



NOM removal by Ion Exchange (IEX): pilots update



Kluizen, DOC2C's workshop October 4-5
Erik Koreman

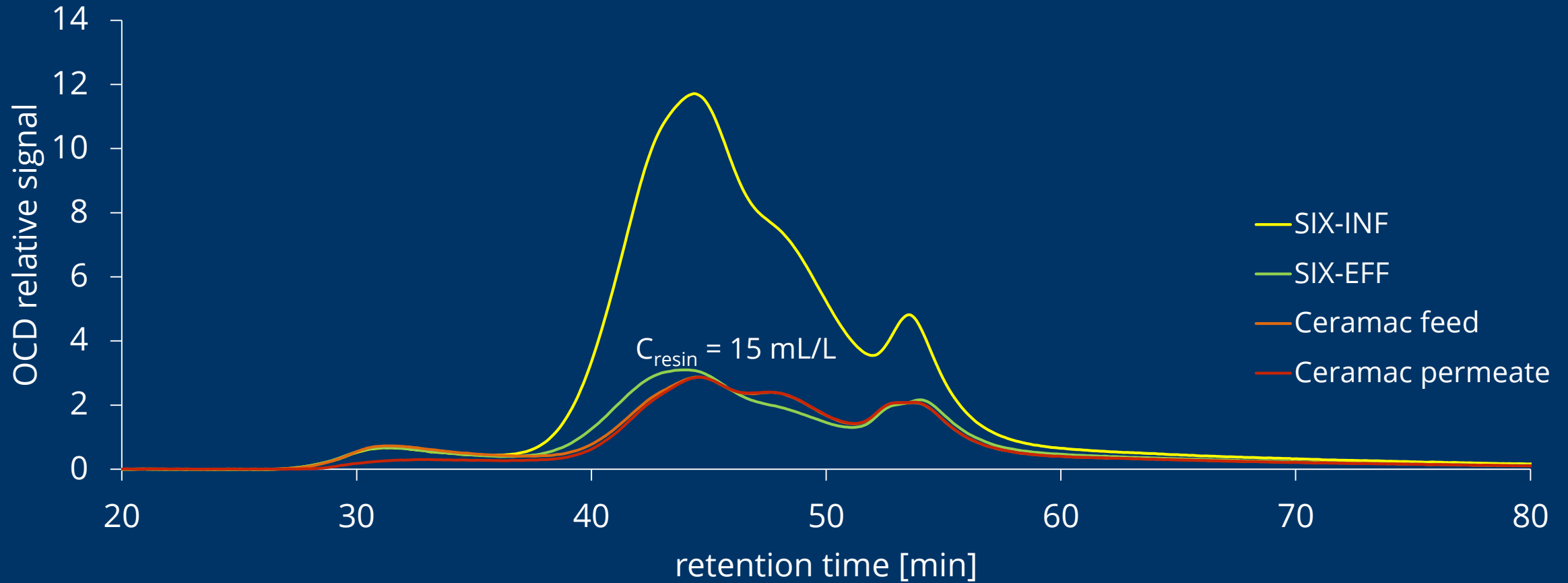
SIX Pilots

current situation Lovö



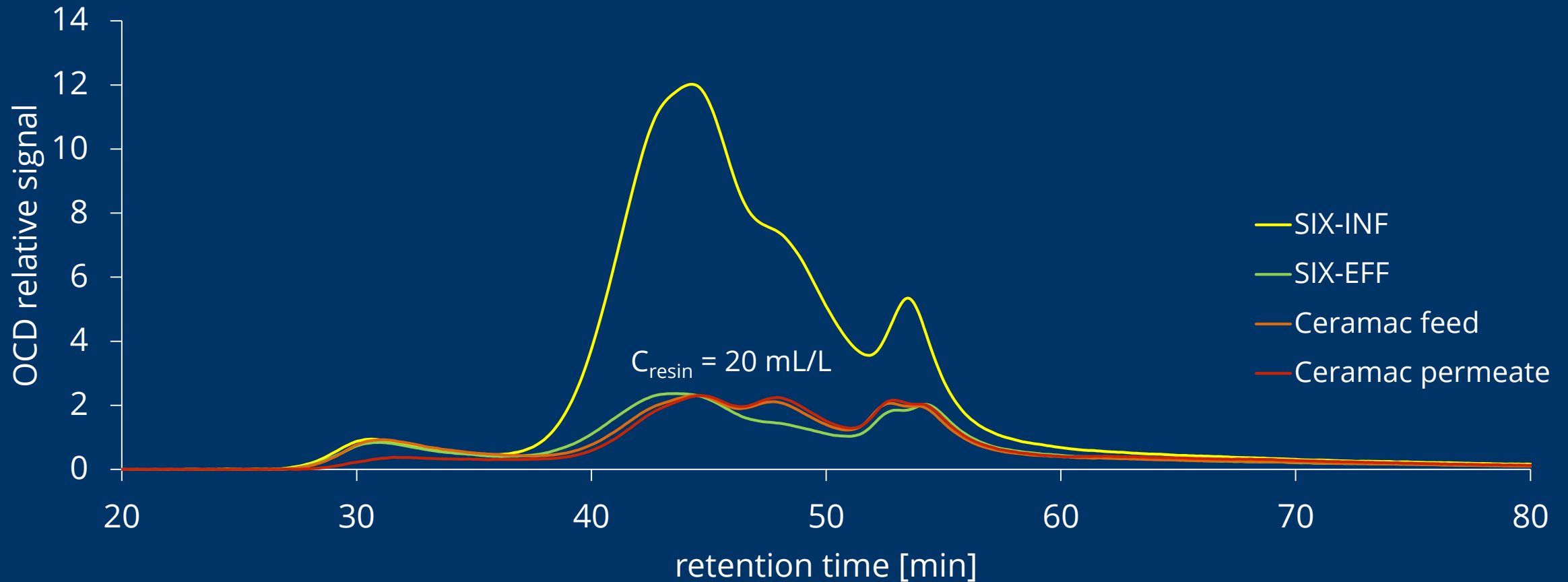
Lovö SIX/Ceramac Pilot LC-OCD data

24-01-2017



Lovö SIX/Ceramac Pilot LC-OCD data

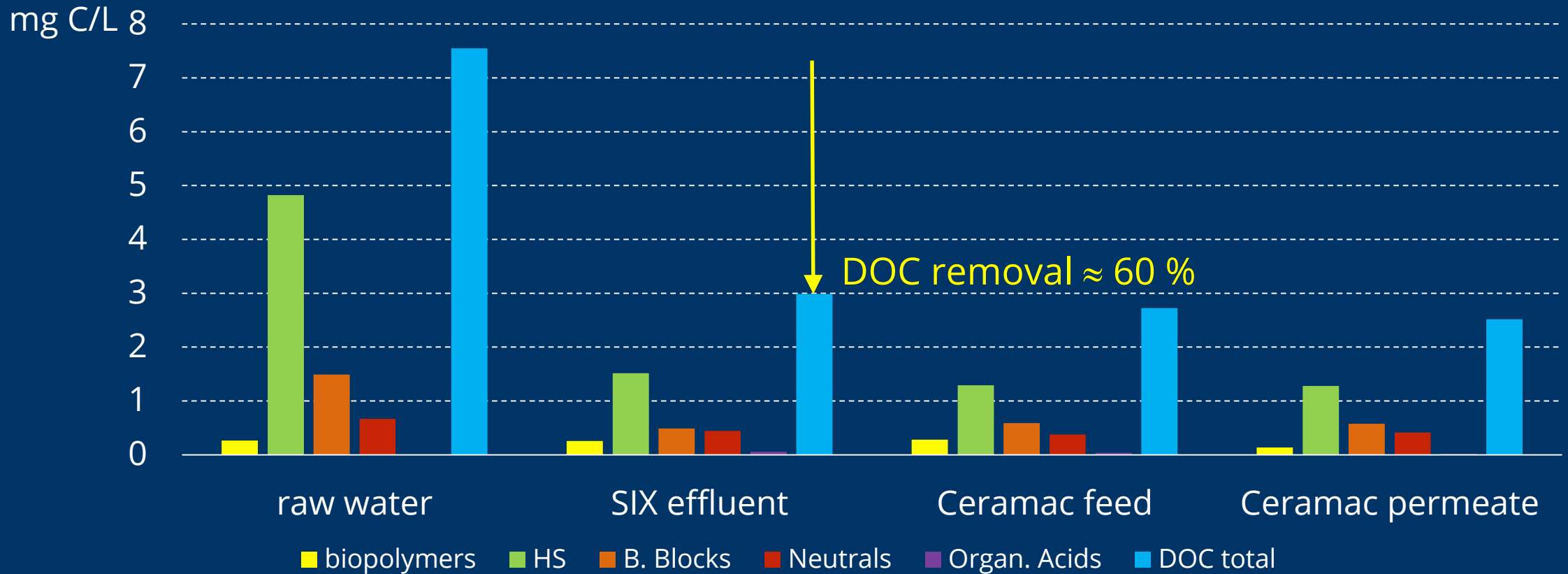
4-04-2017



Lovö SIX/Ceramac Pilot LC-OCD data

24-01-17 ($c_{\text{resin}} = 15 \text{ mL/L}$)

