

VALIDATION OF A DIFFUSIVE
SAMPLER FOR MONITORING
1,3-BUTADIENE AT THE
NEWLY ESTABLISHED OSHA
PEL OF 1.0 PPM

by

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SAMPLING of 1,3 BUTADIENE

The Problem:

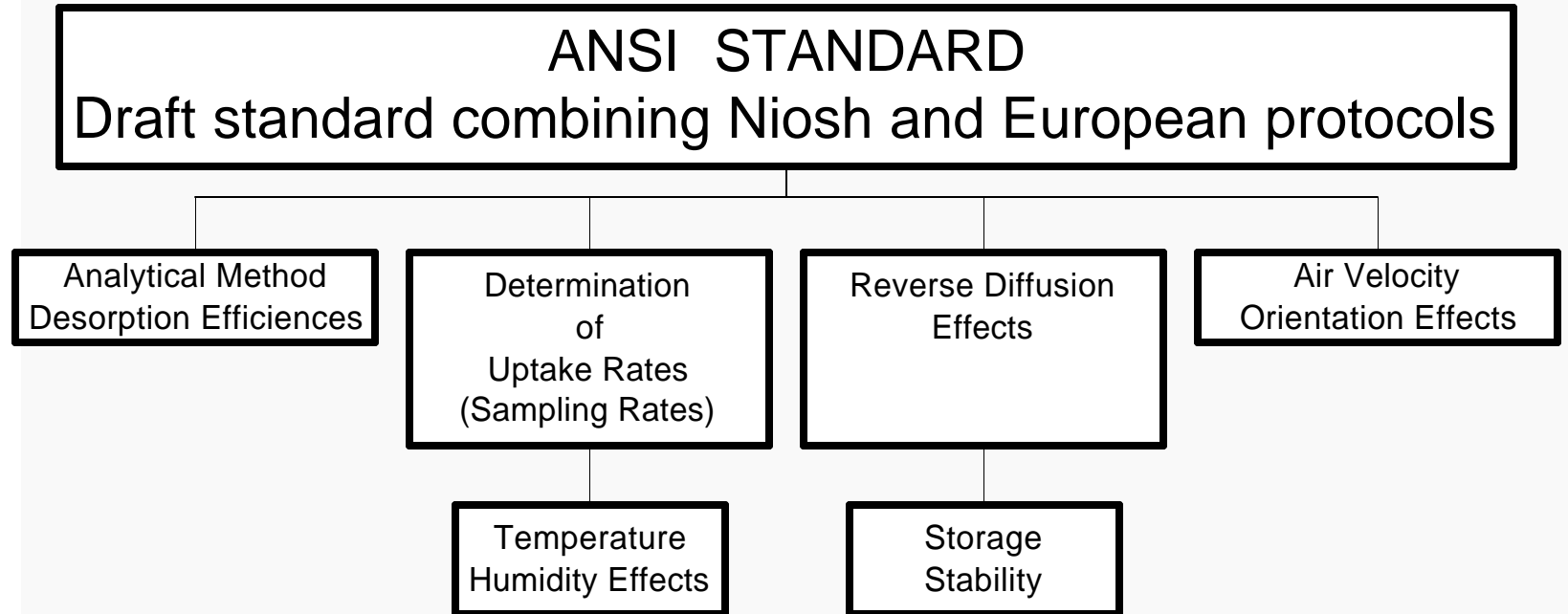
- Used widely in the rubber industry, adhesives and coatings industry
- OSHA reduction of PEL from 1000 ppm to 1.0 ppm
- Sample stability concerns with existing methods
- Analysis requires Low Detection Limits

SAMPLING OF 1,3 BUTADIENE

The Solution

- ☞ General Diffusive Sampling Method
- ☞ Convenient and cost effective sampling method
- ☞ Accurate for 15 minute (STEL) and 8 hour twa (PEL) sampling
- ☞ Sensitive from 0.1 to 2.0 ppm
- ☞ Meets NIOSH Criteria for Accuracy and Precision

Validation Protocol



1,3-BUTADIENE

Analytical Parameters

Instrumentation: Gas Chromatography

Detection: Flame Ionization

Injection Mode: Dual Capillary

Columns: Restek RT-1 and RT-Volatiles

Desorption Solvent:

Carbon Disulfide with 5% Benzyl Alcohol

Average Desorption efficiencies: 91%

Retention Time: 3.62 minutes

Detection Limit: 0.8 ug/sample

1,3-BUTADIENE

De-Sorption Efficiency

Concentration	micrograms	micrograms	%
ppm	spiked	recovered	DE
2.5	9.95	9.28	93
1.26	4.98	4.63	93
0.63	1.99	1.8	90
0.25	1	0.84	84
0.1	0.4	0.37	92

