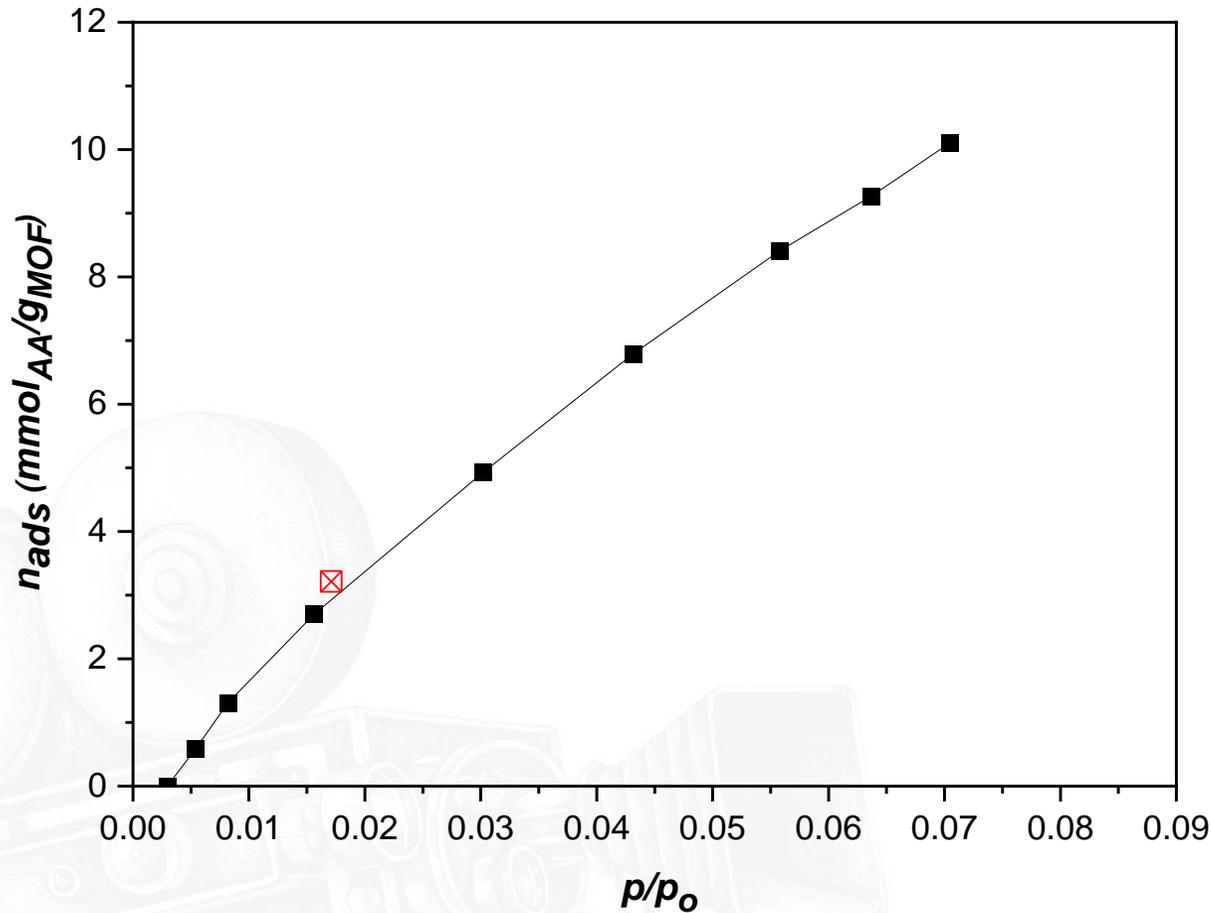




Breakthrough curves



Results comparison - cross confirmation of amounts

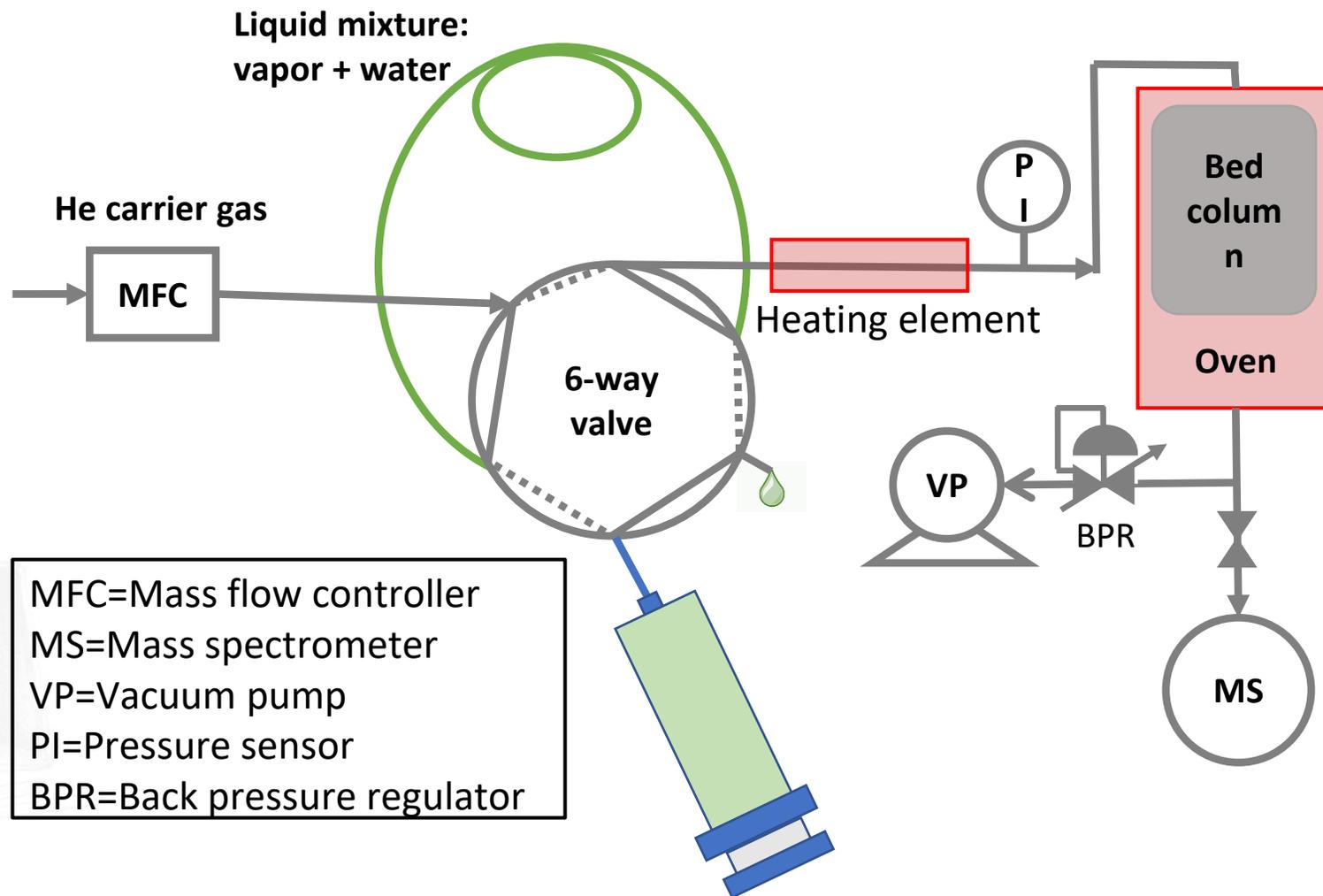


The adsorbed amount using breakthrough experiment is in perfect agreement with that using single component isotherm.

This gives us confidence about the performance of the selected material under moisture (in real life application).