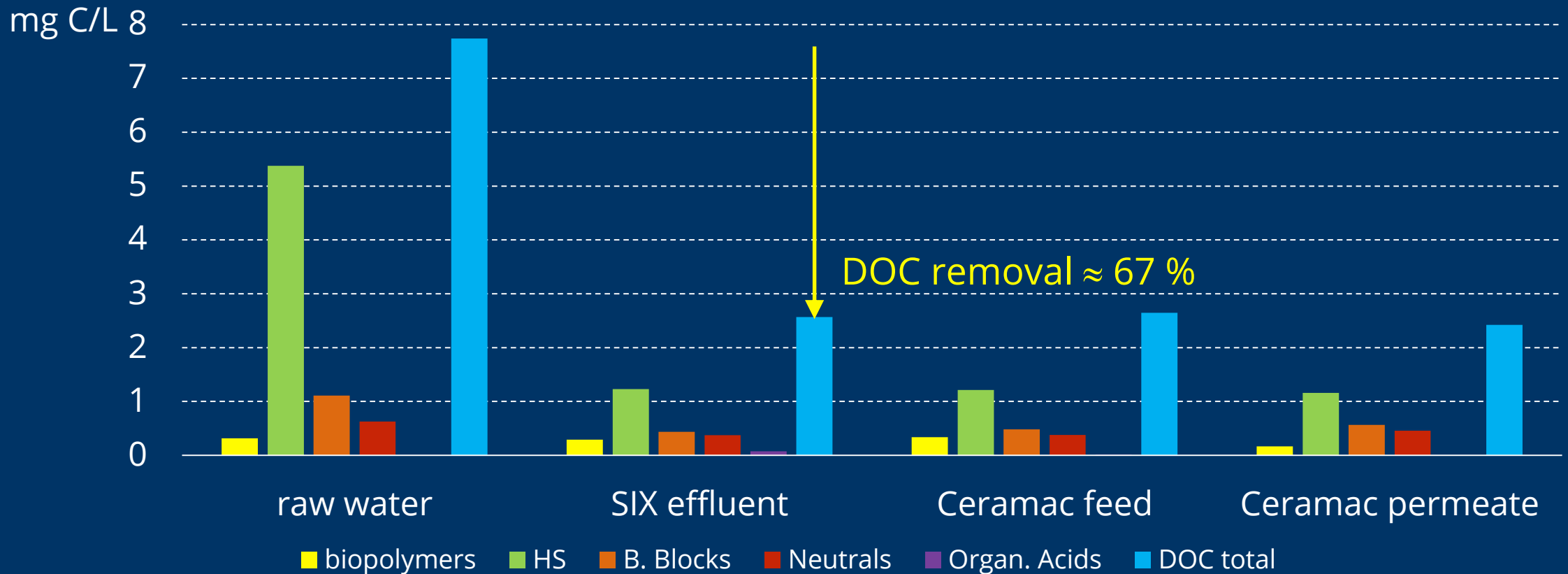
affected NOM fractions



Lovö SIX/Ceramac Pilot LC-OCD data

04-04-17 ($c_{\text{resin}} = 20 \text{ mL/L}$)

affected NOM fractions



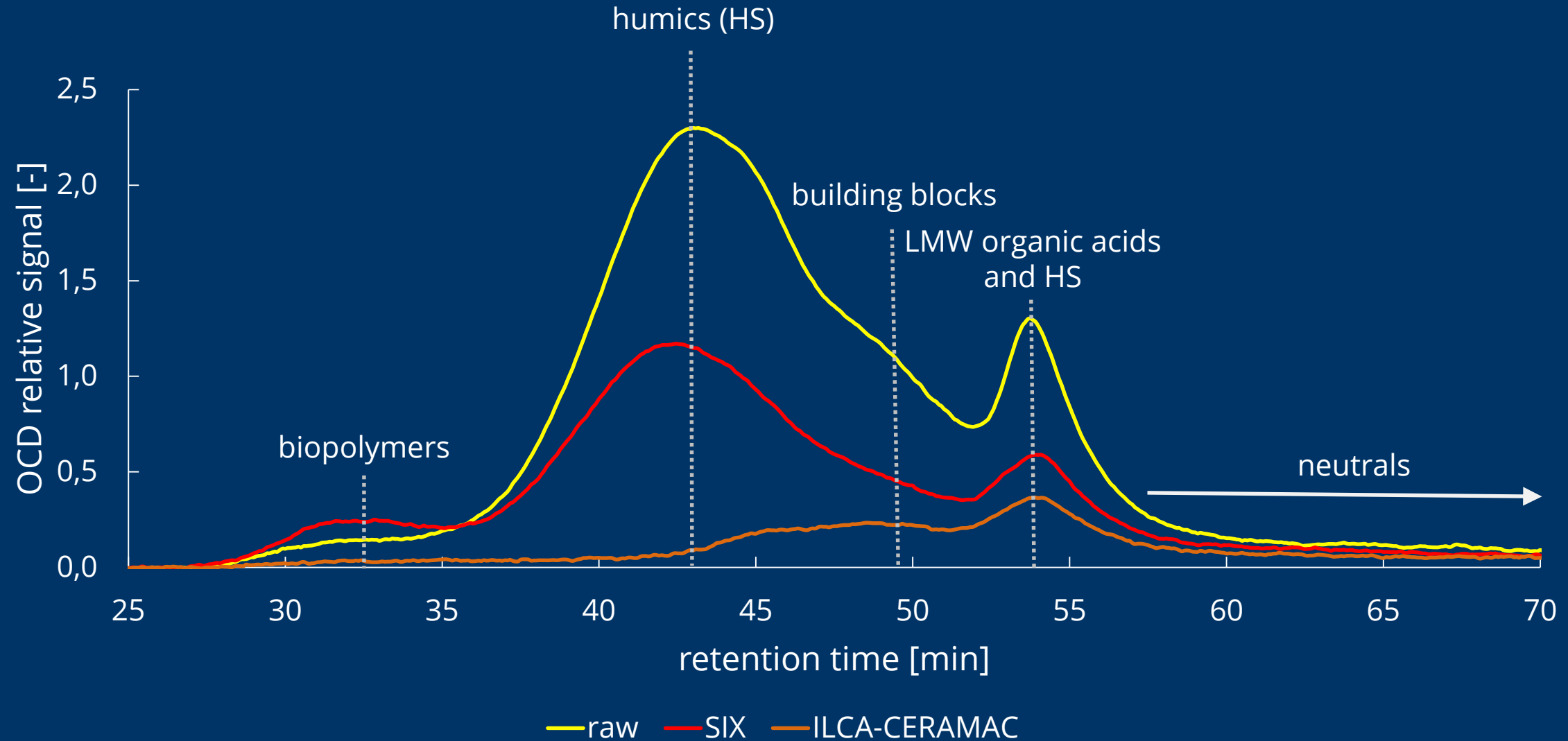
SIX Pilots

current situation **Invercannie**:
pilot performance &
multiple regeneration column
experiments