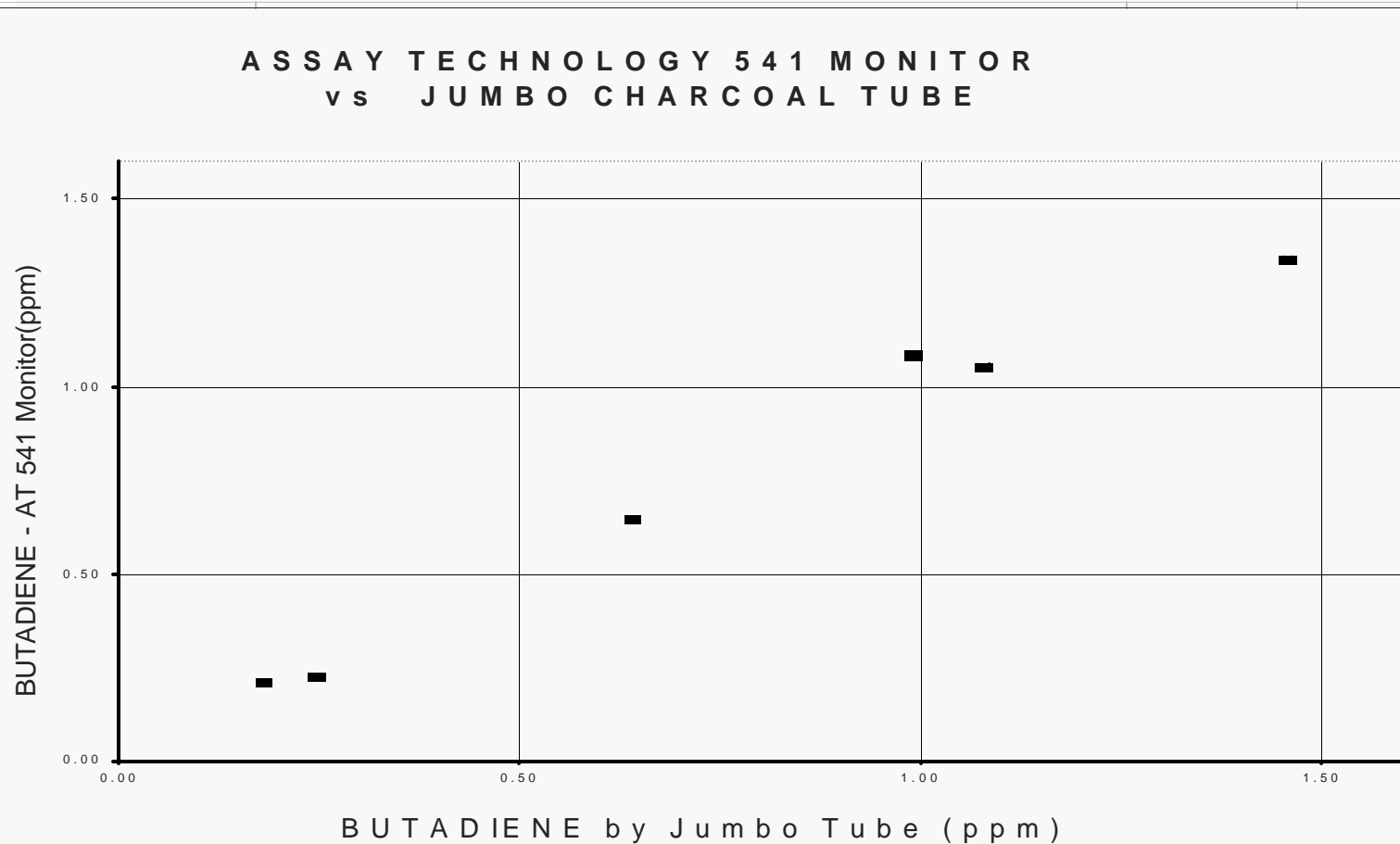
1,3- BUTADIENE

Field Validation Study

Performed at Goodyear Tire and Rubber Co., Houston, TX

Charcoal Tube	Assay Technology
Jumbo	Monitor 541
(ppm)	(ppm)
0.64	0.64
0.25	0.22
0.99	1.08
0.18	0.21
1.08	1.05
1.46	1.34

FIELD VALIDATION vs JUMBO CHARCOAL TUBE



1,3- BUTADIENE

Reverse Diffusion Challenge

Exposure @	Exposure @	% of analyte
2.2 ppm for 2 hours	0 ppm for 6 hours	retained
2.47	2.33	97
2.51	2.39	95
2.04	2.40	118
2.67	2.41	90
2.51	2.32	92

1,3-BUTADIENE

Temperature & Humidity Challenge

	Exposure @ 2.0 PPM
Replicates	%RH=70, T=40 C
	(ppm)
1	2.00
2	1.92
3	1.88
4	1.92
5	2.00
6	1.84