

Laboratory Evaluation of AT580 Aldehyde Sampler for Glutaraldehyde Sampling

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AT580 Aldehyde Sampler

The AT580 aldehyde sampler incorporates the same internal sampling medium as the AT571: a glass fiber filter treated with 2,4-dinitrophenylhydrazine (DNPH). The difference between the two samplers lies in their different external sampling grids (13 cm² for AT580 versus 1.8 cm² for the AT571). While the AT571 was designed to provide a small, convenient sampler with very high sample capacity, the AT580 has been designed for the highest possible sampling rate. The increase in sampling rate of nearly one order of magnitude produces a detection limit close to one order of magnitude lower than the AT571 (i.e. on the order of 0.002 ppm for a 15-min sample).

1. Test Apparatus & Method

Glutaraldehyde vapor was generated by injecting a 1% aqueous glutaraldehyde solution through a gas tight syringe into a flowing stream of air using a metering syringe pump. The glutaraldehyde injection rate was matched to the air flow rate of 157 L/min generated by a Miller-Nelson HCS-401 atmosphere control system to generate glutaraldehyde concentrations in the range of interest. Input air generated by the HCS-401 was provided at 50% RH and 25°C prior to glutaraldehyde injection then was passed into a 4" x 4" acrylic rectangular chamber 12" in length generating a linear velocity on the order of 25 cm/sec.

Each separate chamber run was monitored for the entire 15 minute test period by active sampling devices (a) at four representative locations and contained five (5) AT580 placed in a steel basket in the mid-chamber.

At the end of each 15-minute exposure run, the active samplers and AT580 samplers were analyzed for their glutaraldehyde content (as glutaraldehyde-2,4-dinitrophenyl-hydrazine) by HPLC using a method similar to OSHA Method 64.

3. Glutaraldehyde Sampling Results

Five separate chamber tests were conducted in order to assess the performance of the AT580 sampler versus active sampling tubes/cassettes. All tests were conducted as described in Section 1. Results are shown below (Table 1, Figure 1).

(a) Sampling cassettes containing DNP-treated glass fiber filters (SKC 225-9003) or sampling tubes containing DNP-treated silica gel (SKC 226-119).

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Table 1. Glutaraldehyde sampling comparison of AT 580 samplers versus active samplers

Chamber Test A - 4 active samplers & 5 diffusive AT580 samplers

Exposure Time (min)	Glutaraldehyde Concentration Active Sampling		Glutaraldehyde Concentration AT580 Sampler		% of ACGIH Ceiling	AT580 vs Active Sampler
	(ppm)	(RSD)	(ppm)	(RSD)		
15	0.0059	0.03	0.0076	0.06	12%	129%

Chamber Test B - 4 active samplers & 5 diffusive AT580 samplers

Exposure Time (min)	Glutaraldehyde Concentration Active Sampling		Glutaraldehyde Concentration AT580 Sampler		% of ACGIH Ceiling	AT580 vs Active Sampler
	(ppm)	(RSD)	(ppm)	(RSD)		
15	0.0065	0.01	0.0085	0.11	13%	131%

Chamber Test C - 4 active samplers & 5 diffusive AT580 samplers

Exposure Time (min)	Glutaraldehyde Concentration Active Sampling		Glutaraldehyde Concentration AT580 Sampler		% of ACGIH Ceiling	AT580 vs Active Sampler
	(ppm)	(RSD)	(ppm)	(RSD)		
15	0.025	0.09	0.027	0.07	50%	108%

Chamber Test D - 4 active samplers & 5 diffusive AT580 samplers

Exposure Time (min)	Glutaraldehyde Concentration Active Sampling		Glutaraldehyde Concentration AT580 Sampler		% of ACGIH Ceiling	AT580 vs Active Sampler
	(ppm)	(RSD)	(ppm)	(RSD)		
15	0.044	0.11	0.046	0.03	88%	105%

Chamber Test E - 4 active samplers & 5 diffusive AT580 samplers

Exposure Time (min)	Glutaraldehyde Concentration Active Sampling		Glutaraldehyde Concentration AT580 Sampler		% of ACGIH Ceiling	AT580 vs Active Sampler
	(ppm)	(RSD)	(ppm)	(RSD)		
15	0.044	0.11	0.044	0.03	88%	100%

The AT580 sampler functioned effectively and accurately in measuring exposures in the range of 0.006 - 0.045 ppm of glutaraldehyde for a 15-minute sampling time with a difference of <10% between active and diffusive samplers for measurements within 50%-100% of the ACGIH TLV.