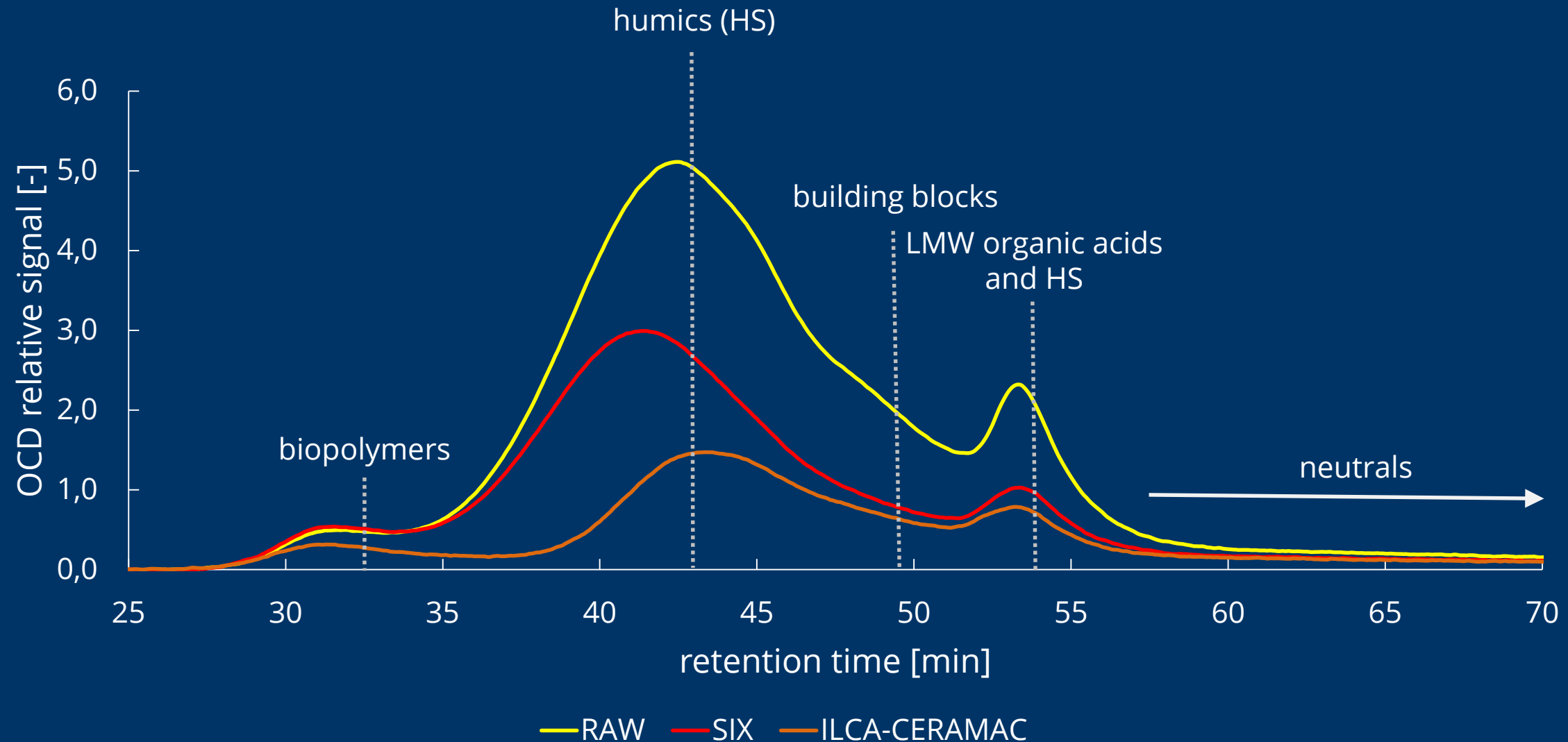
Invercannie SIX/CERAMAC Pilot

affected NOM fractions: 29-3-17



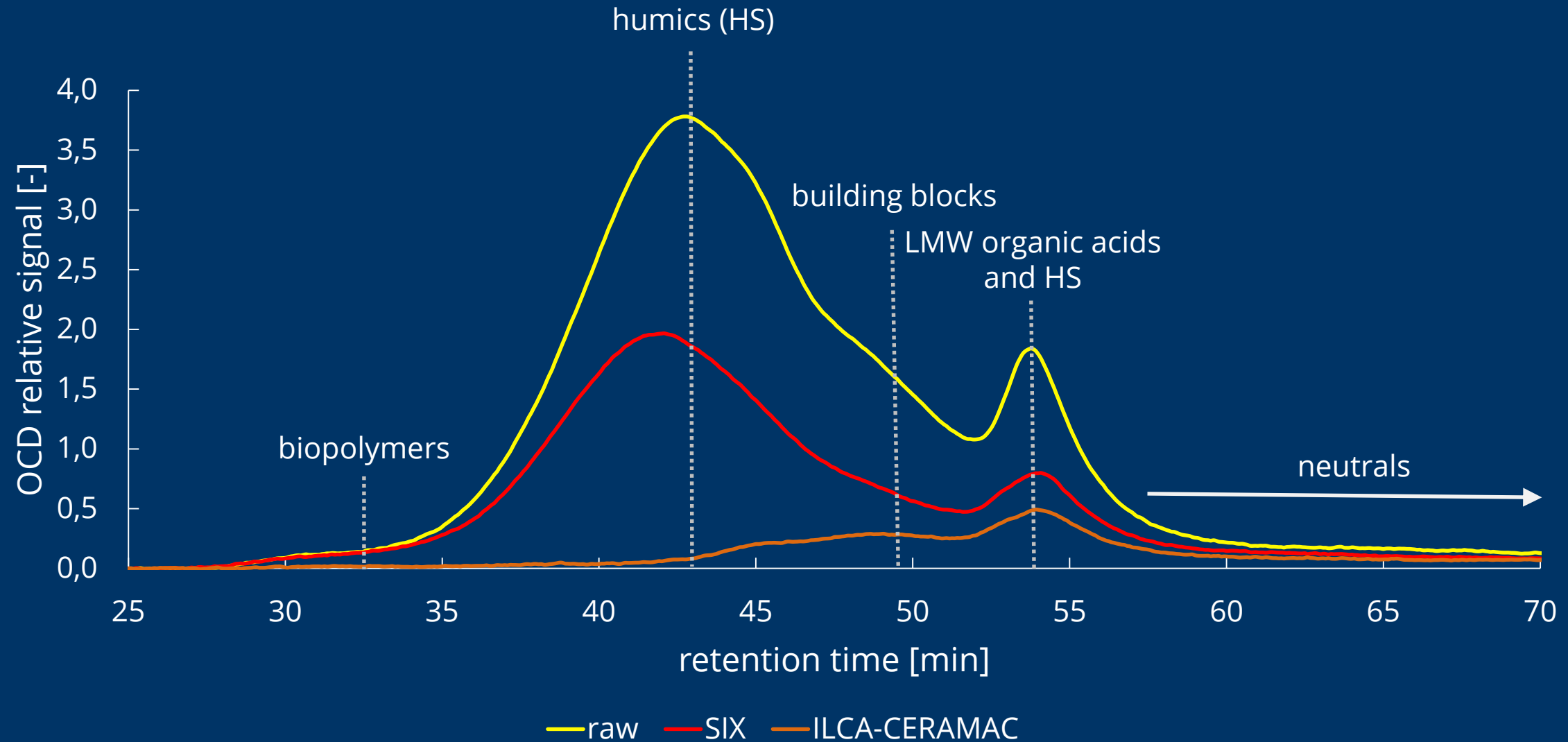
Invercannie SIX/CERAMAC Pilot

affected NOM fractions: 3-5-17



Invercannie SIX/CERAMAC Pilot

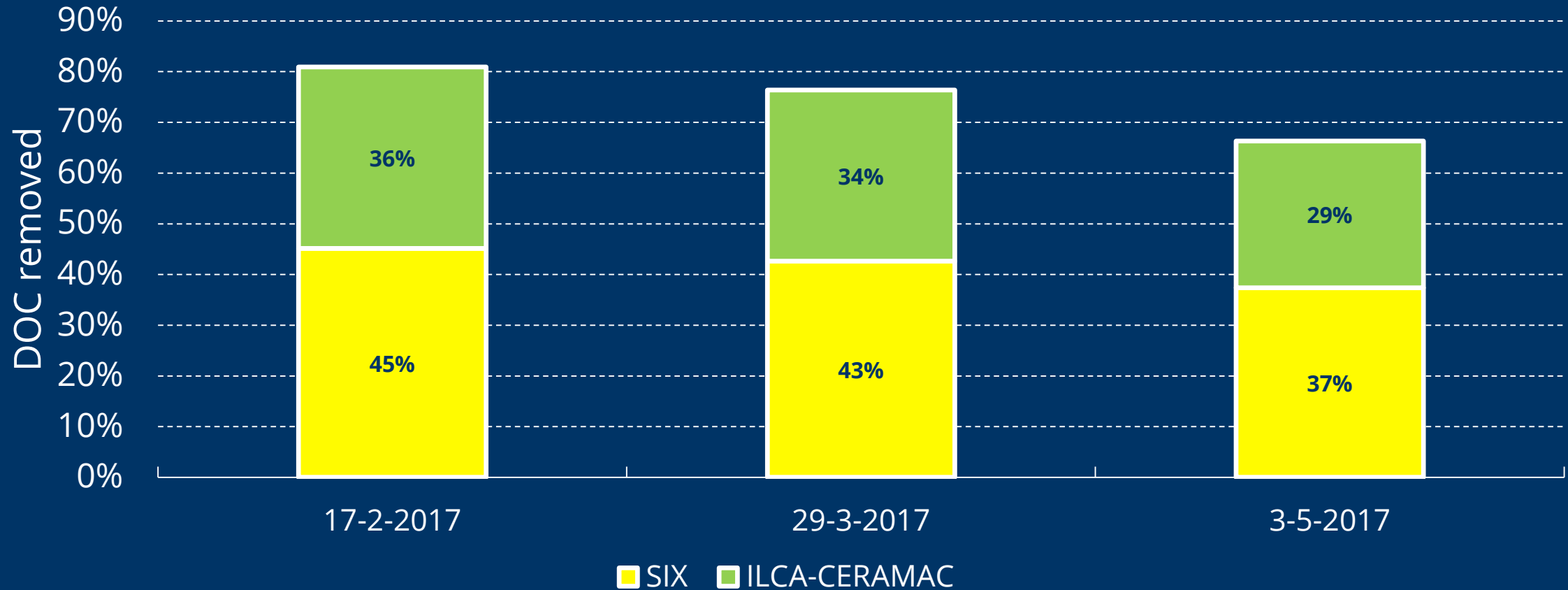
affected NOM fractions: 17-2-17



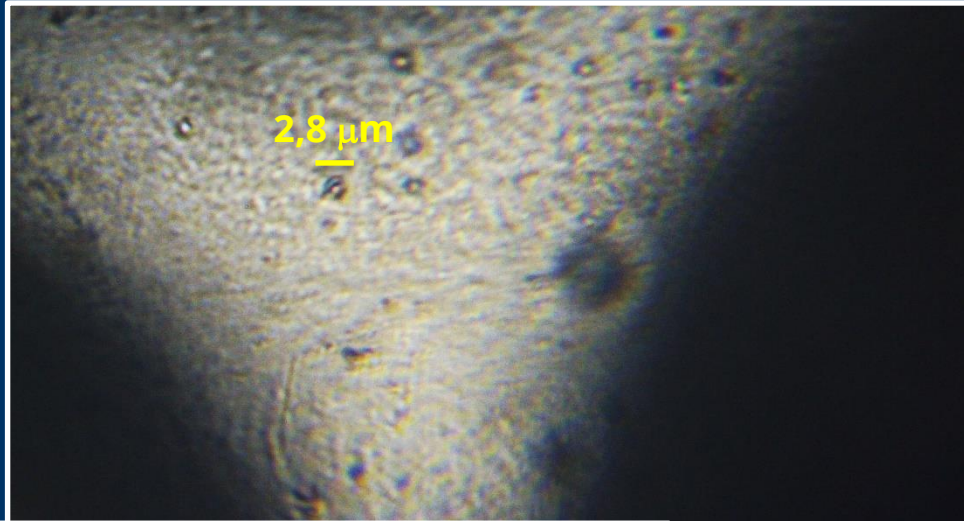
Invercannie SIX/CERAMAC Pilot

DOC removal

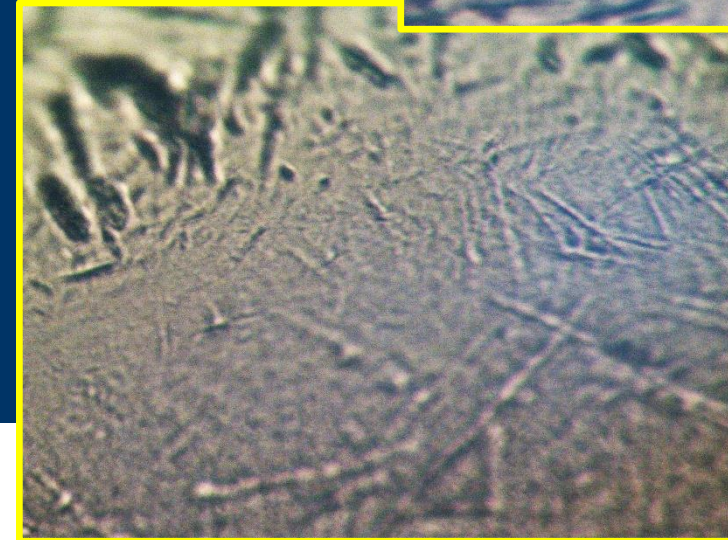
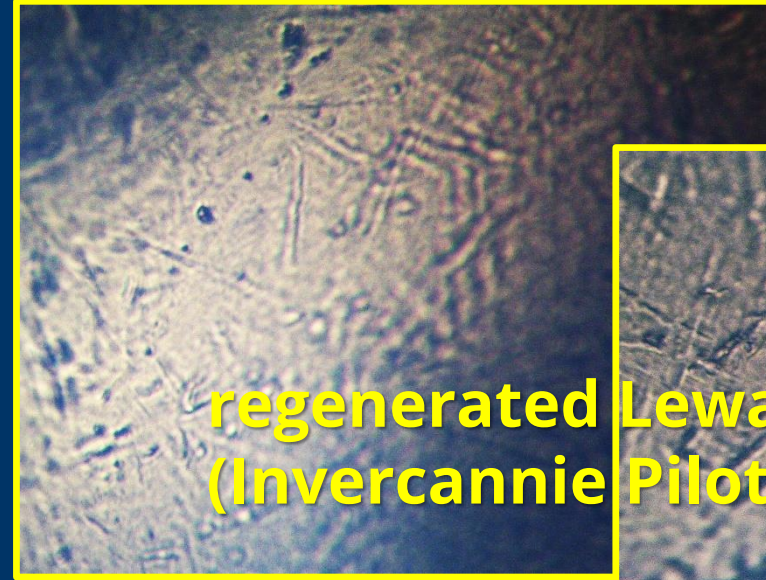
results all LC-OCD data



microscopic observations (500 x)

