Validation and applications of a LC-MS/MS method for the simultaneous quantification of 22 organic micropollutants in seawater

J. Couleaud[a], V. Bebing[b], N. Cimetière[a], F. Chenier[c], C. Cordier[d], F. Girardin[f], S. Giraudet[a], V. Héquet[e], P. Le Cloirec[a], V. Le Razavet[f], H. Leroy[b], M. Monnot[d], C. Stavrakakis[f], D. Wolbert[a], P. Moulin[d]

a-ENSCR, b-Novostrea Bretagne, c-Vendée Naissain, d-AMU, e-IMT, f-IFREMER, FRANCE

Contact : julie.couleaud@ensc-rennes.fr

https://projet-soap.fr

For shellfish hatcheries, water treatment is essential to secure and guarantee optimal growing conditions, particularly for sensitive growing such as spat. The presence of organic micropollutants in mollusk has been proven for many years and could be the cause of occurrence of deaths.

To face biological and chemical pollution, the SOAP project works on an innovative seawater hybrid treatment and developed an analytical method to follow organics micropollutants.

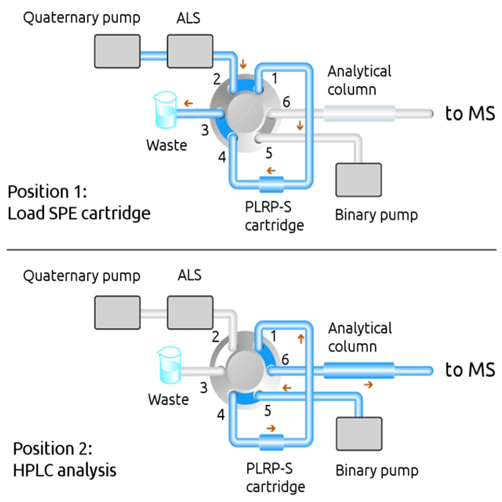
Validation of a LC-MS/MS analytical method

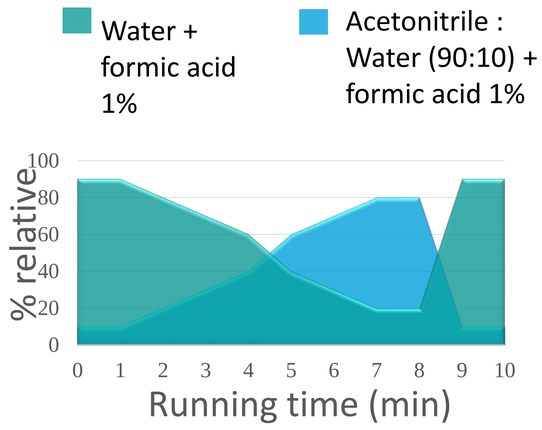
Targeted analysis of 22 molecules including pesticides, drug residues and industrial compounds, selected according literature.

A Waters Quattro Premier Micromass LC/MS/MS is used with Acquity UPLC System (UPLC T3 1,8µm C18 sur silice) and a SPE-online (OASIS HLB 20µm). It allows a detection down to a few ng.L^{-1}.

caffeine, diuron, ketoprofen, oxybenzone, diclofenac, lincomycin, benzotriazole, ofloxacine, naproxen [1] [2] [3] [4] [5]

carbamazepine, atrazine, metolachlor, metolachlor-OA, atrazine-2-hydroxy, atrazine-desethyl, quinoxyfen, difenoconazol, propyzamide, isoproturon, metolachlor-ESA, nicosulfuron, tributyletain





