



Región de Murcia

APPLICATION OF SOLID PHASE MICRO EXTRACTION TO THE BIOLOGICAL MONITORING OF ORGANIC COMPOUNDS IN URINE

C. Prado, A. Zambudio, J.F. Periago
Gabinete de Seguridad e Higiene en el Trabajo, Murcia

INTRODUCTION

- In general, volatile organic compounds are biologically monitored by measuring the urinary excretion of its metabolites
- Last works are currently dealing with the direct measurement of unmetabolized compounds
- Solid Phase Micro Extraction (SPME) has been shown to be fast and efficient for the analysis of organic compounds in water
- The performance of SPME for the biological monitoring of organic compounds in urine has been studied

EXPERIMENTAL

Sample



- VM: 4 mL
- urine (2.5 mL) spiked with styrene in methanol (0.1 µl/ml)
- 10 min at 39°C for temperature equilibration

Extraction



- SPME fiber: 100 µm polydimethylsiloxane film
- headspace
- 30°C, 2 min.
- constant stirring

Desorption and GC conditions



- Desorption: 2 min, 200°C
- Injection: splitless, 2 min
- Column: Methyl silicone, 60m
- Oven: 35°C (5 min) to 150°C at 25 °C/min
- Detector: FID, 250°C

RESULTS

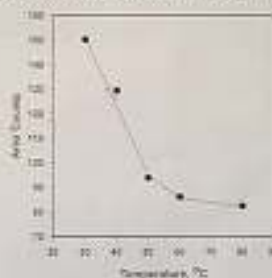
Repeatability of the determination of styrene in urine samples

| Concentration (ppm) | Extraction T (°C) | t (min) | Area |
|---------------------|-------------------|---------|-------|
| 0.3054 | 30 | 15 | 84.21 |
| | | | 82.92 |
| | | | 82.17 |
| | | | 75.71 |
| | | | 81.59 |
| | | | 83.00 |
| Mean value | | | 82.43 |
| R.S.D | | | 6.1% |



Chromatogram of urine sample. 1: styrene

Effect of temperature on extraction of styrene from urine



Effect of temperature and time on styrene extraction

| Concentration (ppm) | Extraction | | Area |
|---------------------|------------|---------|--------|
| | T (°C) | t (min) | |
| 0.309 | 30 | 15 | 83.43 |
| | 30 | 15 | 83.00 |
| | 35 | 15 | 83.84 |
| | 40 | 15 | 125.48 |
| | 30 | 15 | 150.24 |
| | 30 | 2 | 410.92 |

CONCLUSIONS

- Headspace SPME can be very useful for the biological monitoring of organic compounds in urine
 - The extraction of styrene from urine spiked samples shows good repeatability
 - The calibration curve for styrene in urine also shows good linearity
- The detection limit (approximately 0.02 ppm) is only representative of what is obtainable by using the exposed conditions. As many factors can influence on the SPME performance an optimization procedure should be made in each case (4)

REFERENCES

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Calibration curve for styrene in urine