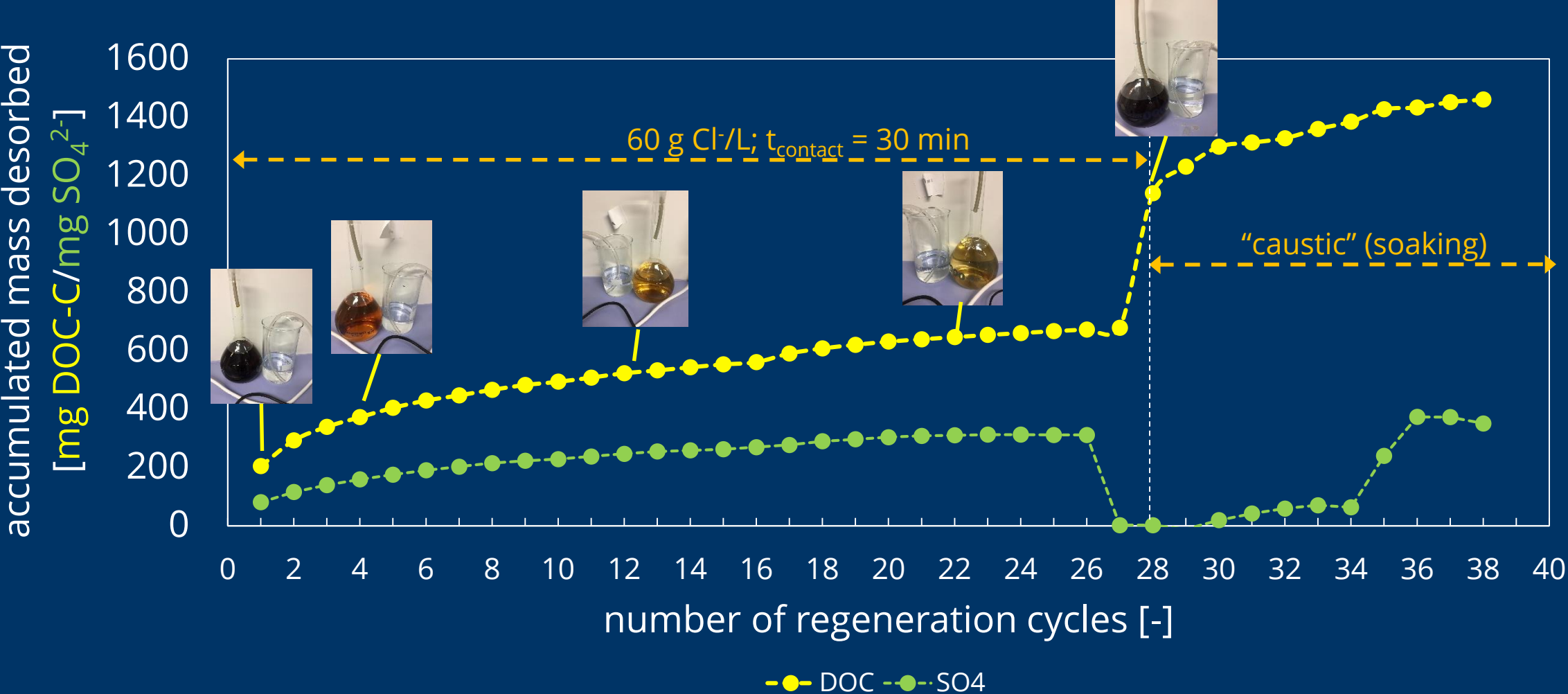


virgin Lewatit 5128 S



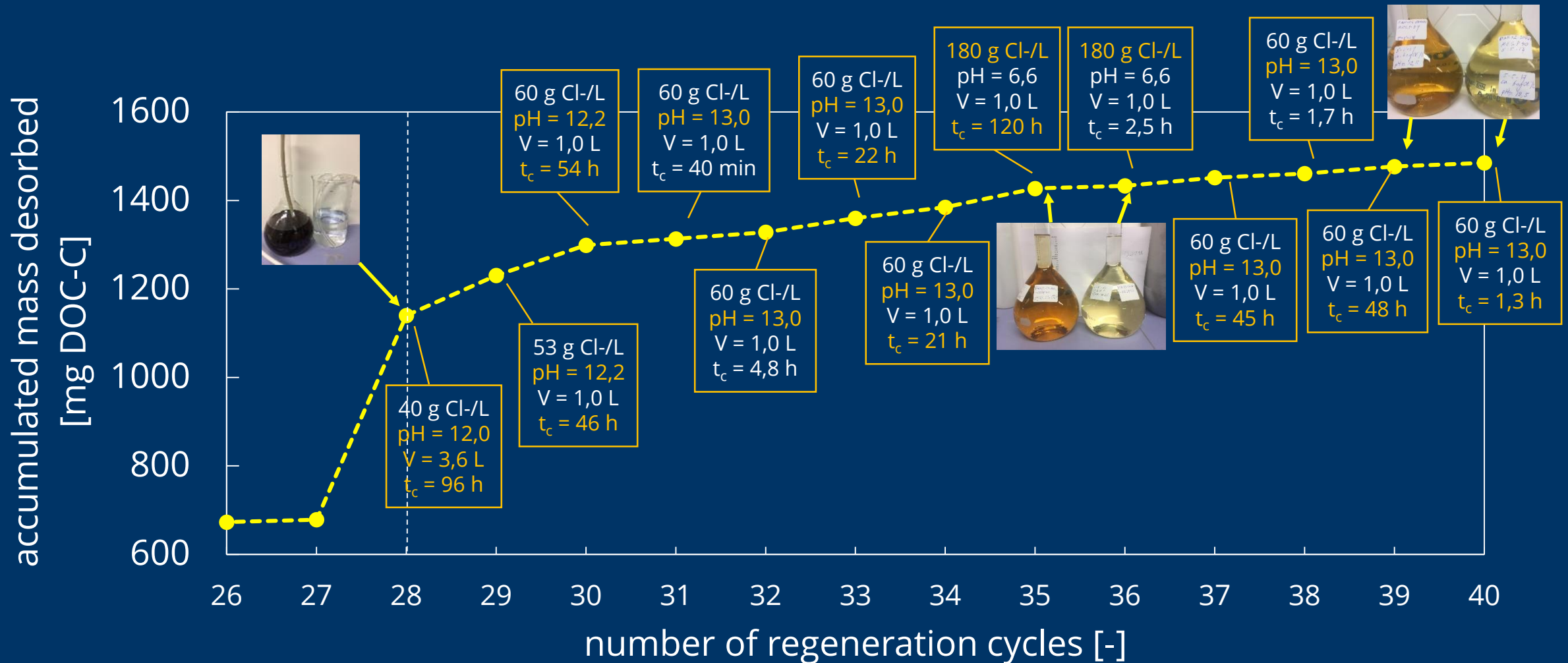
multiple column regeneration experiments

regenerant: 100 g NaCl/L, volume = 1L; Imhoff resin volume = 600 mL



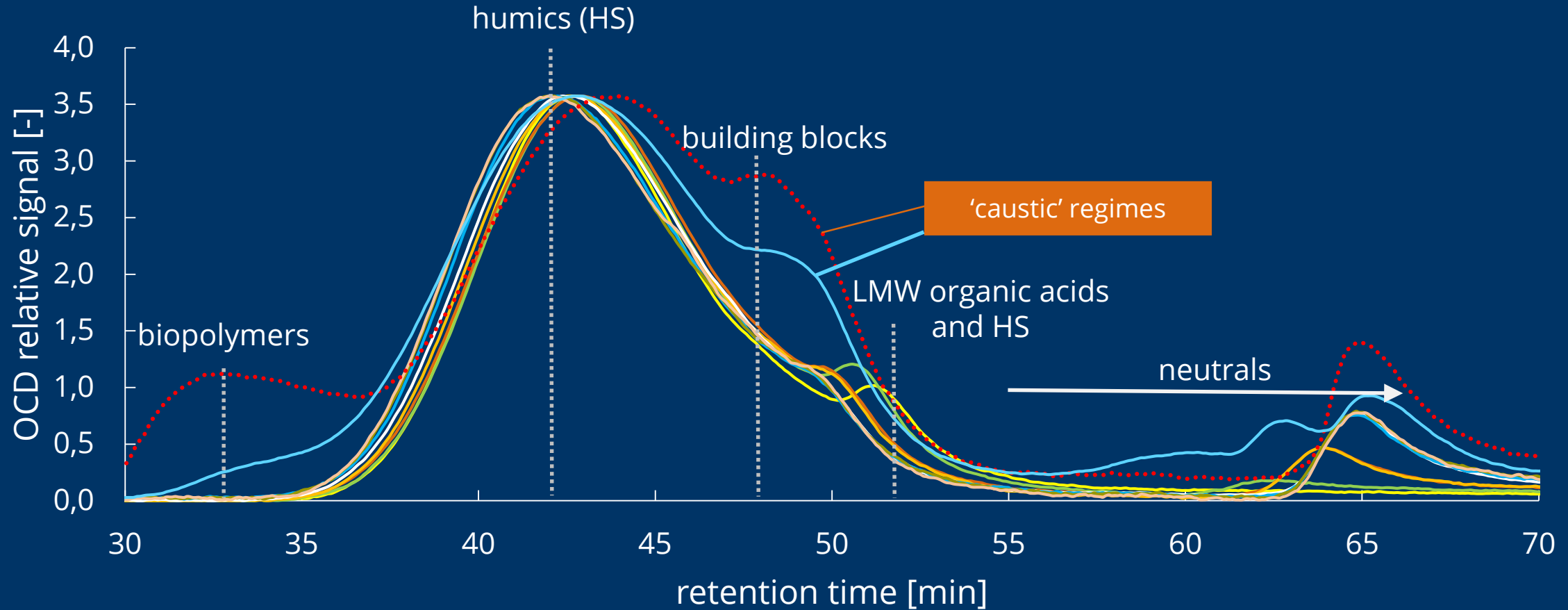
multiple column regeneration experiments

