THE EVALUATION OF AIR PURE PAINTS

EXECUTIVE SUMMARY

STUDY OBJECTIVE

The objective of this study was to evaluate Air Pure Paints for its effectiveness at removing volatile organic compounds (VOCs) from the air.

ANALYSIS CONCLUSIONS

Two experiments were conducted to evaluate Air Pure Paints' effectiveness at removing volatile organic compounds (VOCs) from a closed system. The initial experiment incorporated the VOC compounds from the article *Common Household Chemicals and the Allergy Risks in Pre-School Age Children.* The results, when evaluating all of the compounds as a whole, gave a percentage loss calculated to be 76% (absorption).

A modified test using a reduced number of volatile organic compounds (to alleviate suspected issues with absorption competition) at an increased temperature resulted in a calculated average absorption of 90%.

SAMPLE PREPARATION AND EXPERIMENTAL PROCEDURE

Identical glass I-Chem jars with septa lids were selected with volumes of approximately 250mL. The inside of half the jars were painted with Air Pure Paints and allowed to dry at room temperature for at least 24 hours in between each coat. Two coats of paint were applied to each jar. The remaining jars were left unpainted. A mixture of compounds was prepared containing mixture of several compounds at various concentrations.
A SPME fiber was exposed to each jar for 30. After sampling was completed, the SPME fiber was removed from the jar and inserted into the injection port of the GC/MS for desorption and analysis. The response for each compound (observed as a peak) present in the painted and unpainted jars was integrated and the area counts were recorded. The percent loss of each compound was evaluated by comparing the area counts of each compound observed in both the painted jars and unpainted jars. The ratio of these areas was used to calculate the percent recovery. This was performed in triplicate and an average was taken of all three.

Example Calculation:

$$\%\ \text{recovery} = \frac{\text{Area counts for compound in paint sample}}{\text{Area counts for compound in unpainted sample}} \times 100$$

SELECTED RESULTS

COMPOUND	CAS #	% LOSS
formaldehyde	50-00-0	52%
acetone	67-64-1	49%
ethyl acetate	141-78-6	96%
p-xylene	106-42-3	85%
2-propanol	67-63-0	58%
2-butanone	78-93-3	95%
benzene	71-43-2	42%
propylene glycol	57-55-6	77%
m-xylene	108-38-3	81%
o-xylene	95-47-6	84%
diethylene glycol*	111-46-6	100%
dipropylene glycol*	25265-71-8	100%

*at elevated temperature.

TECHNIQUE DESCRIPTIONS

CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

In Gas Chromatography/Mass Spectrometry (GC/MS), GC resolves the sample components based on volatility, and MS detects and identifies the components. Sample components that interact less with the stationary phase spend less time in the chromatographic column. In MS, the resolved sample components are ionized and separated in a mass analyzer. The fragmentation pattern of a sample component and its computer-library match enables sample identification.

SOLID PHASE MICROEXTRACTION GAS CHROMATOGRAPHY/MASS SPECTROMETRY SPME-GC/MS

Solid Phase Microextraction (SPME) is a sensitive extraction technique for volatile components in various matrices in which components are adsorbed directly onto a fused silica fiber that is coated with an appropriate stationary phase. Samples are heated and the volatile headspace gases generated are exposed to the SPME fiber for a pre-determined time interval. The SPME fiber is then inserted in the injection port of the GC where the volatiles are thermally desorbed and analyzed by GC (or GC/MS).

For the full report, please see the pdf file on www.clinicalpaints.com