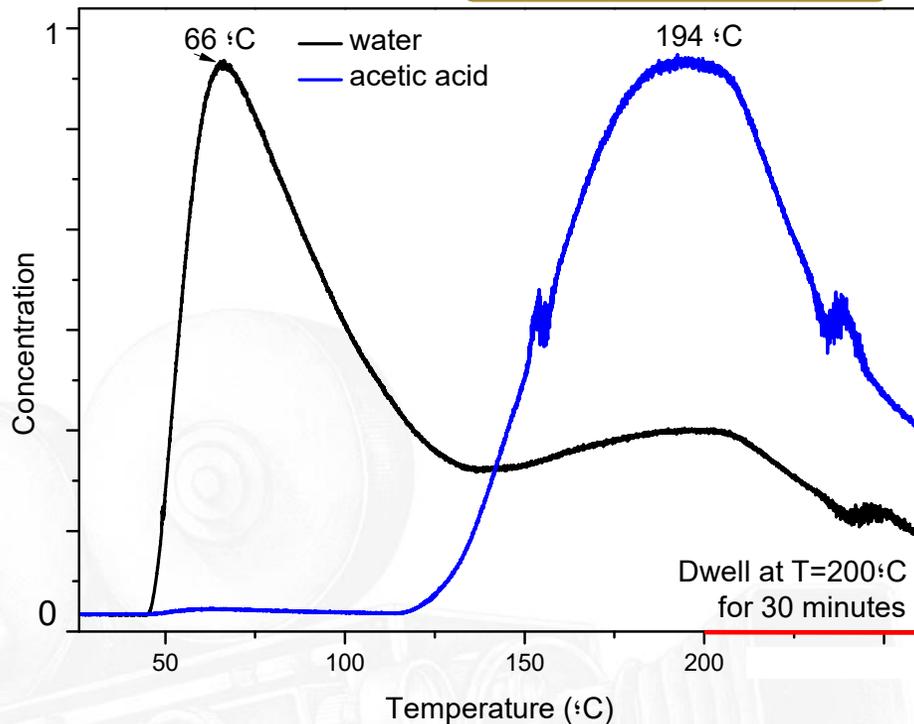
Temperature Programmed Desorption with mass spectrometry detection

- ❑ Adsorption of 50% water + 50% vapor at room temperature
- ❑ Thermal desorption is achieved by increasing the temperature from 25°C to 200 °C with a ramp of 2°C/min under a He carrier gas flow
- ❑ The desorbed species are recorded as function of time by the mass spectrometer
- ❑ This technique gives a clear idea about the selectivity of the materials between the moisture and studied vapor