regenerant: NaCl/NaOH mixtures, volume = 1L; Imhoff resin volume = 600 mL



regenerant NOM composition

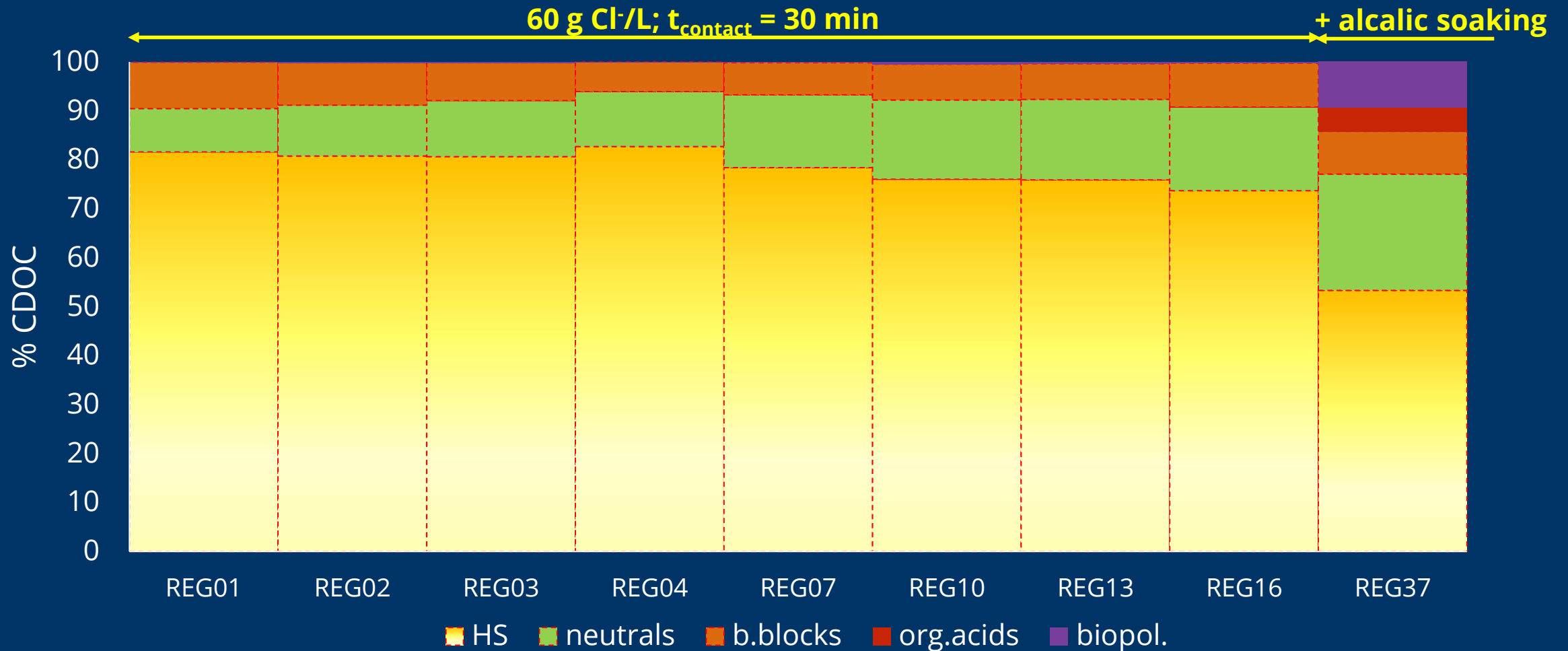
normalized LC-OCD mass spectrum



REG01 REG02 REG03 REG04 REG07 REG10 REG13 REG16 REG37 REG44

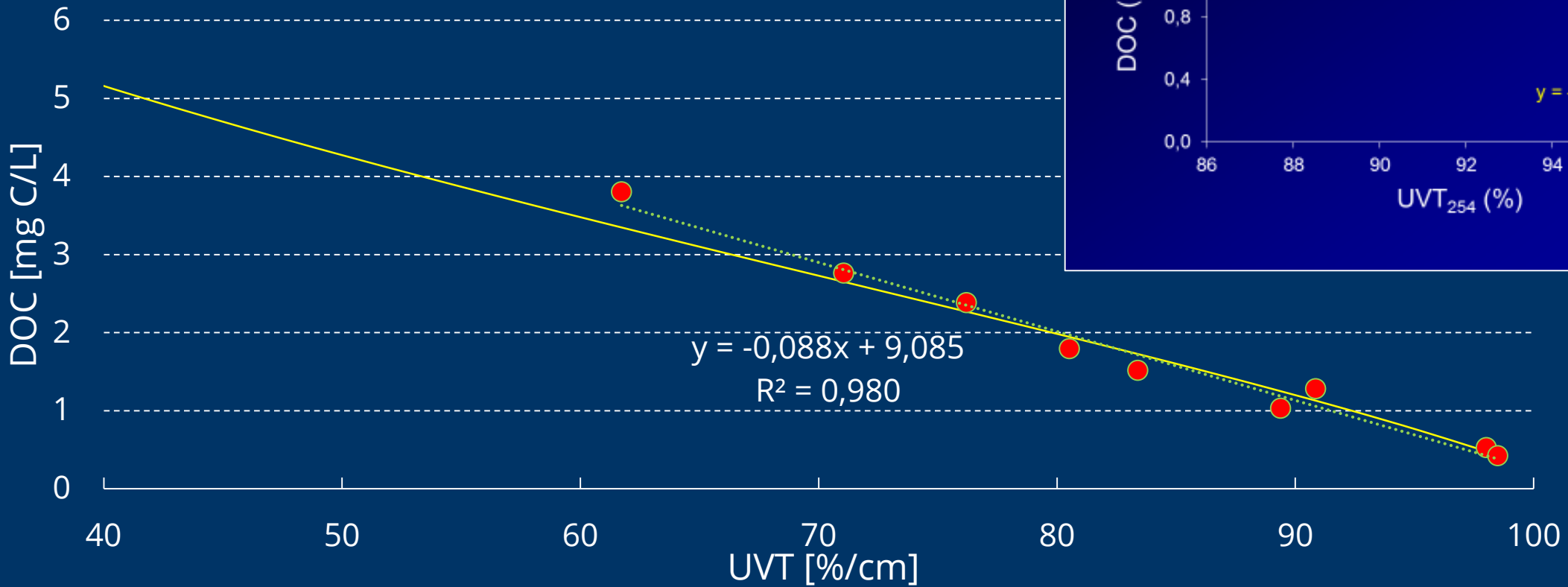
regenerant NOM composition

contribution different fractions



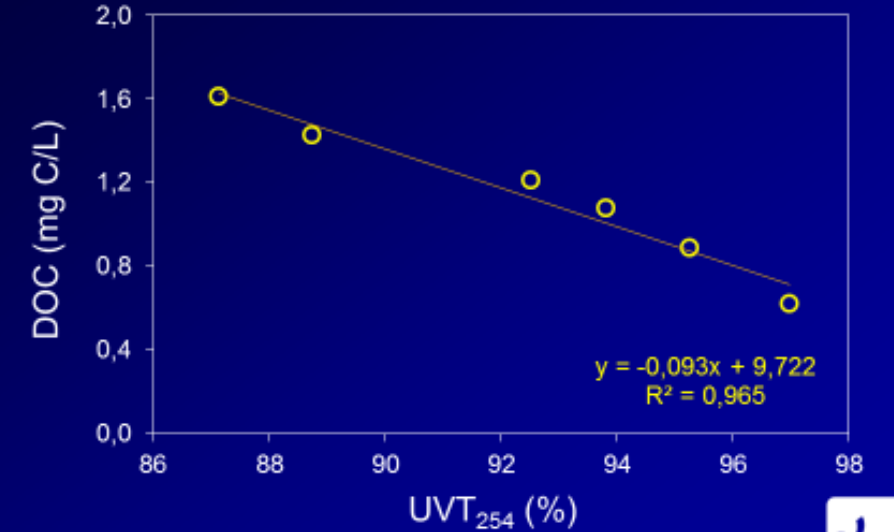
DOC(UVT)

model vs. pilot LC-OCD data and bench scale tests



DOC-UVT correlation

results derived from bench scale IEX experiments (July 2015)



