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Reported By: J.Newton

- Laboratory Report -

Project: Formaldehyde Study

Analyzed by:



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Laboratory Manager

22 April 2008

Date

QA/QC :



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Materials Scientist

22 April 2008

Date



Conclusions:

Chempace samples FR2/Purple and FR2/Blue were found to absorb formaldehyde gas in laboratory testing. An additional sample Lot # 13244L was submitted for analysis on 4/25/08. Specific details are discussed in the following documentation.

Definitions and Nomenclature:

Sample	Generic term used to denote FR2/Purple and FR2/Blue Odor Absorb Supreme supplied by the client.
Environmental Chamber	Sealed chamber roughly 15 cubic feet capable of maintaining both temperature and humidity during the testing.
(ppm)	Parts Per Million. Equivalent (0.1% = 1000ppm)
Formaldehyde	A pungent gas commonly released by synthetic resins. The specific forms H_2CO and $H_2C(OH)_2$ are not differentiated in this study.
CDR	Chamber Dissipation Rate. The natural loss of free formaldehyde gas within the environmental chamber. The CDR is used as the base-line for calculating the actual loss of free formaldehyde due to the samples.

The results are obtained using the methods and sampling procedures as described in the report or as stated in the published standard methods, and are only guaranteed to the accuracy and precision consistent with the used methods and sampling procedures. Any change in methods and sampling procedure may generate substantially different results. EMSL Analytical, Inc. assumes no responsibility or liability for the manner in which the results are used or interpreted. Official, legally defensible reports require hand signatures. Reports with digital signatures are for email and other digital distribution only.



Procurement of Samples and Analytical Overview:

The material arrived at EMSL Analytical's corporate laboratory in Westmont, NJ on 4/16/08. The package arrived in satisfactory condition with no evidence of damage to the contents. The purpose of the analysis is to determine the effects of Odor Absorb Supreme (FR2/Purple, FR2/Blue & Lot #13244L) on formaldehyde gas. The data reported herein has been obtained by testing the concentration of formaldehyde gas in a sealed environmentally controlled chamber.

An environmental chamber conditioned to 23°C ($\pm 1^\circ\text{C}$) and with a relative humidity of 50% ($\pm 1\%$) was subjected to elevated concentrations of formaldehyde gas to a stable concentration of 10ppm. The natural chamber dissipation rate (CDR) of the formaldehyde gas was observed and is used as the baseline for the study. Once the environmental chamber was subjected to a stable formaldehyde concentration of 10ppm the Sample was opened and allowed to sit within the chamber according to the manufacture's instructions. Specifically, the contents of the plastic container were removed from the main container and allowed to set on the lid with the "base" and "sides" open to the gas providing maximum surface exposure.

The formaldehyde concentration was then monitored for a total of 48 contiguous hours. The two samples (FR2/Purple, FR2/Blue & Lot #13244L) were analyzed in separate test runs under the same conditions. The results are documented in Table A.

Results and Discussion:

Analysis of the formaldehyde concentrations within the environmental chamber revealed that the Odor Absorb Supreme samples diminished the free gas concentrations. A 25% to 30% reduction in free formaldehyde gas over a 2 day period was observed during this study. A total gas reduction of 0.047ppm to 0.053ppm per cubic foot of chamber space was observed.

It should be noted that the reduction was observed in a fixed initial gas concentration and does not directly apply to enclosures with continuous gas generation.



Time Point (hrs)	CDR Ppm	FR2/Blue Ppm	FR2/Purple Ppm	Lot:13244L %	Time Point (hrs)	FR2/Blue %	FR2/Purple %	Lot:13244L %
0	10	10	10	10	0	0	0	0
0.17	10	10	10	10	0.17	0	0	0
0.33	10	9.9	9.9	9.9	0.33	1	1	1
0.5	9.9	9.7	9.6	9.5	0.5	2	3	4
0.75	9.9	9.5	9.4	9.3	0.75	4	5	6
1	9.2	8.8	8.7	8.6	1	4	5	7
2	8.5	8	8.1	8	2	6	5	6
3	7.8	7.3	7.4	7.1	3	6	5	9
4	7.2	6.8	6.7	6.5	4	6	7	10
5	6.6	6.1	6	5.8	5	8	9	12
6	5.8	5.2	5.3	4.9	6	10	9	16
12	4.3	3.7	3.8	3.5	12	14	12	19
24	4	3.3	3.3	3.1	24	18	18	23
36	3.2	2.5	2.4	2.3	36	22	25	28
48	2.7	1.9	2	1.8	48	30	26	33

Table A: Formaldehyde concentrations in parts per million and percent reduction.