Based on the lab's detection limit of 0.008 µg/sampler (determined experimentally), the detection limit for a 15-minute air sample taken with the AT80 Sampler is 0.002 ppm.

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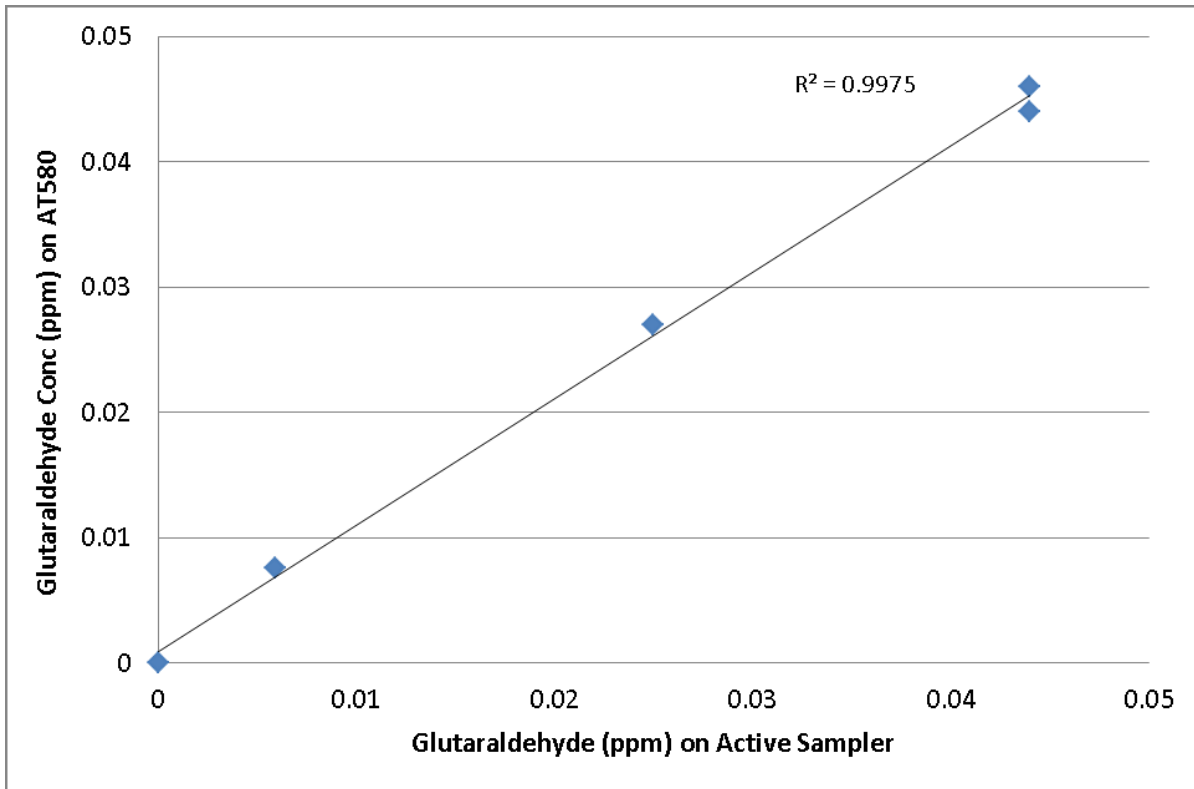


Figure 1. Glutaraldehyde STEL (15-min) test comparison of AT580 sampler versus active sampler