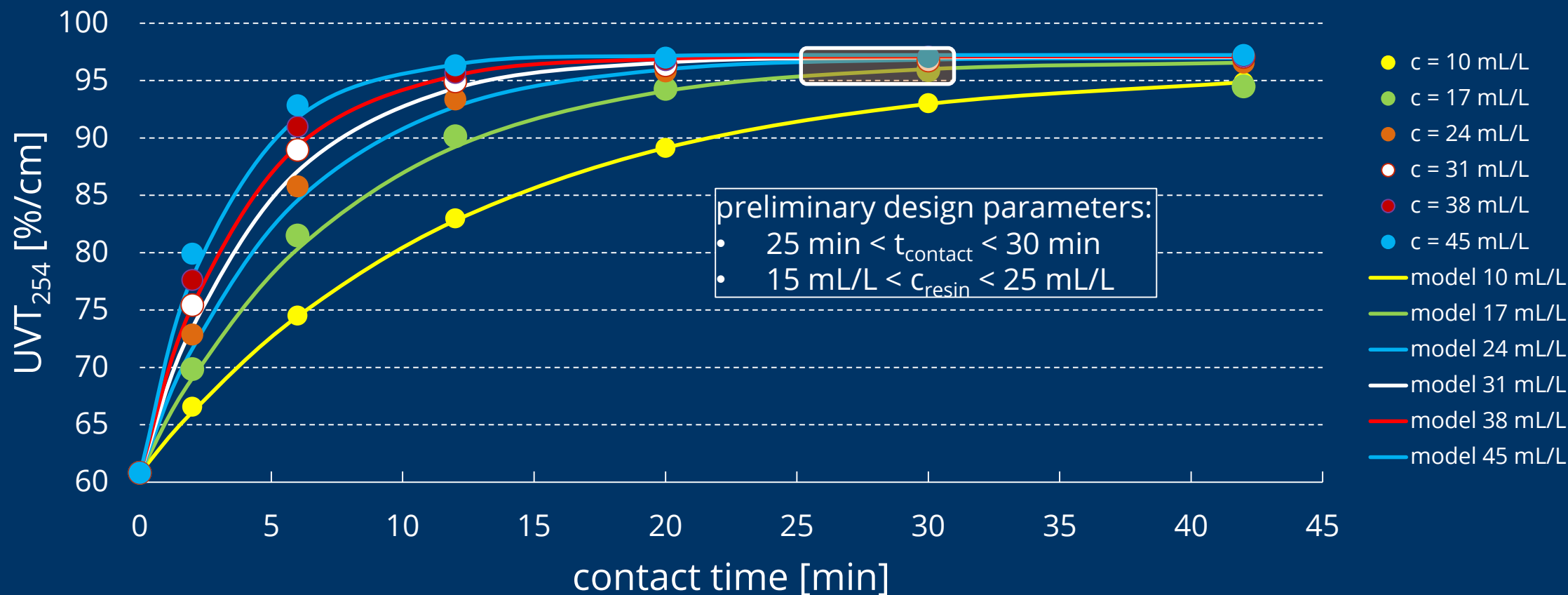
Welsh Water

SIX jar test data for
2 reservoir waters



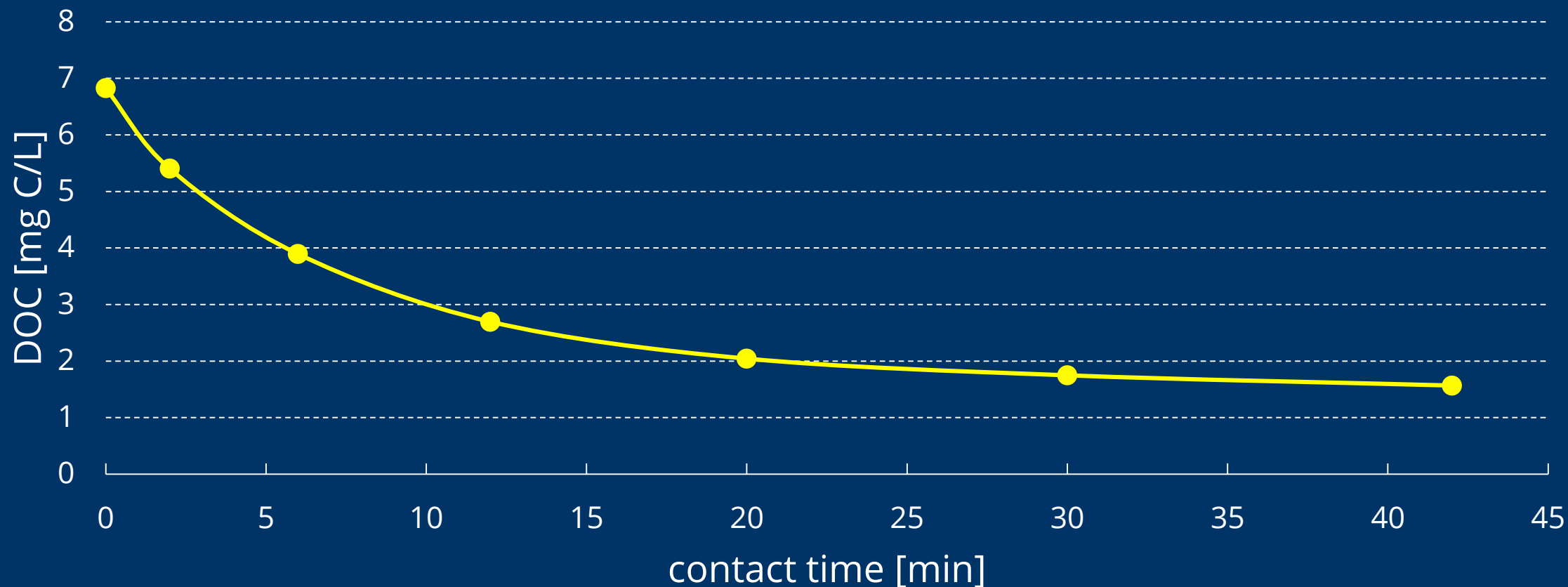
SIX treatment ALAW 1 (WW) with Lewatit S 5128

results jar test experiments d.d. 14 – 07 - 17



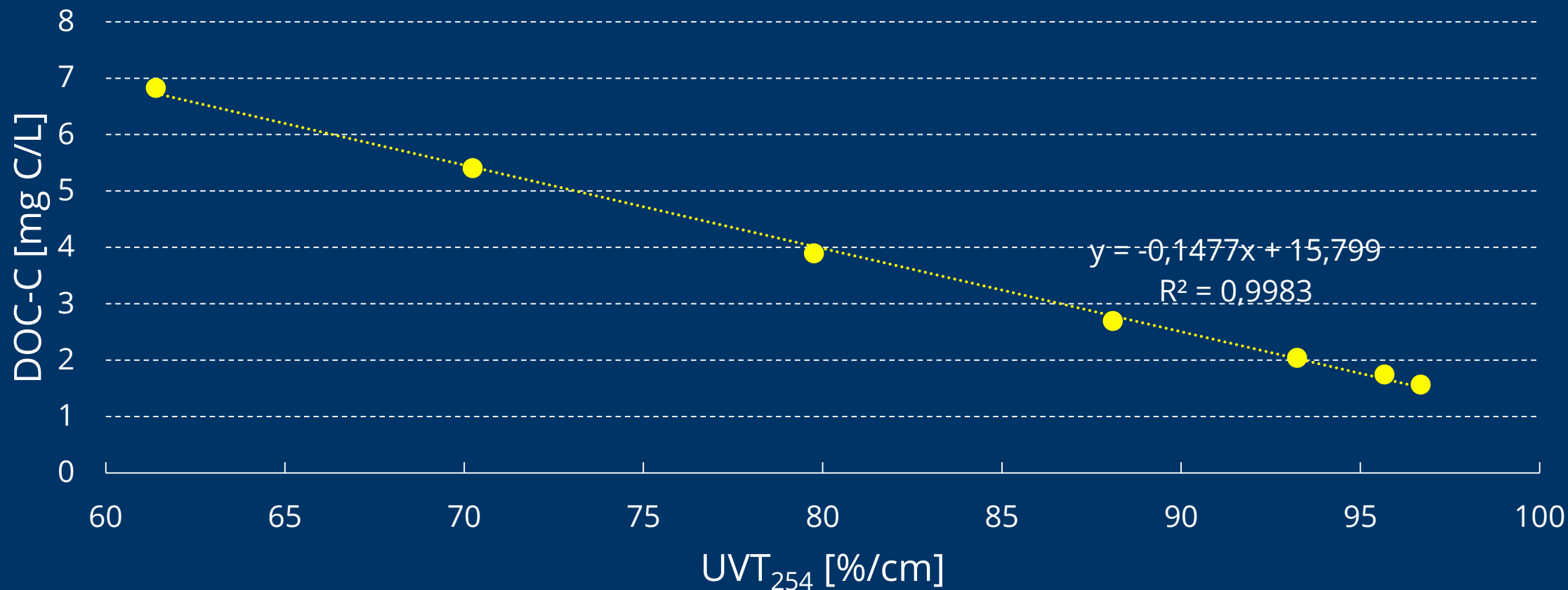
SIX treatment ALAW 1 (WW) with Lewatit S 5128

bench scale experiment: DOC removal (17 mL/L)



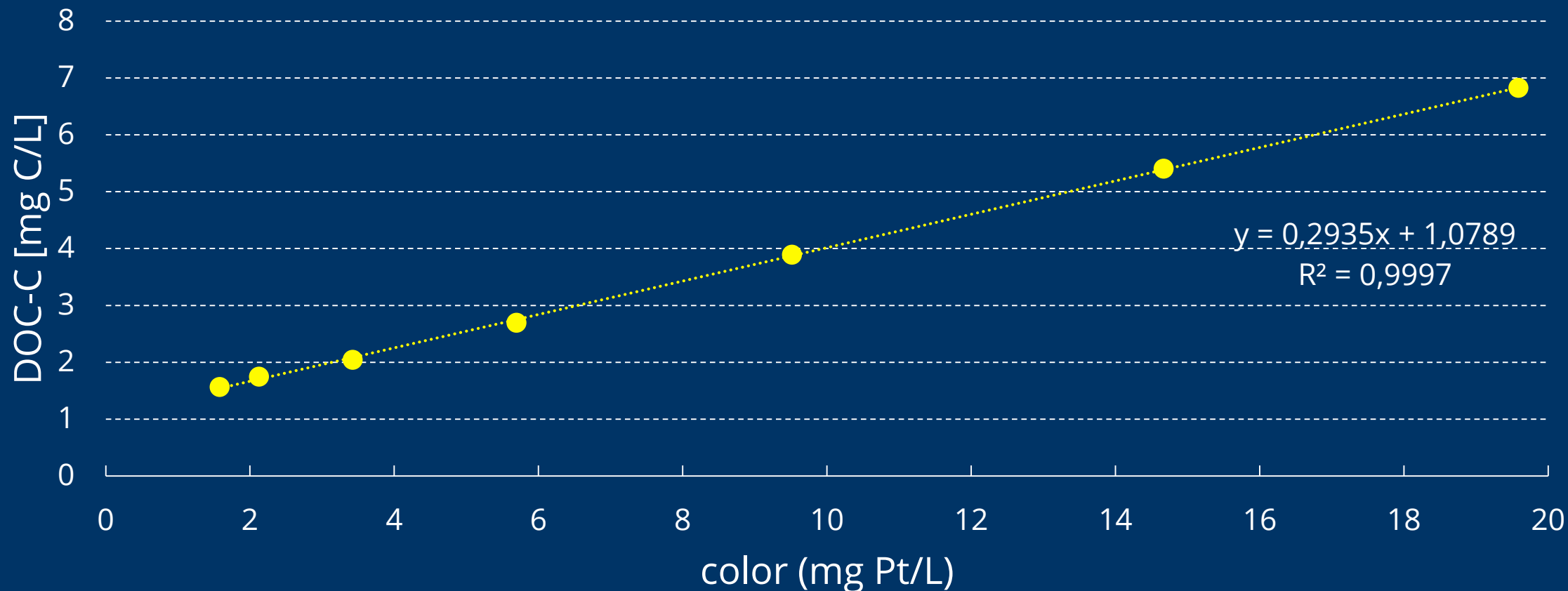
SIX treatment ALAW 1 (WW) with Lewatit S 5128

