T. V. Kidd
August 24, 1967

Chambers Works Process
K-13-A78 531 etc.
"Freon" Area

AEROSOL SOLUTIONS "FREON" 12/VINYL CHLORIDE

Principle

These blends are prepared by direct mixing of "Freon" 12 dichlorodifluoromethane and vinyl chloride. The vapor pressure of the solution can be obtained from Figure 1. (Vapor pressure calculations were based on Raoult's Law.) They are used as aerosol propellants.

Reaction

None. This product is a physical mixture.

Critical Hazards

Blends containing more than 25% vinyl chloride are flammable when completely vaporized. Vinyl chloride is a dangerous fire and explosion hazard. Take precautions to avoid sparks, open flames, or heated surfaces. Ground both storage container and receiver to protect against static electricity. Do not permit vinyl chloride or blends of "Freon" and vinyl chloride to contact copper or copper-bearing alloys, as a trace impurity of acetylene may form the explosive acetylide. These liquids can cause frostbite on contact with skin. Liquid-full systems must be avoided.

Basis

Previous experience in making these blends. For example, see TMR-C-64-79 (65% "Freon" 12/35% vinyl chloride), TMR-C-66-95 (76/24), TMR-C-66-103 (20/80) and the corresponding Test Conclusions.

Test Authorization TA-C-67-218, "All Existing 'Freon' Blends - Blending of 'Freon' Mixtures using the Foxboro Fluorocarbon Blending System", dated March 7, 1967.

Equipment

Regular trailer and/or cylinder loading facilities in the Service Building and Tank Farm, "Freon" Area.

Bill of Materials

Net basis (given per 100 pounds of product). May be scaled to fit any size of approved cylinder. The loading density as per cent of water capacity is shown in Figure 2. (Calculated as described in CWPD Report No. 156. Practice has been to recommend a per cent of water capacity 2.0% under the calculated value shown in Figure 2.)

Material and Orchem Product Code Number	Wt. Ratio	Lb./100 lb. Produced	Mol. Wt.	Orchem Spec. No.
"Freon" 12 384 100	See Order	Wt. Ratio x 101	120.9	27-F
Vinyl Chloride 985 960	See Order	Wt. Ratio x 101	62.5	Note 1
Product				
Aerosol Solution "Freon" 12/Vinyl Chloride	99.0	100.00	-	Note 2

Note 1: Purchase from Dow Chemical Company

Note 2: Specifications for this product are as follows:

1. The product shall be a clear, colorless liquefied gas, substantially free from particulate matter.

2. The composition shall be as stated ± 1.0% by wt. "Freon" 12 and as stated ± 1.0% by wt. vinyl chloride.

3. The moisture content shall not exceed 25 ppm by weight for blends containing up to 40% by wt. vinyl chloride, and 40 ppm by weight for blends containing between 40 and 80% by wt. vinyl chloride.

4. The soluble residue shall not exceed 0.01% by volume.

5. Halides shall be nil by the silver nitrate test.

Note: "Freon" 12/vinyl chloride blends containing over 80% by wt. vinyl chloride are not expected.

Batch Size and Yield

Batch size may be any value which may be contained in any approved container. Standard and goal yield is 99%, representing handling losses only. Yield will vary from 92 to 99% depending upon the container.

Procedure

Scale as required to container capacity. Select between Alternative A and B.

Alternative A

1. Clean and inspect the container thoroughly, then evacuate it (unless loading on heels).

   The container must be clean (unless loading on heels); all oil, residue, moisture, etc. should be removed as completely as possible.

2. Calculate the weight to be charged, using the loading density data attached (Figure 2) and assuming 99% yield.

3. Charge accurately: (recommended order of addition)

   (1) Caluclated amount of vinyl chloride.
   (2) Calculated amount of "Freon" 12.

   Check the weight of each component by actual scale weight or by Neptune Meter, whichever is available. Container must be less than 95% full.

   Note: When loading vinyl chloride, ground both the storage container and receiver to protect against static electricity. It is desirable to load the vinyl chloride out-of-doors to minimize the fire hazard.

4. Mix the contents of the container thoroughly.

   This may be accomplished by rolling the cylinder.

5. Request the "Freon" Control Laboratory to sample the container and conduct the following analyses:

Analysis	Orchem Method No.
Appearance	6-50-3
Composition	6-30-1 (gas chromatography)
Moisture	2-14-5 (Karl Fischer)
Soluble Residue	6-50-3
Halides	6-6-6

Alternative B

1. Evacuate the tank (unless loading on heels). Connect automatic blender to the tank truck and/or tank car and attach ground wire.

2. Calculate total pounds to be blended, using the available data on tank car or tank truck volume and the attached loading density data, and set batch size selector.

