MARKES international

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Application Note 151

Uptake rates for the POD radial sampler

Introduction

This application note provides uptake rates for sampling VOCs on the POD (POcket Diffusive) radial diffusive sampler for workplace and environmental monitoring applications. Further information on radial diffusive sampling may be found in our Application Note 008: The theory and practice of passive monitoring.

Radial diffusive sampling is generally valid for the measurement of airborne vapours of VOCs in a concentration range of approximately 0.3–300 µg/m^3 per compound for exposure times of 1–6 hours. However, in some cases, longer exposure times of up to one week may be used.

Note that for transferring methods between axial and radial sampling, stronger sorbents are generally stated for radial sampling, as outlined in Table 1.

The data in Table 1 were supplied by the EU Joint Research Centre, Ispra, Italy.[1,2] Uptake rates were determined on POD radial diffusive samplers packed with Carbopack™ X sorbent cartridges, combined with analysis by TD-GC.

Compound	B.p. (°C)	Uptake rate (cm^3/min)	Exposure time (hours)	Ref.
Aliphatic hydrocarbons				
n-Butane	-0.5	4.94	72	1
1-Butene	-6.3	3.01	72	1
1,3-Butadiene	-4.5	4.29	72	1
trans-2-Butene	0.9	5.97	72	1
cis-2-Butene	3.73	4.13	72	1
2-Methylpropane	-12	1.28	72	1
n-Pentane	36	8.47	24	2
		8.59	72	1
1-Pentene	29.9	9.55	72	1
trans-2-Pentene	36.3	8.83	72	1
2-Methylbutane	27.8	8.56	72	1
Isoprene	34	9.89	72	1
n-Hexane	68.7	8.1	72	1
2-Methylpentane	60.2	9.9	72	1
2,2-Dimethylbutane	49.7	6.76	72	1
2,3-Dimethylbutane	57.9	6.76	72	1
n-Heptane	98.5	6.82	24	2
		7.13	72	1
2-Methylhexane	90	5.77	72	1
3-Methylhexane	91	5.77	72	1
n-Octane	125.6	6.58	24	2
		6.29	72	1
n-Decane	174.1	3.73	72	1
Methylcyclopentane	71.8	7.89	72	1
Cyclohexane	80.7	6.84	72	1
Methylcyclohexane	100.9	6.79	72	1
1,3-Dimethylcyclohexane	122.4	6.8	72	1
1,4-Dimethylcyclohexane	120	6.78	72	1
2,2,4-Trimethylpentane	99.2	5.5	72	1
Aromatic hydrocarbons				
Benzene	80	8.15	24	2
		8.89	72	1
Toluene	110.6	6.04	24	2
		8.1	72	1
Ethylbenzene	136	5.96	24	2
		6.92	72	1
m,*p*-Xylene	138–139	5.28	24	2
		5.93	72	1
o-Xylene	144.5	7.67	24	2
		5.69	72	1
Cumene	152.4	5.29	72	1
1,3,5-Trimethylbenzene	165	5.5	72	1
1,2,4-Trimethylbenzene	169	5.85	72	1
1,2,3-Trimethylbenzene	176.1	5.85	72	1

Table 1: Uptake rates on POD cartridges packed with Carbopack X.

References

1. P. Pérez Ballesta, R.A. Field, A. Cabrerizo and R. Edie, Unconventional oil and gas development: Evaluation of selected hydrocarbons in the ambient air of three basins in the United States by means of diffusive sampling measurements, EUR 29244 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-86560-2, doi:10.2760/818914, JRC 108917.
2. P. Pérez Ballesta, E. Grandesso, R.A. Field and A. Cabrerizo, Validation and modelling of a novel diffusive sampler for determining concentrations of volatile organic compounds in air, *Analytica Chimica Acta*, 2016, 908: 102–112.

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Trademarks

Carbopack™ is a trademark of Supelco, USA.

Applications were performed under the stated analytical conditions. Operation under different conditions, or with incompatible sample matrices, may impact the performance shown.

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