bench scale DOC(UVT) correlation



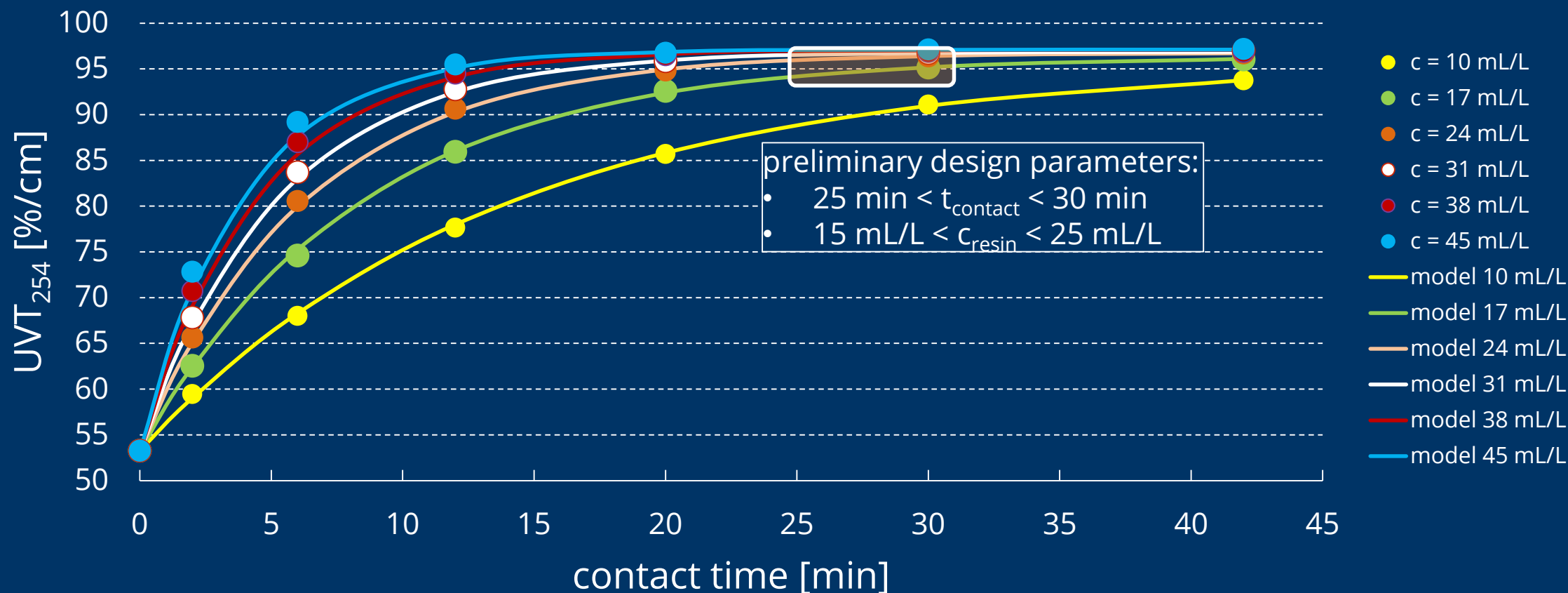
SIX treatment ALAW 1 (WW) with Lewatit S 5128

bench scale DOC(color) correlation



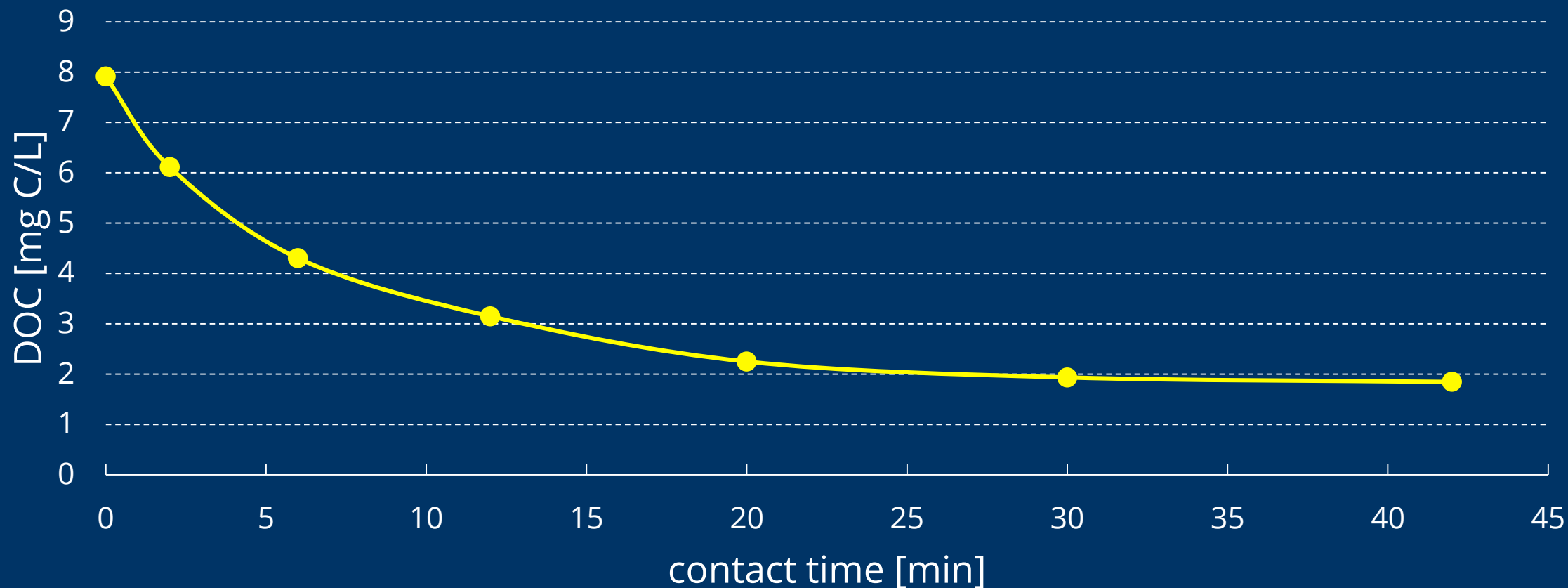
SIX treatment CEFNI 1 (WW) with Lewatit S 5128

results jar test experiments d.d. 17 - 07 - 17



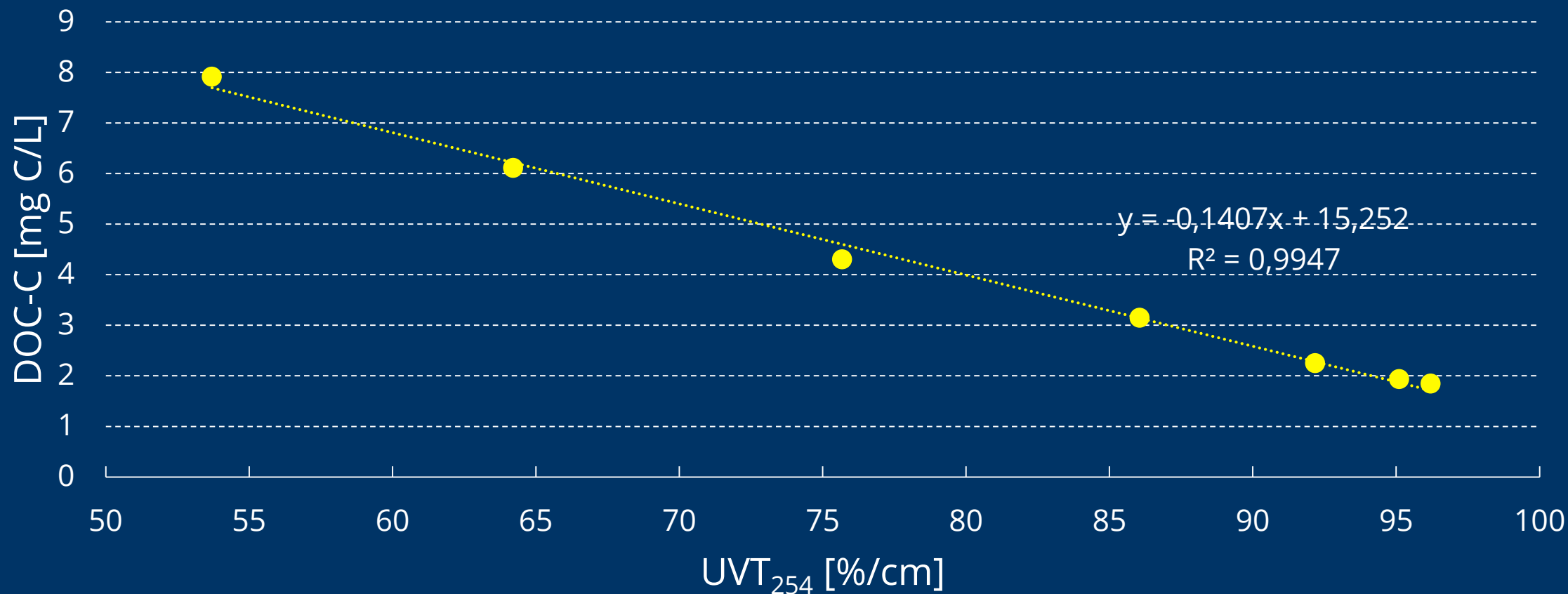
SIX treatment CEFNI 1 (WW) with Lewatit S 5128

bench scale experiment: DOC removal (17 mL/L)



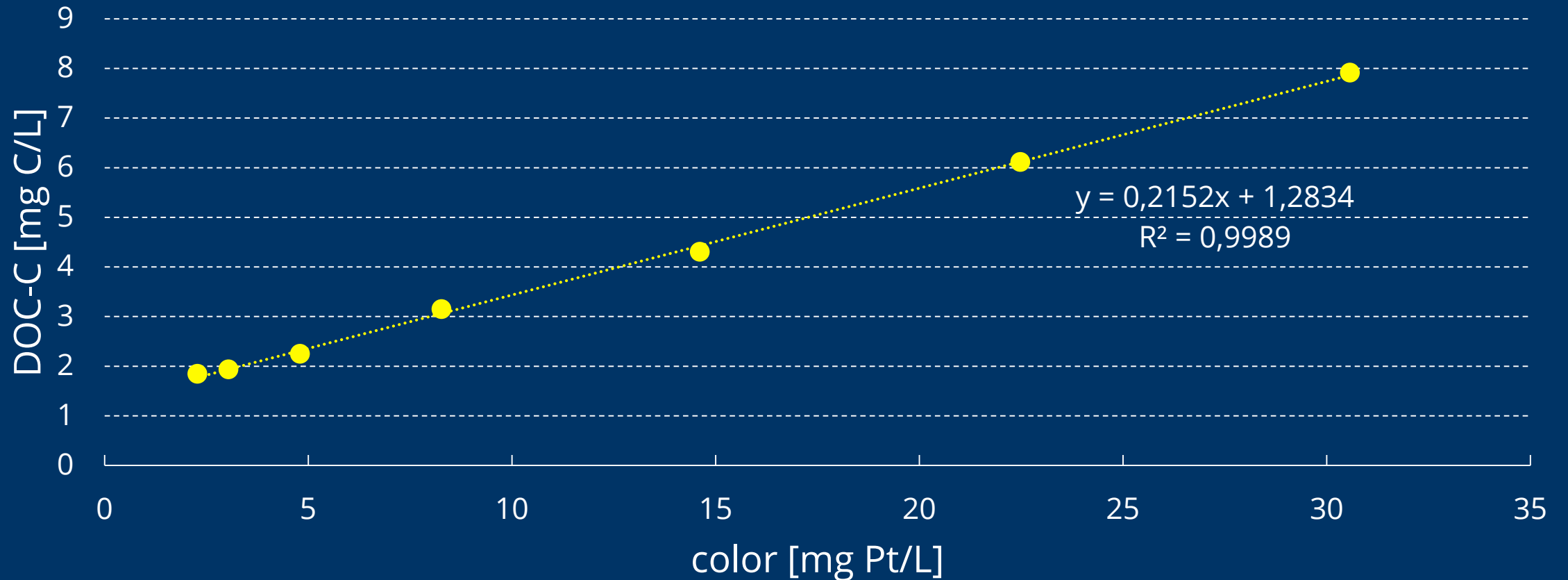
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bench scale DOC(UVT) correlation



