

fumes were sampled within one or two seconds after they were produced. The lead oxide fumes were removed from the improved sampler with 25 cc. of hot nitric acid (1:1) and from the filter paper with a 10 per cent hot acetic acid solution. The lead was recovered as a chromate and determined colorimetrically with diphenylcarbazide.

It will be noted in table 2 that some of the results indicate a trace of lead in the second sampler. The amount is less than 0.1 mg. of lead calculated on the basis of a 10 cu. m. air sample. Our conclusion is that the improved sampler is satisfactory for lead oxide fumes.

It is suggested that when sampling heavy concentrations of dust or fume, the top filter plate be removed. The reason for this is indicated in the vacuum gage readings for samples no. 1, 2 and 3 in table 1. This difficulty was overcome when a ball float type flowmeter was used. This

TABLE 1.—*Efficiency Tests of New Sampler*

Sample *	Air Flow, C. F. M.	Sampling Time, Min.	Filter Plates	Vacuum, In. Hg. (Cm. Hg.)		Mg. NH ₄ Cl Fume per 10 Cu. M.		Efficiency, %
				Start	End	Ætna Sampler	Filter Paper	
1	0.92	20.0	2	6.50 (16.5)	7.25 (18.5)	404.0	1.1	99.7
2	0.94	20.0	2	6.50 (16.5)	8.00 (20)	532.4	1.1	99.8
3	0.89	20.0	2	6.75 (17)	8.00 (20)	148.4	0.0	100.0
4	0.90	20.0	1	6.25 (16)	6.25 (16)	240.3	0.5	99.8
5	0.91	20.0	1	6.25 (16)	6.75 (17)	842.5	2.2	99.7
6	0.87	20.0	1	6.50 (10.5)	7.00 (17.8)	194.1	0.5	99.7
7	0.87	20.0	1	6.25 (16)	6.25 (16)	6.5	0.0	100.0
8	0.89	20.0	1	6.25 (16)	6.25 (16)	17.0	0.0	100.0

* Samples 1 to 6, inclusive, were heated ammonium chloride; samples 7 and 8 represented a mixture of gases.

TABLE 2.—*Results of Tests for Retention of Lead Fumes **

Sample	Mg. Lead per 10 Cu. M.		
	Ætna Sampler	Filter Paper	Second Ætna Sampler
1	1.0	None	.....
2	1.9	None	.....
3	2.0	None	.....
4	7.2	None	.....
5	7.4	None	.....
6	8.0	None	.....
7	0.6	.....	None
8	0.7	.....	None
9	1.4	.....	Trace
10	5.0	.....	Trace
11	6.0	.....	None
12	7.0	.....	None

* Air flow, 1 c. f. m.; sampling time, 17.6 min.

type of flowmeter actually measures air flow rather than vacuum, and a bleed valve can be adjusted to compensate for any plugging effect caused by heavy fumes.

CONCLUSIONS

The new air sampler is a practical and efficient device for the determination of air-borne dust and especially fume. Soluble dust and fume may be easily and completely removed from the filter and determined by any analytic procedure desired. The materials used in the sampler contain no organic matter and, therefore, present no analytical difficulties arising from this source. The sample does not have to be transferred to another container—it can be sealed immediately after the sample is taken, so that there is no chance of loss or contamination. Being rugged, and a dry sampler, it presents no special difficulties in shipment. It may be used either vertically or horizontally. It is recommended for use by industrial hygienists for the determination of air-borne non-pneumoconiosis-producing toxic particulate matter.