3. Dial in the per cent of each component on the respective selector dials.

4. Start blender and permit system to operate until automatic shut-off.

5. Check liquid level in tank truck by rotogauge and tank car weight by scale weight.

   This check is to avoid overfilling. Tank must be less than 95% full.

6. Request the "Freon" Control Laboratory to sample the container and analyze as indicated above (Alternative A, Step 5).

Labeling

All blends of "Freon" 12/vinyl chloride will have a vapor pressure exceeding 25 psig at 70°F and therefore will be considered a compressed gas in accordance with ICC regulations.

"Freon" 12/vinyl chloride blends containing more than 25% by weight vinyl chloride will be considered flammable and will be labeled such as per ICC regulations.

Small containers of this mixture are color coded with one 1 1/2" red tape on a white cylinder.

Chemical Hazards

	Starting Material		Product
	"Freon" 12	Vinyl Chloride	"Freon" 12/ Vinyl Chloride
Flammability	Nonflammable	Flammable	Flammable if > 25% vinyl chloride
Toxicity	TLV 1000 ppm	TLV 500 ppm	MAC 500 ppm
Irritant	None	Avoid skin contact and inhalation.	Avoid skin contact and inhalation.
Reactivity	Avoid flame heat	Avoid copper, copper-bearing alloys, sparks, flames and heated surfaces.	Avoid copper, copper-bearing alloys, sparks, flames and heated surfaces.

Waste Disposal

	"Freon" 12	Vinyl Chloride
Physical state	Vapor	Vapor
Odor	Faintly ethereal	Natural gas
Volume	About 1%	About 1%

Patent Status

In the opinion of Orchem-Patent Service, we are free to operate this process. Opinion is based on OPA-6307, K. C. Ackerman, May 14, 1963.

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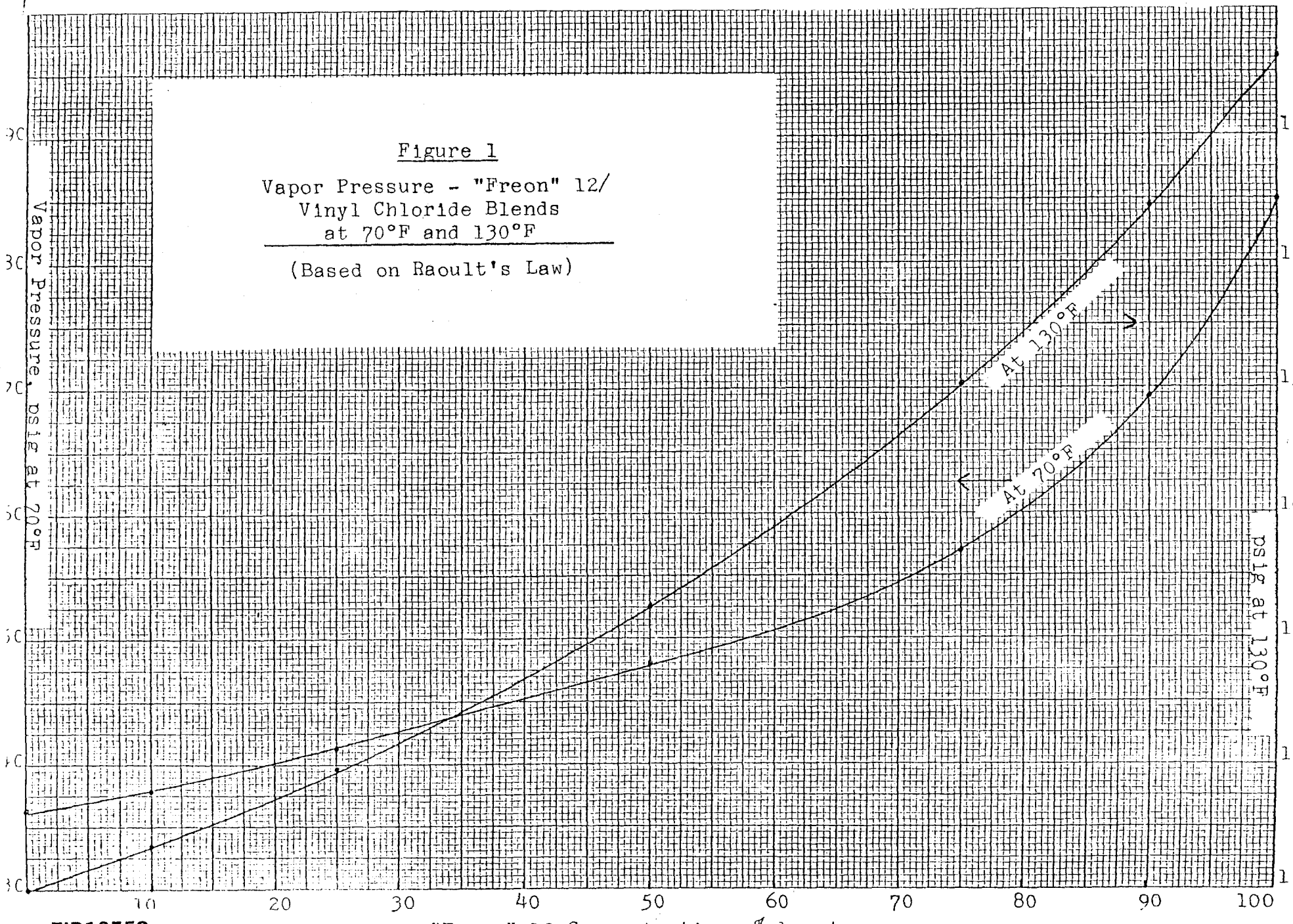

