

## CHARACTERISATION OF NATURAL ORGANIC MATTER FROM COASTAL SEAWATER: SIZE DISTRIBUTION AND BIOREACTIVITY

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### INTRODUCTION

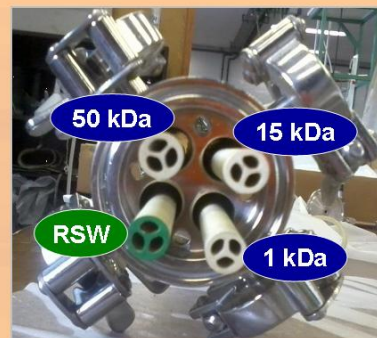
Water fractionation by ultrafiltration (UF) membranes is a common practice that permits to distribute natural organic matter (NOM) present in water following different molecular weight cut off (MWCO) and by consequence to characterize separately those different fractions. Furthermore, UF fractionation can be applied to a water before and after treatment in order to assess the effect of such treatment and improve its efficiency.

The aim of this study is to determine both molecular size distribution and the bioreactivity of NOM found in coastal seawater.

### MATERIALS AND METHODS

Raw seawater (RSW) is obtained from the Mediterranean Sea (Prat de Llobregat, BCN) where the water is pumped from the offshore open intake located at 2 km from the coast and 25 m below the surface.

RAW SEAWATER QUALITY		
PARAMETER	METHOD	VALUE
UV <sub>254</sub> [m <sup>-1</sup> ]	Spectrophotometry	0.87
DOC [mg C/L]	HTCO	1.25
BOD <sub>7</sub> [mg O <sub>2</sub> /L]	Adapted ISO 5815:1989	0.69
SUVA [L/(mg C·m)]	calculus	0.70
BOD <sub>7</sub> /DOC [mg O <sub>2</sub> /mg C]	calculus	0.55



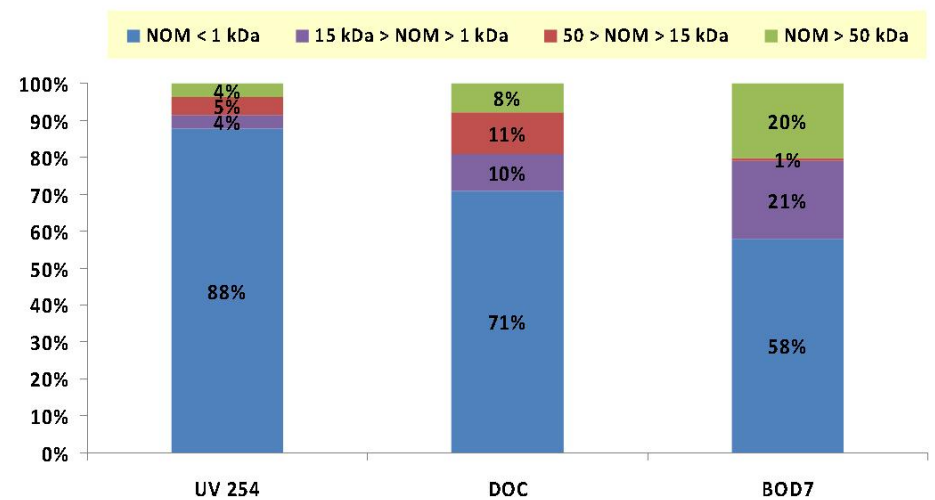
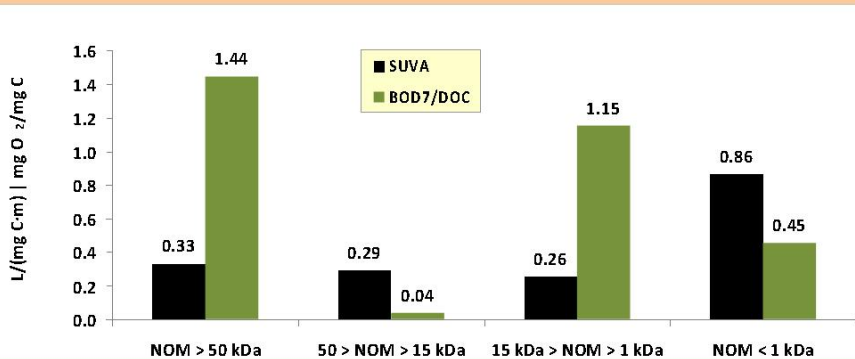
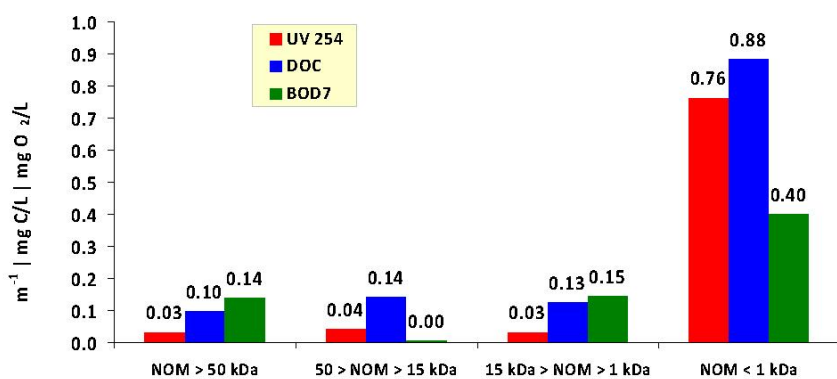
RSW is fractionated by tangential filtration in tubular ceramic membranes. Membranes used corresponds to MWCO of 50 kDa, 15 kDa and 1 kDa. So, by calculations, 4 different fractions can be analyzed:

