FABRIC PHASE SORPTIVE EXTRACTION (FPSE) FOLLOWED BY UHPLC-MS/MS FOR THE ANALYSIS OF UV STABILIZERS IN AQUEOUS SAMPLES FROM GRAN CANARIA ISLAND (SPAIN)

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INTRODUCTION

Fabric phase sorptive extraction (FPSE) is a novel, highly sensitive, fast, efficient and solvent minimized sample preparation approach [1] that integrates the advantages of sol–gel derived hybrid inorganic-organic sorbents and the flexible, permeable and rich surface chemistry of cellulose fabric. Benzotriazole UV filters are a group of compounds added not only in sunscreen but also in variety of personal care products, which present negative effects over aquatic systems. They are mutagenic in bacterial systems and toxic in plants and can exert adverse effects on the fecundity and reproduction of fish [2]. We optimized the extraction of seven benzotriazole UV filters from liquid samples evaluating all the parameters involved in FPSE.
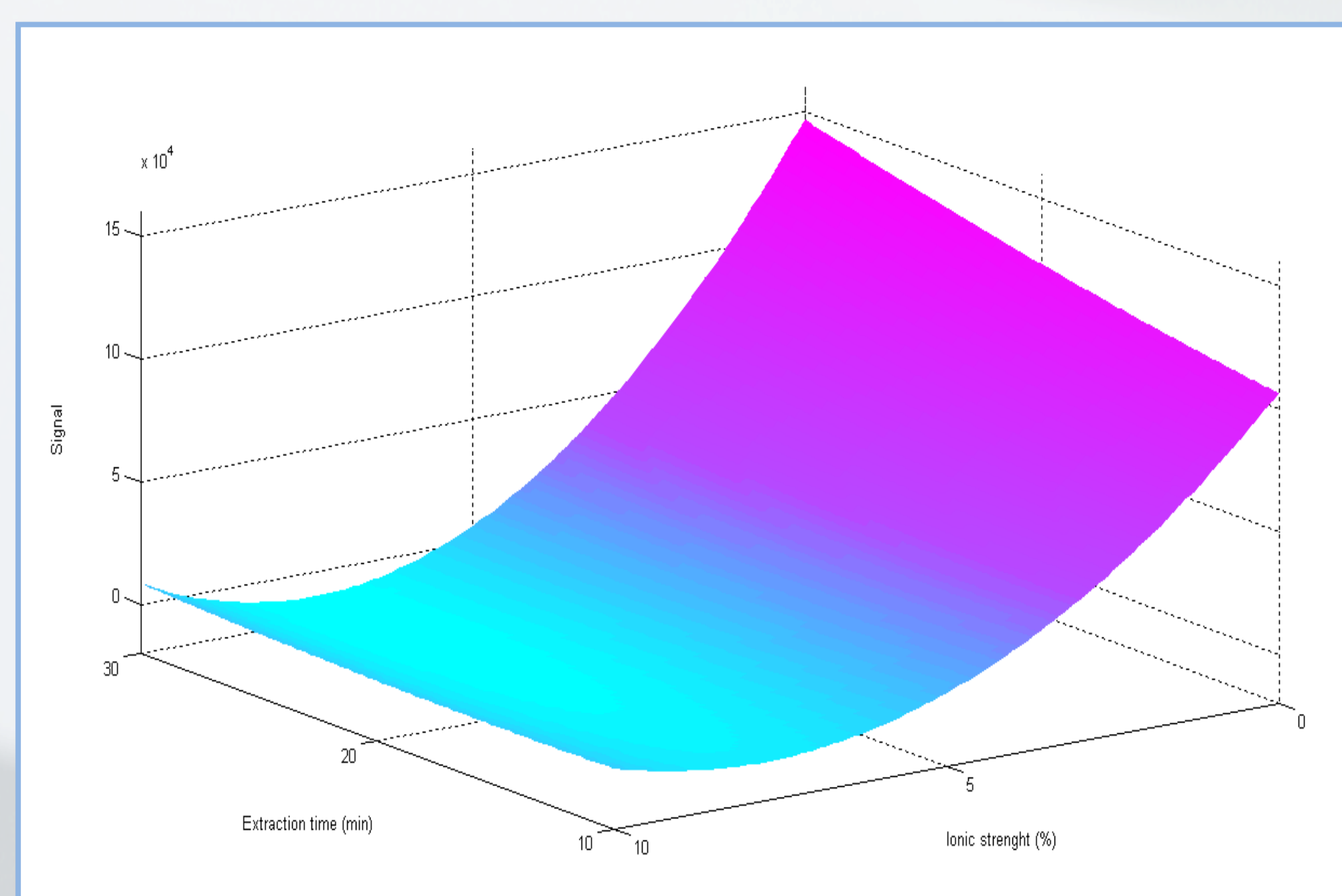
EXPERIMENTAL
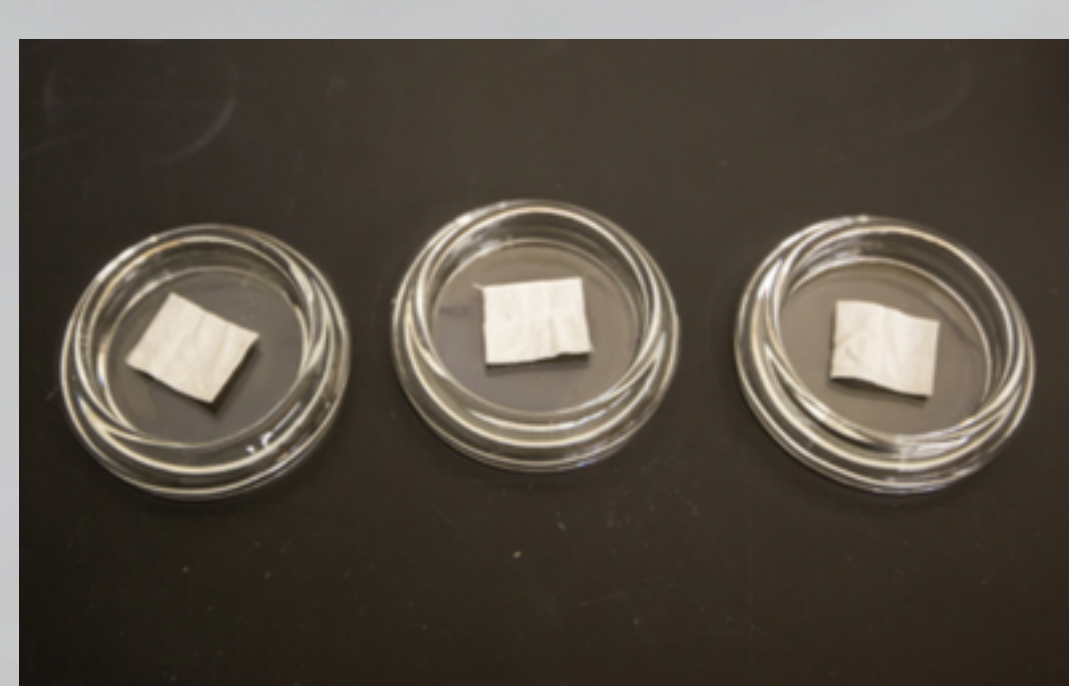
OPTIMUM FPSE CONDITIONS	
SAMPLE VOLUME	10 mL
EXTRACTION TIME	60 min
IONIC STRENGHT	0%
BACK EXTRACTION TIME	5 min
BACK EXTRACTION SOLVENT	1 mL MeOH