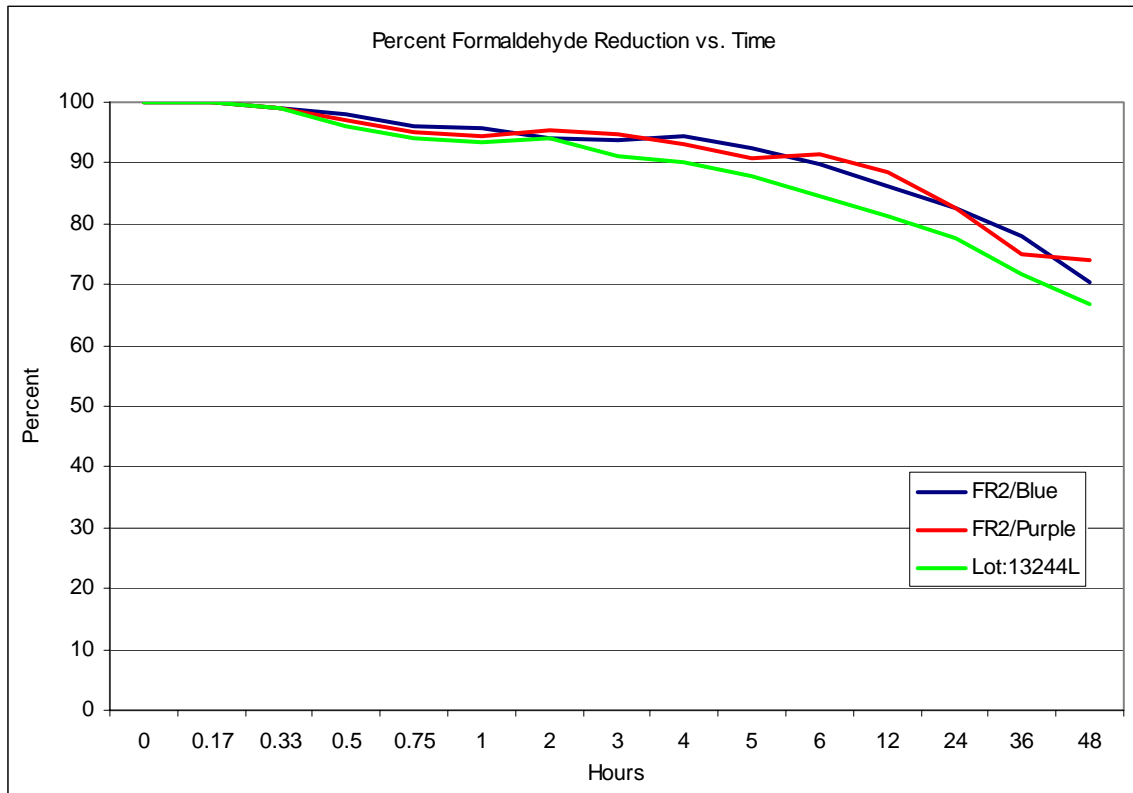


Figure 1: Percent reduction of free formaldehyde vs. time in hours.



Room size (cu ft)	Day one removal (ppb)	77 ppb start	<-- start day 1 concentration
864	15.6	61.4	<-- end day 1 concentration
1768	7.6	69.4	<-- end day 1 concentration

Table B. Rate of removal of formaldehyde for two room sizes based on the rate of removal of one cartridge in an environmental chamber. Removal rate is based on the first day, no change in formaldehyde concentration was seen from day one to day two. A longer analysis may be required to calculate the rate of formaldehyde absorption after day one.

Room size (cu ft)	One can % removal (of total)	# of cans needed to remove to 40 ppb in one day calculated and (actual)
864	20.3	2.4 (3)
1768	9.9	4.8 (5)

Table C. Number of cans needed to remove enough formaldehyde to bring the concentration down from 77 ppb to 40 ppb.