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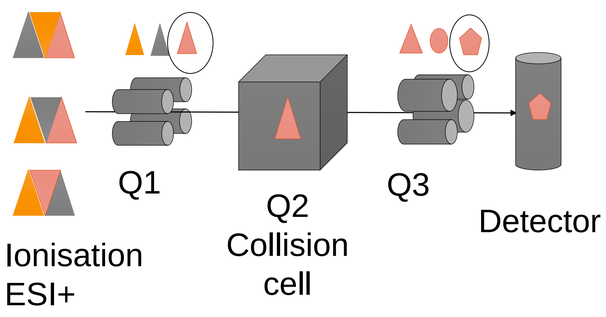
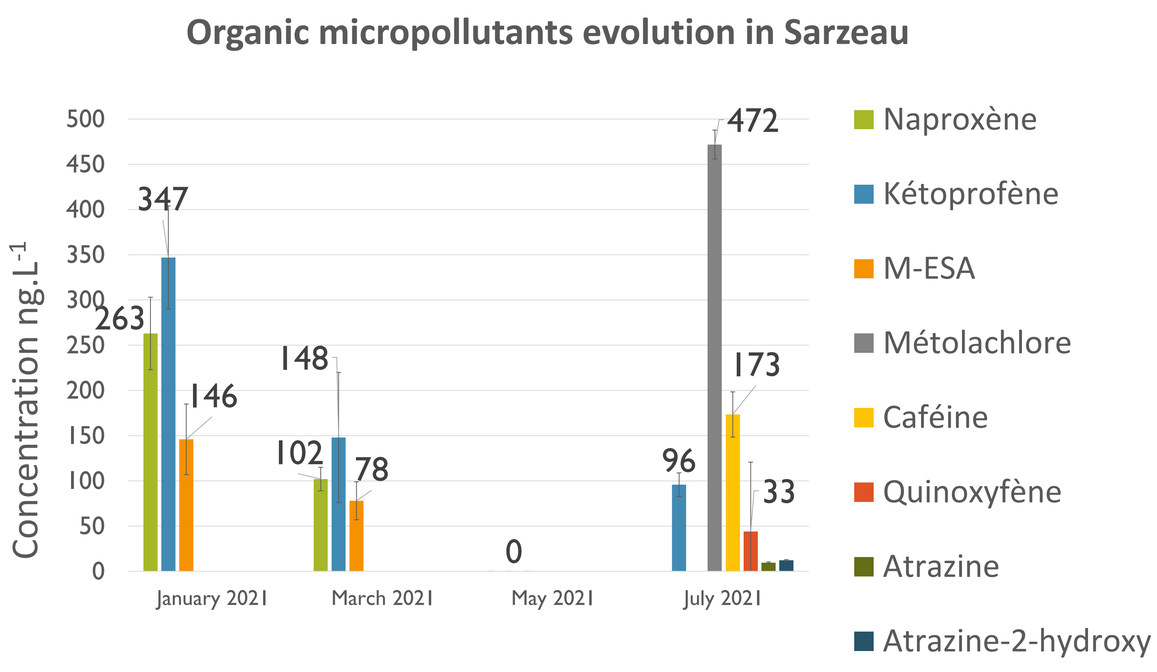


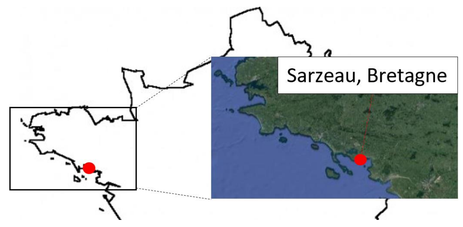
Triple quadripole system : MRM detection

Validation – Exemple of caffeine and quinoxyfen in seawater

	Caffeine	Quinoxyfen
Limit of detection (LOD) - ng.L^{-1}	14	23
Limit of quantification (LOQ) - ng.L^{-1}	25	38
Linearity range - ng.L^{-1}	4 - 500	
Linearity (R^2)	0.998	0.999
Precision - ng.L^{-1}	±9	±13

Application of the analytical method





Seawater sampling in french hatcheries in Sarzeau.

Pesticides and pharmaceutical residues are occasionally detected. The most significant pollution corresponds to metolachlor in July (472 ± 16 ng.L^{-1}), perhaps because of the phytosanitary treatment of crops near the coast.

No compounds detected in May; their presence is linked to one-off polluting events.

Perspectives : extending the analytical protocol for a non-targeted analysis

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