

VISTA PERFORMANCE POLYMERS
PREMIERE POLYMER DIVISION

Louisville, Kentucky

INDUSTRIAL HYGIENE SURVEY

January 10 and 21, 1992

Survey conducted by: Kenneth R. Troutman, CIH
and
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INTRODUCTION

An industrial hygiene study was conducted at Vista Performance Polymers, Premiere Polymer Division, Louisville, Kentucky. The purpose of the study was to assess emissions from a plastic compounding operation. The chemicals in question were vinyl chloride, styrene and acrylonitrile. The survey was conducted on the first shift, January 10, 1992. The surveyors were Kenneth Troutman, CIH and Bob Unterbrink, Jr., CIH. The plant contact was Greg Lipps.

The objective of the survey was to assess employee exposure to the various agents encountered at each work station. Some air samples were taken to determine worst case information on chemical emissions at process points. Two boxes of the finished product were also tested for styrene. Samples were taken in the head space of each box. The boxes had been stored in the warehouse and were tested on January 21, 1992 by Kenneth Troutman.

METHODS OF SAMPLING AND ANALYSIS

All of the organic vapors of interest were collected on charcoal tubes. VCM was collected using two tubes in series. Air flow was provided by pre- and post calibrated SKC personal sampling pumps.

The head space tests were conducted in the following manner. Two boxes of SUPREL 9420 grey 90001 (boxes # 7 & 8) product manufactured 1-10-92 were stored in the warehouse. Charcoal tubes were inserted into the head space. These boxes were not full. Both boxes (# 7 and # 8) had net weights of 898 pounds. A flow rate of 1.0 liters per minute (lpm) was provided by duPont sampling pumps. Care was taken to minimize disturbance of the head space. Sample time was 1.0 liter per minute for 15 minutes. The purpose of this test was to assure that styrene was not being released during storage conditions. The temperature in the warehouse was 68 degrees F.

The pumps were calibrated before and after sampling at IH Associates. All tubes were capped and sent to the Analytics Laboratory of Richmond, Virginia for analysis by gas chromatography. The Analytics Laboratory is accredited by the American Industrial Hygiene Association (AIHA). The laboratory also participates successfully in the Proficiency Analytical Testing program sponsored by AIHA and the Center for Disease Control. Gas chromatography is one of the analysis techniques tested by the PAT program.

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CRITERIA AND STANDARDS

There are two major sources of industrial hygiene health risk criteria used in the United States. They are the Occupational Safety and Health Administration (OSHA) Permissible Exposure Levels (PELs) and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs). The OSHA PELs have the force of law. The ACGIH TLVs are reviewed annually and are sometimes based on more recent information. OSHA adopted many of the 1987/88 TLVs in rule making finalized in 1989.

These criteria can be further divided into two types of exposure categories. There are two different sets of values that can be appropriate for a particular industrial operation. They are the eight-hour time-weighted average (eight-hour TWA) and the short term exposure level (STEL). The eight-hour TWA TLV deals with the average exposure throughout a working day to which practically all workers can be repeatedly exposed without suffering deleterious health effects. This is the proper method of assessing the potential for chronic health effects.

The STEL is the concentration to which workers can be exposed for a short period of time without suffering from irritation, chronic or irreversible tissue damage, or narcosis. Thus, the STEL deals with acute health effects.

The parameter of most interest for these compounds is the eight-hour TWA. The probability of exceeding the STELs is considered very small based upon the previous studies and this data. (See Results and Discussion)

Each result is expressed as a time-weighted average during a process run. Thus, dilution by "down time" is not a factor and the results show the actual exposures found while the process is running. It is a sound assumption that the TWA exposures of employees operating a regular production shift would be less than those detected in this study. This is due to set up, cleaning activities, and other miscellaneous tasks with low exposure potential.

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The OSHA PELs and ACGIH TLVs are shown below and are also shown at the bottom of the result tables.

Compound	1989 OSHA PELs (ppm)			1989/90 ACGIH TLVs (ppm)	
	Action Level	TWA	STEL (ppm)	TWA	STEL
Vinyl Chloride (A1)	0.5	1	5	5	none
Styrene	none	50	100	50	100
Acrylonitrile (A2)	1	2	10 (ceiling)	2	none

A1 and A2 refer to the carcinogenicity classifications of ACGIH.