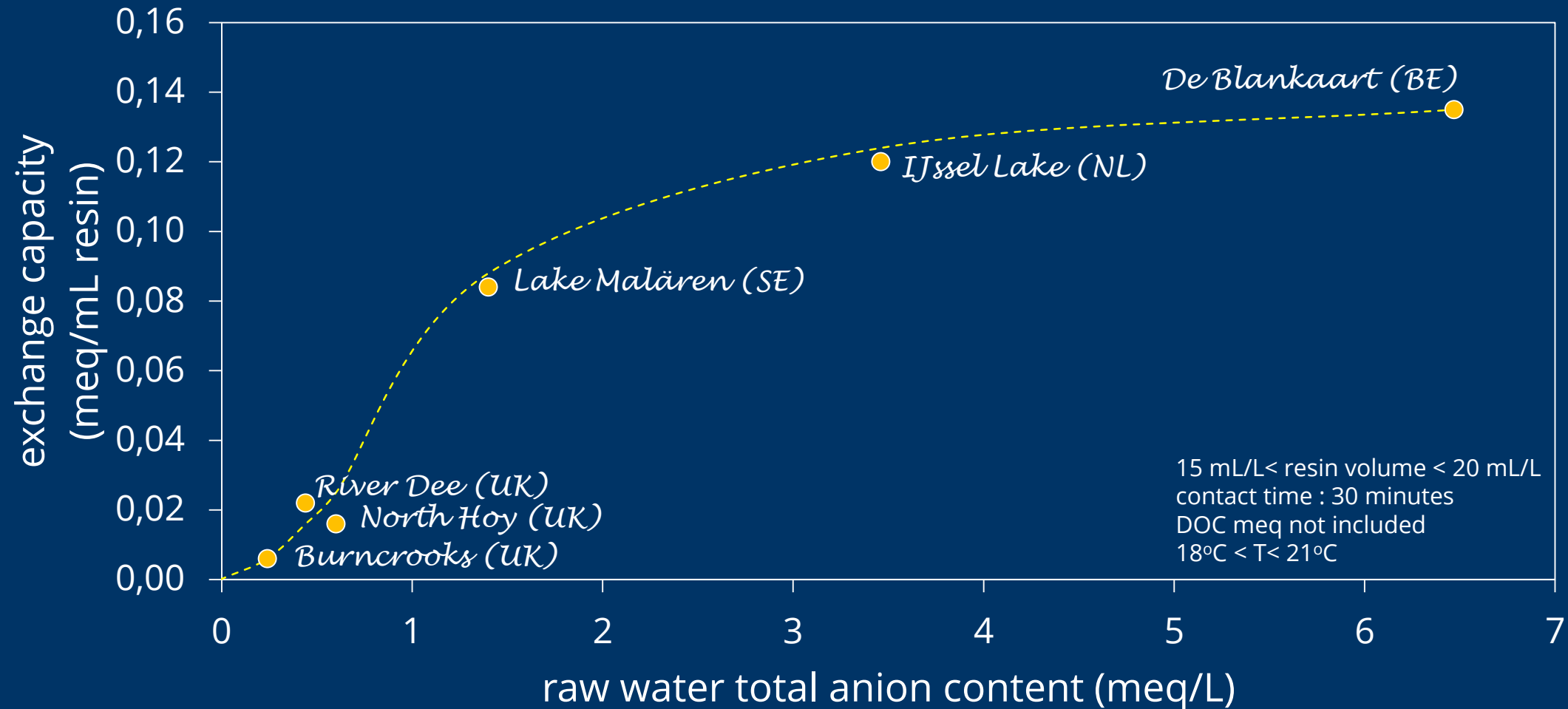
SIX treatment CEFNI 1 (WW) with Lewatit S 5128

bench scale DOC(color) correlation



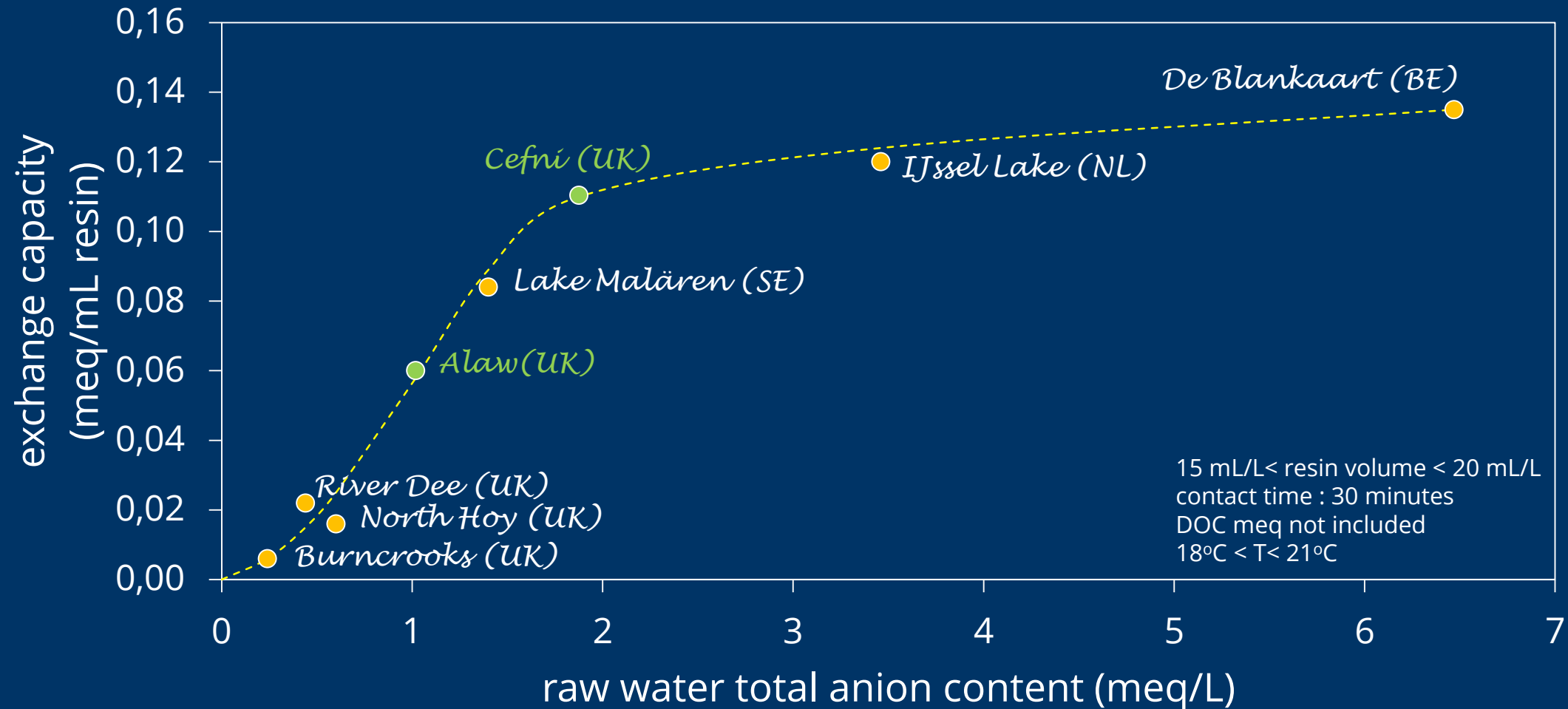
exchange capacity for different european locations

("near equilibrium" state: contact time = 30 min)



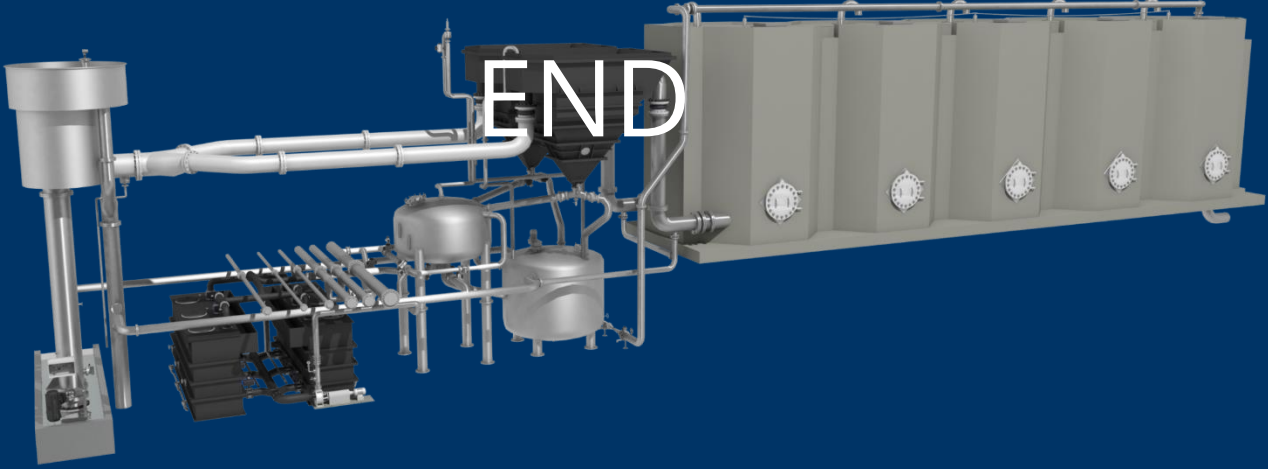
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