- NOM > 50 kDa
- 50 kDa > NOM > 15 kDa
- 15 kDa > NOM > 1 kDa
- NOM < 1 kDa



### RESULTS

PARAMETER	NOM < 50 kDa	NOM < 15 kDa	NOM < 1 kDa
UV <sub>254</sub> [m <sup>-1</sup> ]	0.84	0.80	0.76
DOC [mg C/L]	1.15	1.01	0.88
BOD <sub>7</sub> [mg O <sub>2</sub> /L]	0.55	0.55	0.40
SUVA [L/(mg C·m)]	0.73	0.79	0.86
BOD <sub>7</sub> /DOC [mg O <sub>2</sub> /mg C]	0.48	0.54	0.45



- Highest signals of UV<sub>254</sub> (88%) and DOC (71%) are found in < 1 kDa fraction.
- The major part of RSW BOD<sub>7</sub> is found in < 1 kDa fraction (58%) but 42% of BOD<sub>7</sub> is > 1 kDa.
- BOD<sub>7</sub>/DOC values shows that NOM > 50 kDa is the most biodegradable and NOM < 1 kDa is the most recalcitrant.
- Highest SUVA (0.86 L/(m·mg C)) is obtained for the NOM < 1 kDa while all other fractions are below 0.33 L/(m·mg C) that is consistent with their higher biodegradability.

### CONCLUSIONS

Compared with other water sources, RSW has low organic matter content (DOC = 1.25 mg C/L; UV<sub>254</sub> = 0.87 m<sup>-1</sup>) with a low biodegradability (BOD<sub>7</sub>/DOC = 0.55 mg O<sub>2</sub>/mg C). Most of the organic matter is found to be inferior to 1 kDa: 71% of DOC and 88% of UV<sub>254</sub>. However, NOM > 1 kDa contains high BOD<sub>7</sub> proportion (42%) that implicates a higher biodegradability confirmed by higher BOD<sub>7</sub>/DOC ratio than NOM < 1 kDa (0.80 mg O<sub>2</sub>/mg C vs. 0.45 mg O<sub>2</sub>/mg C). NOM > 1 kDa is the most biodegradable fraction of NOM found in coastal seawater. NOM < 1 kDa has higher SUVA and lower BOD<sub>7</sub>/DOC which is characteristic of recalcitrant compounds.

### ACKNOWLEDGEMENTS

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