Emerging Contaminants in The Mediterranean Sea

Endangering Lebanon's Palm Islands Natural Reserve

Bilal Nehmeh[1#], Fatima Haydous[1#], Hiba Ali[1,2], Adonis Hdaifi[1], Bayan Abdlwahab[1], Mariam Bou Orm[1],

Zohrab Abrahamian[1,3], Elias Akoury[1*]

[1] Department of Physical Sciences, School of Arts and Sciences, Lebanese American University, Beirut 1102-2801, Lebanon

[2] Université Lille Nord de France, USTL, Cite Scientifique, 59652 Villeneuve d'Ascq cedex, France

[3] US-Middle East Partnership Initiative (MEPI) Tomorrow's Leaders Program

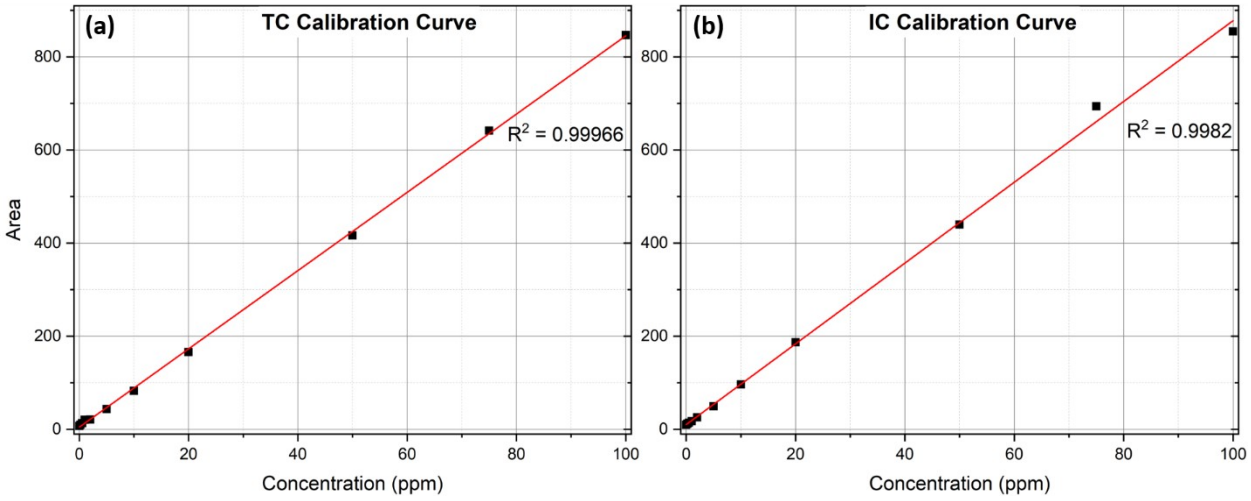
[#] Contributed equally

* Corresponding author:

