



INTERNAL CORRESPONDENCE

CHEMICALS AND PLASTICS

P. O. BOX 8361, SOUTH CHARLESTON, WEST VIRGINIA 25303

To (Name) Mr. R. N. Wheeler
Division Bldg. 189
Location South Charleston

Date August 4, 1971

RECEIVED

Originating Dept. Group I Safety AUG 06 1971

Copy to Mr. R. O. Cavender
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Mr. R. J. Lindroth
Dr. W. R. Manning
Mr. J. R. Matthews
Mr. H. L. Robinson
Mr. R. W. Sesler
Mr. K. L. Topham
Mr. J. J. Walker

Subject Preparing Vinyl Chloride
Cars for Maintenance **R. N. WHEELER**

VC deck
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Dear Nick:

In accordance with your request I have examined two proposed methods for preparing the 48,000 gallon vinyl chloride tank cars for maintenance. The proposed methods are as follows:

Method I -

1. Unload car in usual manner by pressuring out contents with vinyl chloride vapor.
2. Strip pressure on car to 0 psig.
3. Pressurize car to 65 psig with nitrogen.
4. Vent pressure on car to atmospheric.

Method II -

1. Unload car by pressuring out contents with nitrogen. (Assume 65 psig maintained on car throughout unloading.)
2. Vent pressure on car to atmospheric.

Calculations for comparing these two methods were made for two different temperatures, 20° and 30°C. Additionally, two different conditions were assumed for Method II as follows:

Condition A - Vinyl chloride exerts its full equilibrium vapor pressure in the car throughout the unloading operation.

Condition B - Vinyl chloride exerts only one-half its equilibrium vapor in the car throughout the unloading operation.

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It is felt that these two conditions represent maximum and minimum limits for Method II and that the actual conditions would lie somewhere in between.

Results of the calculations are tabulated in the attachments. From these results we may conclude that Method I is superior to Method II for the following reasons:

1. Method I is basically safer because the gas in the car after pressurizing will not form a flammable mixture with any proportion of air. With Method II the gas in the car after unloading will form a flammable mixture with air in the proportion of one volume of gas to about 1/2 to three volumes of air (depending on prevailing conditions). Thus ignition of the gas during venting is not possible with Method I but is possible with Method II. Furthermore, external maintenance around the dome of the vented car should be safer with Method I because of the nonflammability of the gas remaining in the car.
2. The vinyl chloride loss with Method I is considerably less than that with Method II.
3. The vinyl chloride loss is constant for different temperatures with Method I but is adversely affected by higher temperatures (above 20°C) with Method II.
4. Air pollution is less with Method I because less vinyl chloride is lost to the air during venting.

Please call me if you have any questions.

Very truly yours,

M. E. Sutherland

MESutherland/map

Attachments

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RESULTS OF CALCULATIONS

	<u>Temp. of VCl in Car</u>	
	<u>20°C</u>	<u>30°C</u>
<u>Method I</u>		
Pounds VCl vapor in car after unloading	3240	4220
Pounds VCl vapor in car after stripping to 0 psig	1015	1015
% VCl in car after pressurizing with N ₂ to 65 psig	18.0	18.0
% VCl in car after venting to atmosphere	18.0	18.0
Pounds VCl lost:		
Vented to air	820	820
Left in car	195	195
Total	<u>1015</u>	<u>1015</u>
Volume of gas vented from car, std. cu.ft.	29000	29000
Volumes of Air/Volume of gas required for flammable mixture	Vented gas will not form flammable mixture with air in any proportion	
<u>Method II - Condition A</u>		
Pounds VCl vapor in car after unloading	3240	4220
% VCl in car after unloading	57.5	75.0
% VCl in car after venting to atmosphere	57.5	75.0
Pounds VCl lost:		
Vented to air	2660	3460
Left in car	580	760
Total	<u>3240</u>	<u>4220</u>
Volume of gas vented from car, std. cu.ft.	29000	29000
Volumes of Air/Volume of gas required for flammable mixture	1.9	2.8

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	<u>Temp. of VCl in Car</u>	
	<u>20°C</u>	<u>30°C</u>
<u>Method II - Condition B</u>		
Pounds VCl vapor in car after unloading	1620	2110
% VCl in car after unloading	28.8	37.5
% VCl in car after venting to atmosphere	28.8	37.5
Pounds VCl lost:		
Vented to air	1330	1730
Left in car	290	380
Total	<u>1620</u>	<u>2110</u>
Volume of gas vented from car, std. cu. ft.	29000	29000
Volumes of Air/Volume of gas required for flammable mixture	0.4	0.9