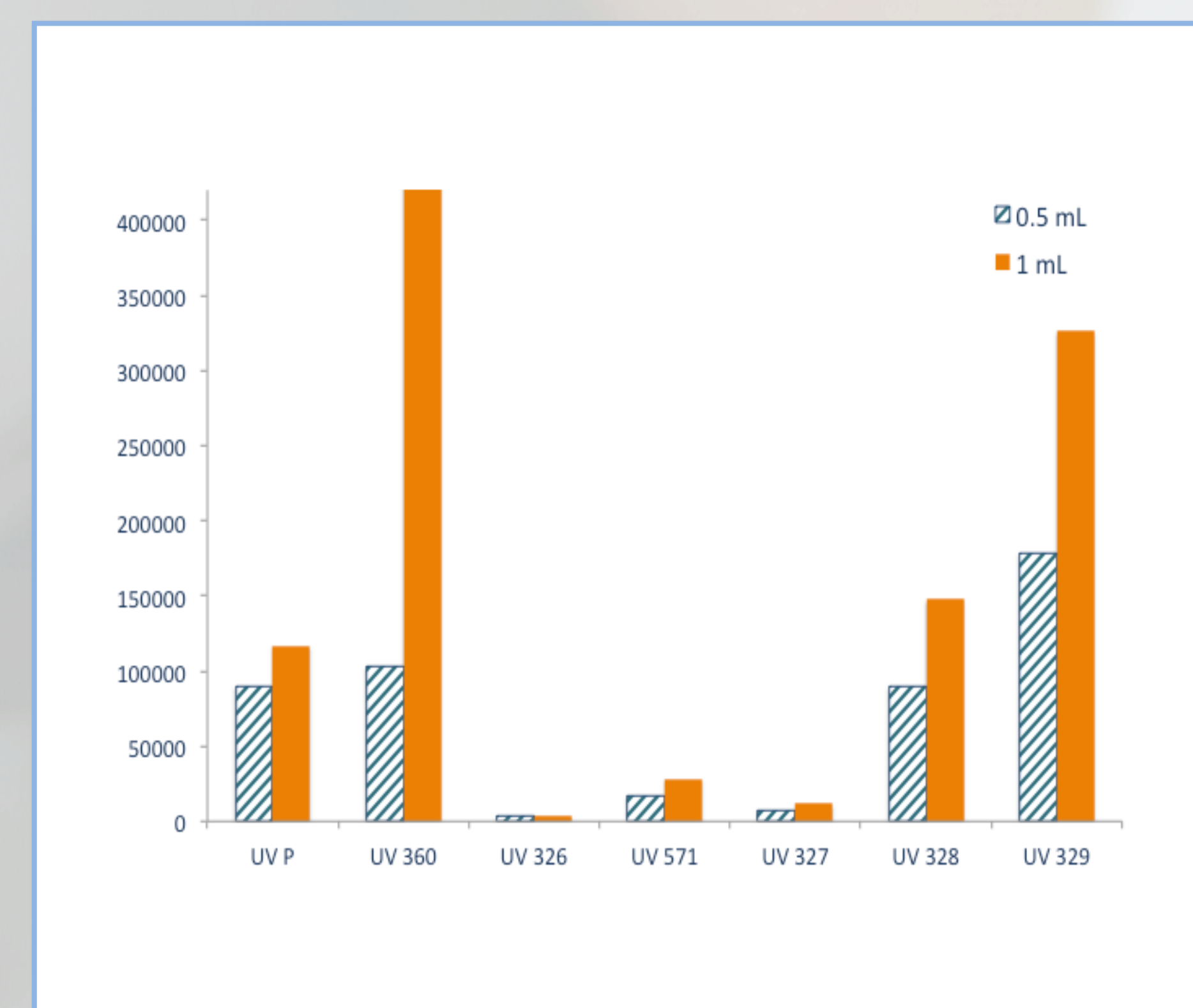| CHROMATOGRAPHIC CONDITIONS	
UHPLC COLUMN	C18 1.7 µm 2.1 x 50 mm
MOBILE PHASE	MeOH 0.1% formic acid
FLOW RATE	0.5 mL/min