The action level is listed above to show eight-hour TWA concentrations where specific actions such as employee education, medical monitoring, exposure measurement, etc., are required by OSHA.

RESULTS AND DISCUSSION

The results of this survey found detectable amounts of only styrene. These results and those of the previous studies of similar operations shows that significant exposure potential to the chemical contaminants tested is unlikely. Observation of the work tasks of the employees involved in this operation also indicated that excessive exposure is unlikely. The results are shown in the attached tables. Table 1 shows the results of area monitoring of styrene emissions. Table 2 shows the results of the personal monitoring for all three contaminants. These results are key in predicting employee health risk and determining OSHA compliance requirements. Table 3 shows the results of head space monitoring.

The probability of exceeding the STELs is considered very small based upon the previous studies and this data. The STELs are relatively high (vinyl chloride - 5 ppm; styrene - 100 ppm; acrylonitrile - 10 ppm ceiling) and a review of the laboratory results shows that most compounds were not even detected. On this date two samples were taken for styrene covering approximately one hour each during the blending

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addition procedure. The results showed concentrations of styrene 0.5 ppm and 0.3 ppm. The other compounds were not detected. This indicates that shorter term samples would not yield significant exposures.

Observation of the process did not discern a high potential for high exposures at any step of the process. There was only one employee (blender) located in close proximity to the ingredients. The blender loaded ingredients on an as needed basis for this batch procedure. His time at this location was limited. Heating of these components takes place in an enclosed environment isolated from employees. Thus, acute effects are considered unlikely. Chronic exposures from leaks in the process line are a somewhat more probable event. The head space tests showed that essentially no styrene was released during normal storage conditions. Please note that this test was conducted in the winter not in summer where slightly higher concentrations would be expected. Summer concentrations could be slightly higher due to the expected increase in ambient temperatures in the warehouse. Temperature is generally correlated to increased off-gasing of gaseous contaminants.

CONCLUSIONS

An air sampling survey was conducted at Premiere Polymers, Louisville, Kentucky on Jan. 10, 1992. The survey found only small amounts of styrene and no detectable amounts of vinyl chloride or acrylonitrile. Based on the results of this study, this process and product does not appear to offer a significant health hazard to employees from these agents.

RECOMMENDATIONS

- 1) Inform the employees of the sampling results and their meaning as part of the PP HAZCOM program. The tables can be used for this purpose.
- 2) Due to the low PELs of the substances involved in this process, a regular monitoring program should be implemented. The data obtained from both surveys indicated that very little emission of these substances occurred. Due to the physical layout of the line and the duties of the employees, personal exposures are anticipated to remain low. However, the seriousness of the health affects associated with vinyl chloride, acrylonitrile are such, that regular documentation of exposure levels should be continued.

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TABLE 1
Process Point - Styrene Exposures

<u>Location</u>	<u>Time of Sample</u>	<u>Concentration (ppm)</u>	
		<u>Styrene</u>	
Roll Mill	8:30-10:08	<0.2	
	10:09-12:28	<0.2	
	12:28-1:57	<0.3	
Top of Blender	8:40-9:40	Batch 1	0.5
	10:52-11:45	Batch 2	0.3
FCM	8:30-11:00	0.9	
	11:00-12:32	<0.4	
	12:32-1:55	0.4	

The OSHA Permissible Exposure Level for styrene is 50 ppm.

TABLE 2
Personal Exposures

<u>Employee/ Location</u>	<u>Time</u>	<u>AN</u>	<u>Exposure Level (ppm)</u>	
			<u>Styrene</u>	<u>Vinyl Chloride</u>
Paul Allen Packing	8:14-2:03	<0.05	<0.5	<0.05
Keith Curry	8:30-10:38	<0.002	<1.2	<0.13
Blender	10:38-11:45	<0.04	<2.2	<0.24

AN = acrylonitrile

The OSHA Permissible Exposure Level for styrene is 50 ppm.
The OSHA Permissible Exposure Level for vinyl chloride is 1
ppm. The OSHA Permissible Exposure Level for acrylonitrile
2 ppm. These are 8 hour TWAs.

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TABLE 3
Styrene Concentrations

<u>Location</u>	<u>Styrene Exposure Level (ppm)</u>
Box # 7	None detected (<0.3)
Box # 8	None detected (<0.3)

The OSHA Permissible Exposure Level for styrene is 50 ppm.