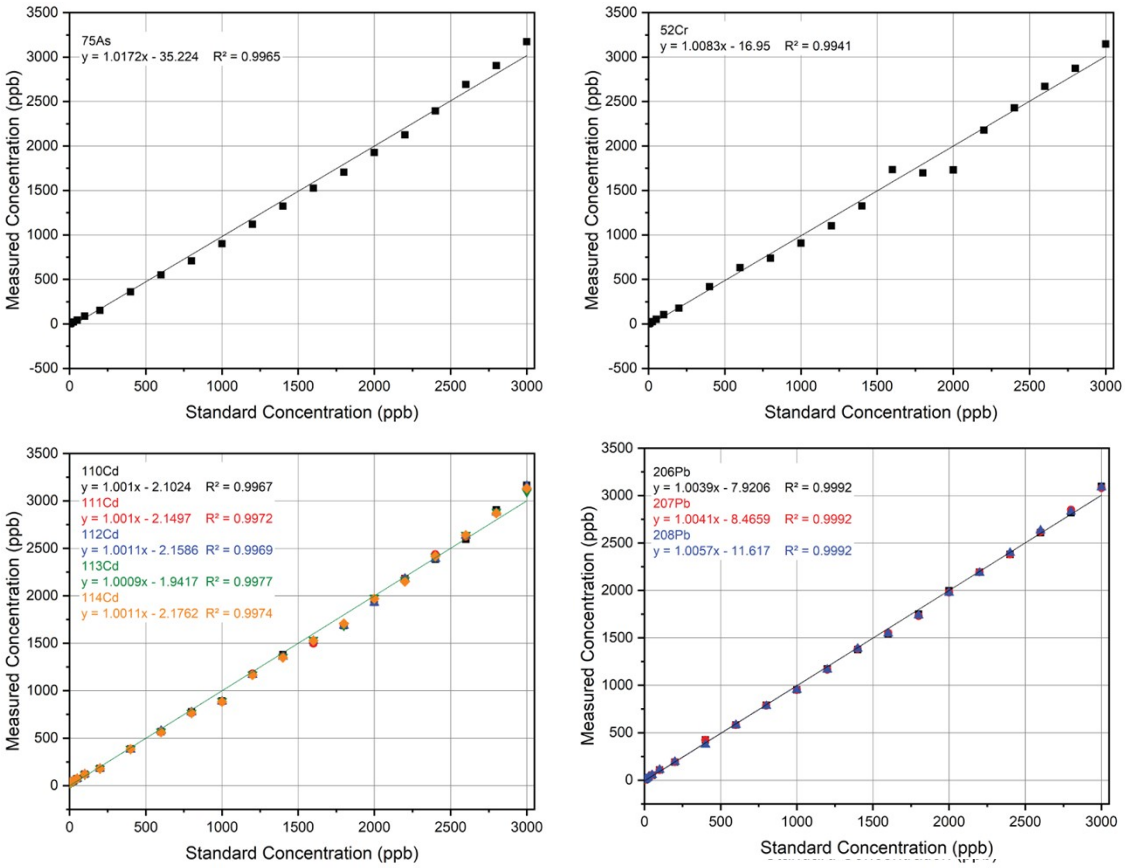
Dr. Elias Akoury
Department of Physical Sciences
School of Arts and Sciences
Lebanese American University
Beirut 1102-2801, Lebanon
+961 1 786456 ext. 3950
elias.akoury@lau.edu.lb