RESULTS

Response surface for the effect of time and ionic strength on the UV P
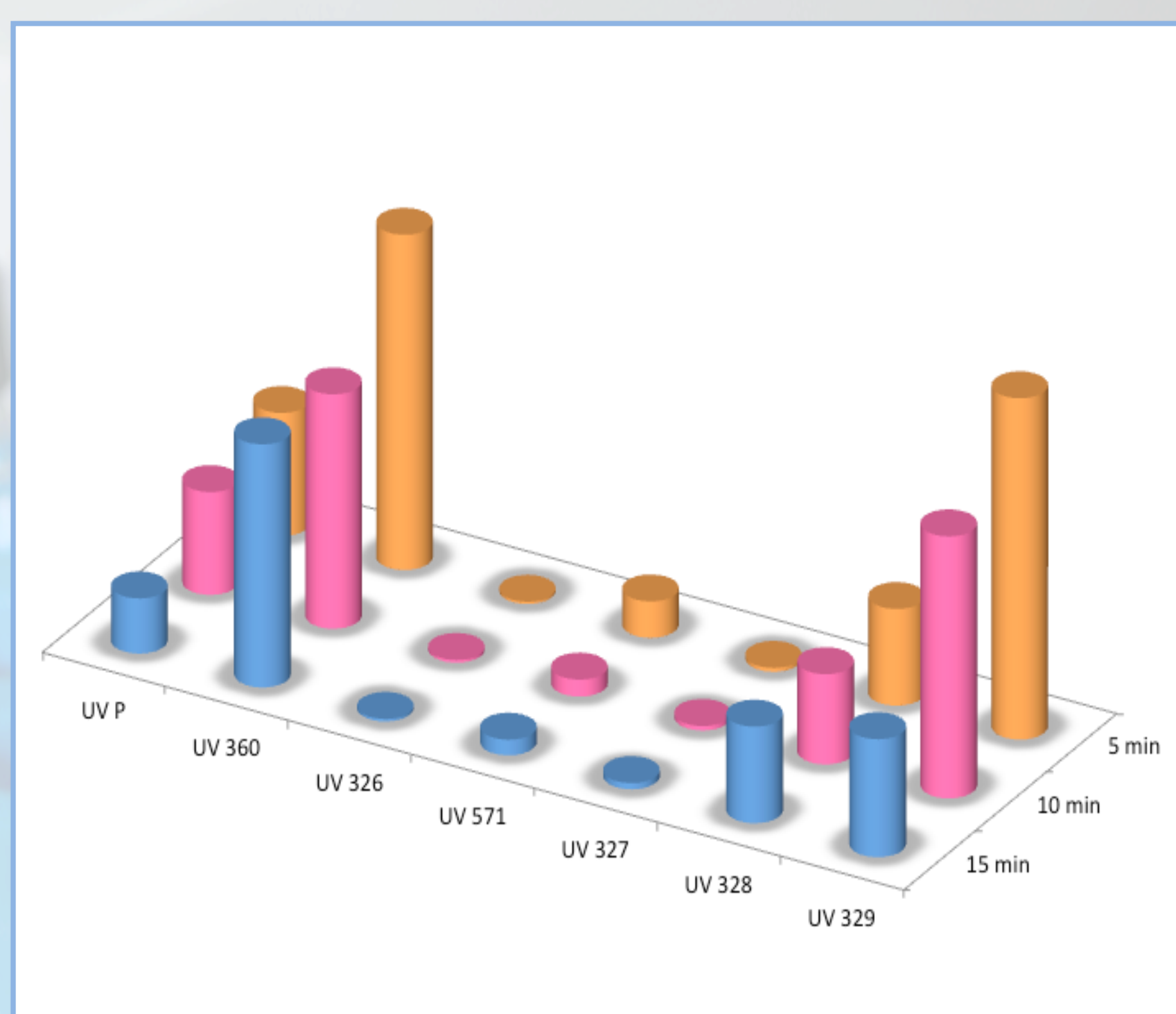
Effect of the desorption time

Effect of the desorption volume

Back extraction[a] (% efficiency)			Recoveries[a] (%) (50 ng·mL⁻¹)			Recoveries[a] (%) (10 ng·mL⁻¹)			LODs[b] (ng·mL⁻¹)		
	MeOH	**ACN**	**WWTP 1**	**WWTP 2**	**WWTP 3**	**WWTP 1**	**WWTP 2**	**WWTP 3**	**WWTP 1**	**WWTP 2**	**WWTP 3**
UV P	105	98	82	95	96	83	84	99	25.3	18.6	12.8
UV 329	59	62	48	61	51	53	65	64	19.8	12.2	12.3
UV 326	72	71	49	58	57	65	64	64	60.3	56.3	51.6
UV 328	63	60	43	59	56	55	64	64	18.1	9.44	10.7
UV 327	75	72	65	73	66	64	79	87	38.1	36.2	38.6
UV 571	72	73	49	52	53	51	57	57	44.3	43.6	40.0
UV 360	56	62	35	46	44	59	42	63	7.34	6.26	6.01

[a]n=3
[b]S/N=3

CONCLUSIONS

A FPSE-UHPLC-MS/MS has been developed for the analysis of seven BUVSs in sewage samples from WWTPs. The performance of the method was studied in terms of sensitivity (LODs between 6.01 and 60.3 ng·L⁻¹), linearity (over 0.99) and intra-day and inter-day precision (1.76-10.9% and 7.72-29.2%, respectively) with enrichment factors of 10 times. The recoveries were higher than 43% for all the compounds. FPSE is then presented as a cheaper alternative to other microextraction methods since it is possible to obtain excellent results without expensive commercial supplies. In the future, research will have the challenge to develop new coatings and materials to determine any analytes complex matrices.

REFERENCES

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[2] M.E. Balmer, H.R. Buser, M.D. Müller, T. Poiger, Envir. Sci Technol, 39 (2005) 953.