

Answer to
questions
concerning
odors.

UCC-product - not
detectable by odor.



UNION CARBIDE CORPORATION
CHEMICALS AND PLASTICS

P.O. BOX 8004, SOUTH CHARLESTON, W. VA. 25303

SOUTH CHARLESTON PLANT

July 28, 1975

VC
Mr. L. H. Harris
GENESCO
6100 Centennial Boulevard
Post Office Box 90
Nashville, Tennessee 37202

Re: Identification of Odors from
Union Carbide Corporation's
VYNW-5, VMCH, VYNS, and VYHH Resins

Dear Mr. Harris:

The identification of odors from vinyl chloride resins is causing a great deal of concern as a result of the Occupational Safety and Health Administration Standard for Vinyl Chloride. Vinyl chloride has been generally described as having a sweet, pleasant odor which, unfortunately, describes a great number of organic materials. In an effort to reduce the confusion and concern regarding odors given off by the subject resins, the following is offered for information:

Union Carbide Vinyl Resin VYNW-5 is a copolymer of vinyl chloride and vinyl acetate produced in Union Carbide's bulk polymerization process. When vinyl chloride and vinyl acetate are copolymerized, the vinyl chloride reacts more rapidly than the vinyl acetate; thus, at the end of the polymerization the concentration of unconverted vinyl acetate is somewhat higher than initially. The finished resin, containing unconverted monomers, is literally boiled in water to remove the unconverted monomers and then air-dried to remove the water. Since vinyl chloride boils at -14°C and vinyl acetate boils at 72°C , the vinyl chloride monomer concentration is readily reduced to very low values; i.e., 1 to 10 ppm, while the vinyl acetate monomer is difficult to remove. In addition to this reluctance to leave the resin, a part of the vinyl acetate monomer is hydrolyzed by the water treatment to acetaldehyde and acetic acid.

Tabulating the materials likely to be present and their threshold odor concentrations shows the following:

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<u>Material</u>	<u>Threshold Odor Concentration In Air</u>
Vinyl Chloride	2,000 ppm by Volume
Acetaldehyde	0.2 ppm by Volume
Vinyl Acetate	0.55 ppm by Volume
Acetic Acid	1.0 ppm by Volume

Since the VYNW-5 resin contains less than 10 ppm vinyl chloride by weight at the time of manufacture and this concentration drops very rapidly to nil within 24 to 48 hours, the odor emanating from the resin in your plant is most likely to consist of a combination of acetaldehyde, vinyl acetate, and acetic acid.

Union Carbide Corporation Vinyl Resins VMCH, VYNS, and VYHH are copolymers of vinyl chloride and vinyl acetate produced by Union Carbide's solution polymerization process. The same problem of differential polymerization rates for the monomers noted in the VYNW-5 exists here too. In the case of these resins, more vinyl acetate is likely to be left in the resin since the resins contain more vinyl acetate in the copolymer. These resins are treated with acetone and isopropanol in the course of manufacture; thus, in addition to the materials noted for VYNW-5, the following are also present:

<u>Material</u>	<u>Threshold Odor Concentration In Air</u>
Acetone	140 ppm by Volume
Isopropanol	28 ppm by Volume

Solution polymerized resins contain less than 1 ppm vinyl chloride monomer at the time of manufacture; therefore, odors emanating from these resins would consist of acetone, isopropanol, vinyl acetate, acetaldehyde, and acetic acid.

Odors, odor detection, and odor identification are largely subjective properties of materials; i.e., there is tremendous variation from one individual's evaluation to another's. In addition, the supposed odor of a material may actually be the odors of impurities and not the material itself. Vinyl chloride appears to be material which has been affected by odors of

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impurities. Published data on vinyl chloride shows its odor threshold as approximately 300 ppm, but this data was obtained when total impurities in the vinyl chloride was 1 to 2 percent. The vinyl chloride of commerce today has approximately 50 ppm total impurities. Recent studies by Union Carbide Corporation have shown that vinyl chloride monomer concentrations of less than 2,000 ppm in the air are not readily detectable. Unpublished work by B. F. Goodrich Chemical has not only confirmed this concentration but has shown that the anesthetic properties of vinyl chloride dull the olfactory senses quickly so that on continued exposure even 3,000 to 4,000 ppm by volume may not be detected.

Since vinyl chloride in the work-space concentrations specified by the Occupational Safety and Health Administration Standard can only be monitored by rather sophisticated analytical techniques, Union Carbide Corporation believes that the resin producer should provide resins which are inherently safe thereby relieving the small manufacturer using vinyl resins of the burdensome requirements of the Occupational Safety and Health Administration Standard.

Very truly yours,



R. N. Wheeler, Jr.

RNWJr/ra

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Mr. M. E. Eisenhour, 515
Mr. D. E. Hardman, NYO-33
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