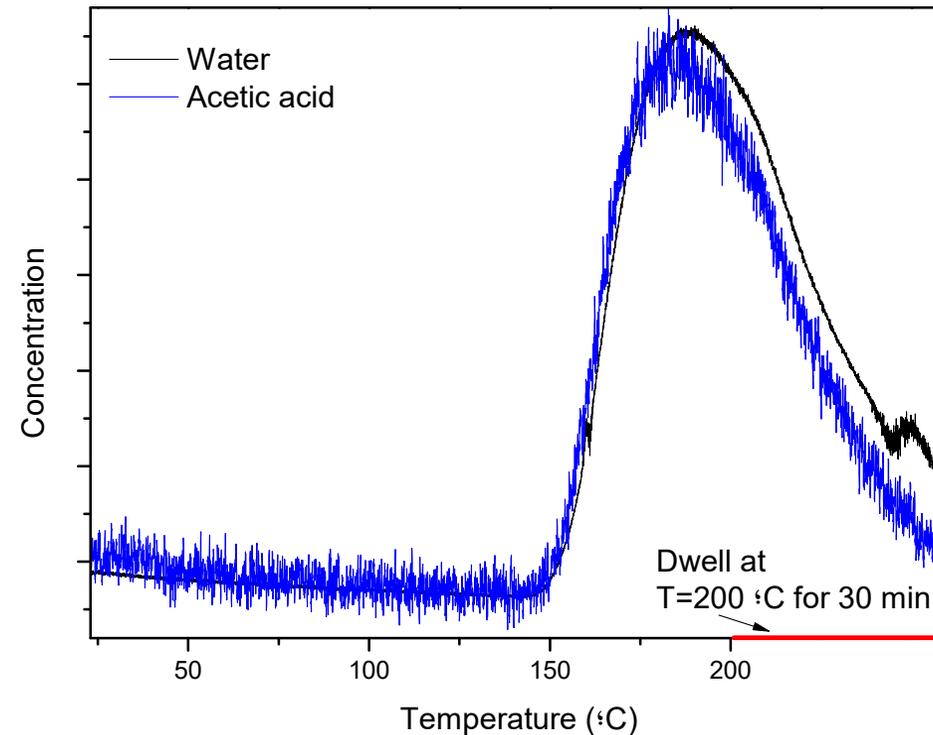


Temperature Programmed Desorption with mass spectrometry detection

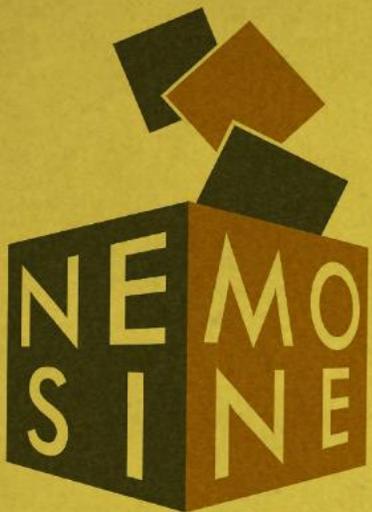
MOF



Zeolite NaY



- ❑ Water is desorbed mainly at a temperature of 65°C
- ❑ Acetic acid desorbs at T=195°C indicating a much higher bonding
- ❑ Even higher bonding is observed for the propionic acid, where it only desorbs upon dwelling at T=200°C

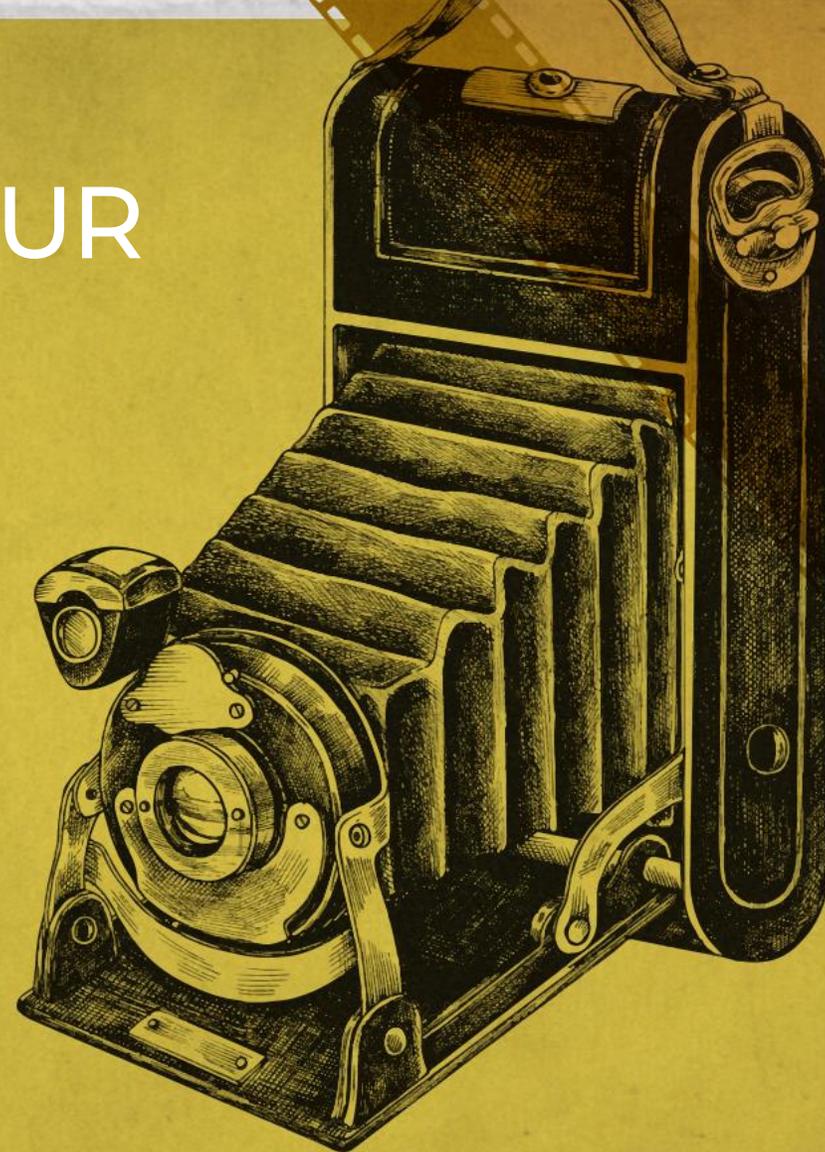


THANKS FOR YOUR ATTENTION

moises.pinto@tecnico.ulisboa.pt



TÉCNICO
LISBOA



More info at: nemosineproject.eu



NEMOSINE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760801.