Figure 1

Vapor Pressure - "Freon" 12/
Vinyl Chloride Blends
at 70°F and 130°F

(Based on Raoult's Law)

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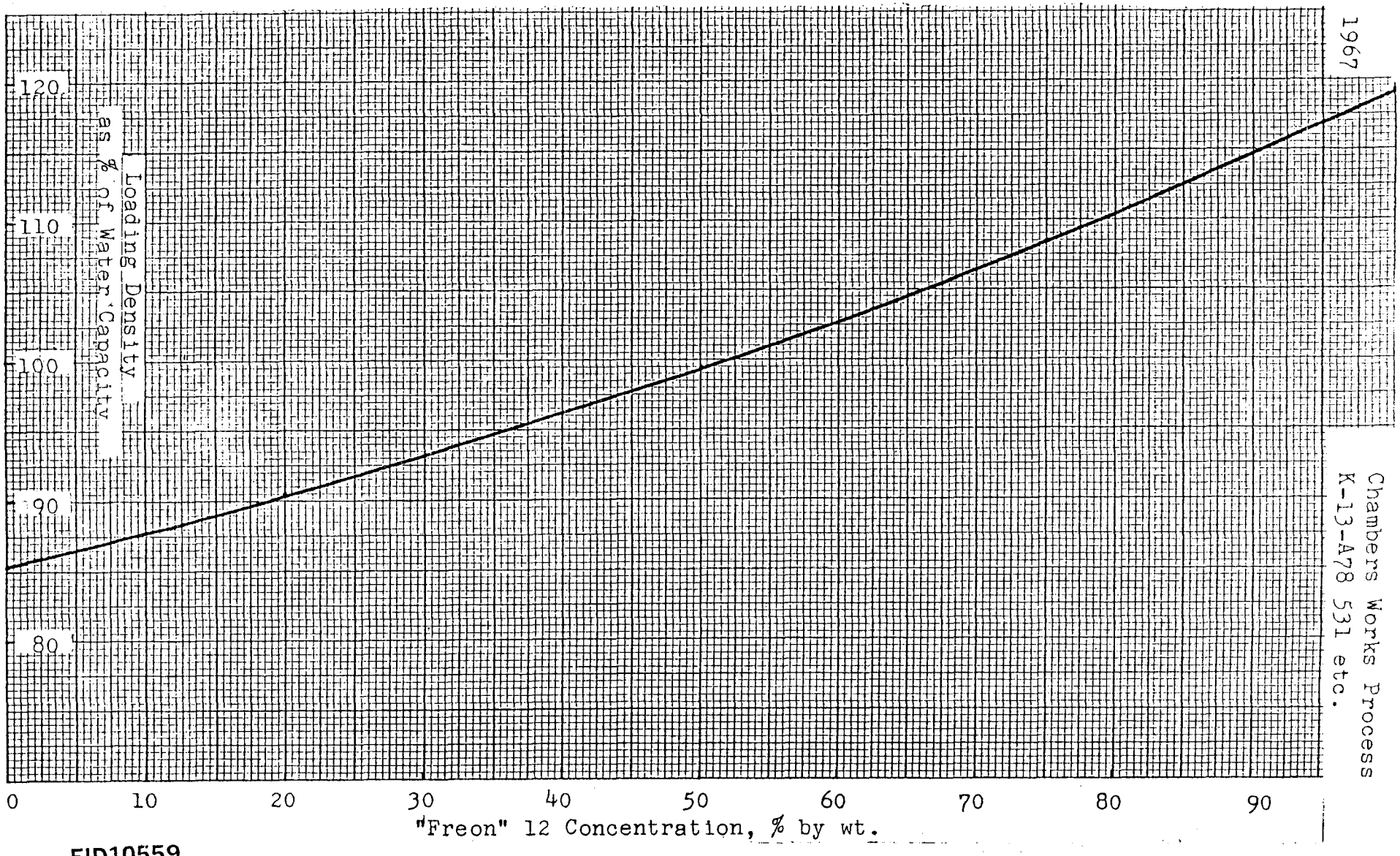
Figure 2

Loading Density - "Freon" 12/Vinyl Chloride Blends



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