Supplementary Information

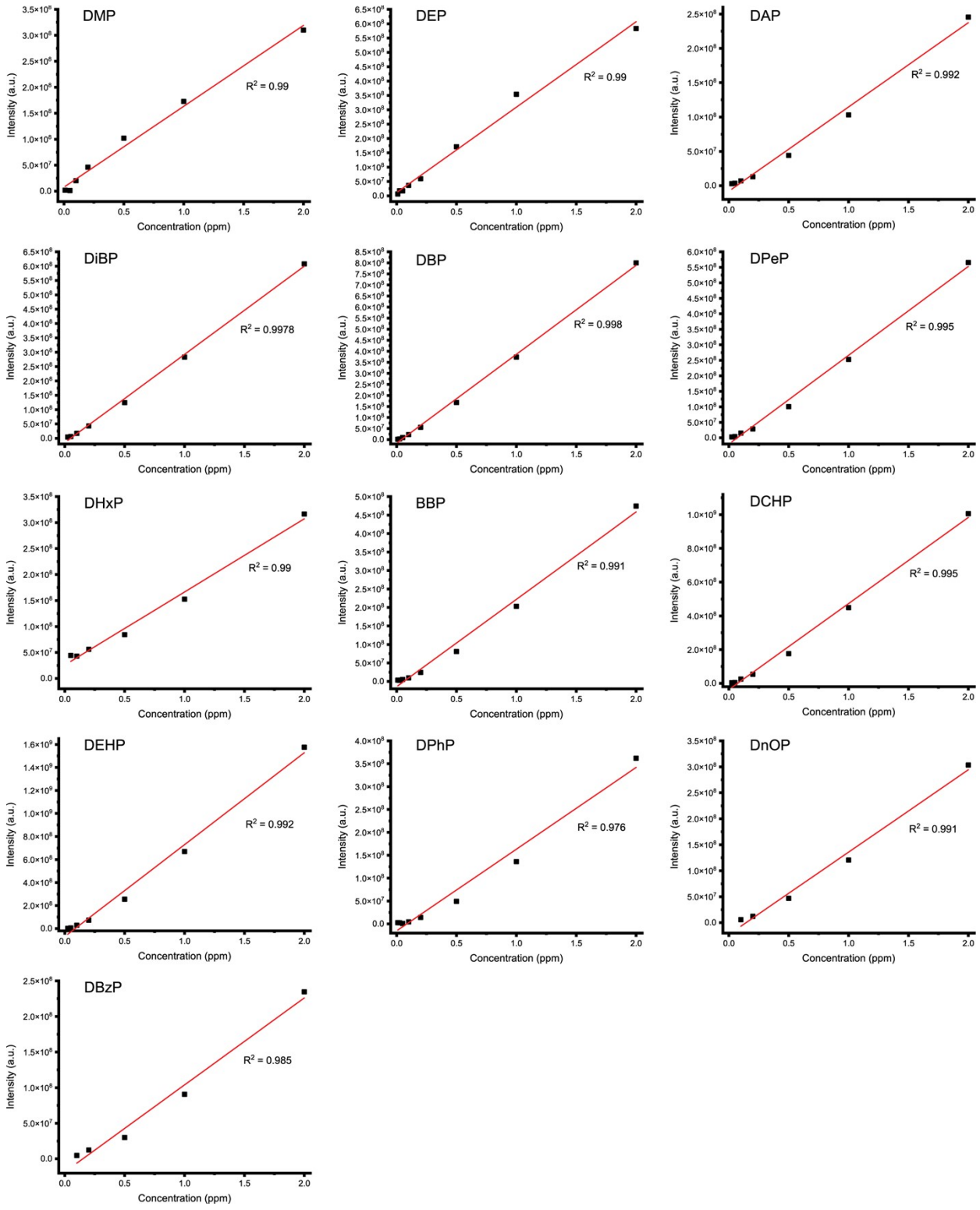
Supplementary Figures and Tables



Supplementary Figure 1. (a) Total Carbon (TC) and Inorganic Carbon (IC) calibration curves acquired on TOC-VCPN instrument.



Supplementary Figure 2. Calibration curves of the heavy metals As, Cr, Cd, and Pb acquired on ICPMS.



Supplementary Figure 3. Calibration curves showing the concentration-dependent variation in the intensity of the chromatogram peaks of the 13 investigated phthalates.

Supplementary Table 1. Assessment of the accuracy of the method by the two certified reference materials Seawater ERM-CA403 and Wastewater ERM-CA713 (n = 6).

	Seawater Reference Material		Wastewater reference Material	
Heavy Metal	**Certified value (μg/L)**	**Recovery %**	**Certified value (μg/L)**	**Recovery %**
As	1.90 ± 0.13	111.74	10.8 ± 0.3	101.31
Cd	0.094 ± 0.011	104.44	5.09 ± 0.20	94.43
Cr	n/a	n/a	20.9 ± 1.3	88.19
Pb	0.098 ± 0.010	81.67	49.7 ± 1.7	116.75

Supplementary Table 2. The physical-chemical properties of the non-deuterated and deuterated phthalates with the retention times, recoveries, quantifier, and qualifier ions from GC-MS analysis.

Standards	Abbreviation	Molar Mass (g/mol)	Retention Time (min)	Quantifier Ion (m/z)	Qualifier Ion (m/z)
Dimethyl phthalate	**DMP**	194.18	12.35	163.04	194, 135, 77
Diethyl phthalate	**DEP**	222.24	14.51	149.04	222, 121
Diallyl phthalate	**DAP**	246.31	17.25	149.05	97
Di-iso-butyl phthalate	**DiBP**	278.34	19.31	149.04	223, 205
Di-n-butyl phthalate	**DBP**	278.35	20.62	149.02	223, 205
Di-n-pentyl phthalate	**DPeP**	306.41	22.85	149.04	251
Di-n-hexyl phthalate	**DHxP**	334.41	24.25	149.03	185
Butylbenzyl phthalate	**BBP**	312.37	25.62	149.05	238, 206
Dicyclohexyl phthalate	**DCHP**	330.42	27.62	149.05	167
Bis(2-ethylhexyl) phthalate	**DEHP**	390.56	27.81	149.04	279, 167
Diphenyl phthalate	**DPhP**	318.32	27.93	225.06	132
Di-n-octyl phthalate	**DnOP**	390.62	29.84	149.05	279
Dibenzyl phthalate	**DBzP**	346.44	30.15	107.03	221