

February 20, 1975

Substance:

Vinyl chloride

Standard:

8-hour time-weighted average: 1 ppm

15 minute ceiling: 5 ppm

Reference: 29 CFR 1910.93, amended October 4, 1974

Analytical Method:

A known volume of air is drawn through two charcoal tubes connected in series to trap the vinyl chloride gas present. The analyte is desorbed from the charcoal with carbon disulfide, and the sample is separated and analyzed using a gas chromatograph with a flame ionization detector. The first charcoal tube is analyzed as a single sample (both front and back sections together) and the second tube is used as a breakthrough indicator.

Sampling Equipment:

A calibrated personal sampling pump whose flow can be determined accurately, $\pm 5\%$, over the range of 50 to 200 ml/min, plus charcoal tubes containing two sections of 20/40 mesh activated charcoal separated by a 2-mm portion of urethane foam.

Sample Size:

A maximum size of 5 liters is recommended. Sample at a flow rate of 50 ml/min.

Sampling Procedure:

1. Immediately before sampling, the ends of the two tubes should be broken so as to provide an opening at least one-half the internal diameter of the tube.
2. The first charcoal tube is positioned in the tube holder with the smaller backup section of charcoal being positioned nearest the pump. The second charcoal tube should be connected with a small, i.e. 0.5 inch, piece of Tygon tubing to the outlet of the plastic charcoal tube holder with the smaller section of charcoal being positioned nearest the pump and connected to the main sample line leading to the pump. Both tubes should be in a vertical position during sampling to avoid channeling and subsequent premature breakthrough of vinyl chloride.
3. Air being sampled should not be passed through any hose or tubing before entering the first charcoal tube.

4. Set the flow rate on the predetermined setting. Record the temperature and pressure of the atmosphere being sampled. If the pressure reading is not available, record the elevation. If a low flow rate pump is used, set the flow rate and record the initial and final counter reading. The sample volume is obtained by multiplying the number of counter strokes by the cc/stroke factor.
5. The charcoal tubes should be capped with the supplied plastic caps immediately after sampling. Masking tape is the only suitable substitute for sealing the tubes. Under no circumstances should rubber caps be used. The two tubes used together should be labeled so as to distinguish the sample tube from the back-up tube.
6. One charcoal tube (at least one) for every 20 samples should be handled in the same manner as the sample tubes except that no sample is taken. The ends are broken and the tube is immediately capped and prepared for shipping. This tube is labeled as a blank.

Special Considerations:

1. Where two or more compounds are known or suspected to be present in the air, such information, including their suspected identities, should be transmitted with the sample.
2. Due to the high resistance of two charcoal tubes in series, this sampling places a heavy load on the sampling pump. Therefore, the pumps should not be operated more than 8 hours continuously without fully recharging the battery.
3. The presence of high humidity or water mist causes a reduction in breakthrough volume. However, this has been taken into account and as long as a maximum of 5 liters is sampled, no breakthrough should occur.
4. The desorption efficiency of charcoal can vary from batch to batch. Therefore, all the tubes used to collect a set of samples should contain charcoal from the same batch. Information on the batch number of the charcoal must be supplied.
5. The increased pressure drop of two tubes in series will cause the cc/stroke factor to change. Also this cc/stroke factor, at this high pressure drop, will vary slightly with flow rate. Therefore, for this special sampling situation, the pumps should be calibrated at a set flow rate with two charcoal tubes in line ahead of the pump and a new cc/stroke factor determined. When sampling, the flow rate should not be changed from that setting at which the cc/stroke factor was determined.

Bulk Samples:

If samples of material containing vinyl chloride are shipped to the lab, they should be submitted in a glass container with a Teflon-lined cap. Do not transport these samples in the same container with charcoal tubes.

Shipping Instructions:

Capped charcoal tubes should be packed tightly and padded before they are shipped to minimize tube breakage during shipping. Never transport, mail, or ship the bulk sample in the same container as the sample or blank tubes. When the samples are received by the laboratory, they should be stored in the freezer compartment of a refrigerator to avoid any chance of loss of vinyl chloride from the samples.

Reference:

Vinyl chloride, NIOSH P&CA Method #178.

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