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FROM L. B. Crider	Avon Lake Technical Center	
W. J. Kroenke	Brecksville Research and Development	DATE THIS LETTER 12/17/73

SUBJECT

Determining Exposure of Personnel to Gaseous Vinyl Chloride.

This note is a response to our conversation of December 13, 1973. It reports my opinions about the possibility of using inorganic or organometallic detector systems for either detecting or providing a cumulative measure of exposure to VCl. Ideally, such systems would be in the form of a badge, similar to the ones we now wear to detect exposure to x-rays. But with one additional feature. This is the ability to show, probably by means of a color change, immediately when a person has been exposed to some significant quantity of VCl.

My conclusions and the discussion which follows are based on searching Chemical Abstracts up to July, 1972, and surveying the review literature pertaining to the formation of metal-vinyl compounds.

The scientific literature reports only a limited number of complexes or compounds formed between VCl and metal compounds which lead to the formation of stable metal-vinyl compounds. Of these only a few merit consideration in terms of the VCl detection problem, and they are discussed below:

(1) VCl-Organocyanocobaltate (III) Complexes

VCl reportedly reacts with an aqueous solution of $K_3[CO(CN)_5H]$ at room temperature.[1] The solution turns yellow with the formation of a 1/1 molar complex between VCl and the complex hydride. A yellow solid can be recovered from the solution.

Supposedly, the reaction proceeds as shown below:

$$[Co(CN)_5H]^{3-} + CH_2 = CHCl \longrightarrow$$

$$[Co(CN)_5(CHClCH_3)]^{3-} \longrightarrow [Co(CN)_5(CH_2 = CH_2)]^{3-}$$

$$+ HCl$$

The $K_3[CO(CN)_5H]$ solution is made by bubbling H_2 through an aqueous solution of $K_3[Co(CN)_5]$.

(2) VCl- Stannite Ion Reaction

VBr is reported to react under alkaline conditions at 0°C with

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hydroxystannite ions.[2]

$$CH_2=\underset{Br}{CH} + Na[Sn(OH)_3] \longrightarrow [CH_2=CHSn(OH)\,O] + NaBr + H_2O$$

I do not know if the vinyl stannoic acid is colored or if VCl would react the same way as VBr, but I would expect the same reaction.

(3) VCl - $Hg(OAc)_2$ Adducts

VCl reportedly forms a stable adduct with $Hg(OAc)_2$[3]. I do not know the details of this reaction, but the adduct can be isolated from a strongly ammoniacal mixture of alcohols using thin layer chromatography on silica gel.

I did find one other interesting report in the literature. It is in the form of a Russian Patent which claims that VCl reacts with aqueous $Ni(OH)_3$ to form acetaldehyde.[4] Since aldehydes can generate colors by reacting with appropriate organic compounds, the VCl-$Ni(OH)_3$ reaction might provide the basis for a VCl detection system.

In summary, the chemical literature only reports a limited chemistry between VCl and either inorganic or organometallic compounds. Especially as applicable to the development of a VCl detection system. Although I have provided a few promising leads, they need additional researching in the literature and/or in the laboratory before their true potential would be apparent.

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References

1 J. Kwiatek and J. K. Seyler, J. Organometallic Chem., 3, 421-32 (1965).
2 A Solerio, Gazz, Chim. ital., 85, 61 (1955).
3 D. Braun and G. Vorendohre, Z. Anal. Chem., 199, 37-41 (1963).
4 U.S.S.R. Patent, 107, 489, September 25, 1957.

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B.F. GOODRICH COMPANY TECHNICAL REPORT

CELLULAR PVC EXTRUSIONS CONTAINING SELECTED SMOKE RETARDANT ADDITIVES -- ANALYSIS OF RATE OF HEAT RELEASE COMBUSTION PERFORMANCE

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Summary

Impending changes in building codes are expected to establish restrictions on the burning performance of items not covered at present such as interior trim and furnishings. Our current expanded or cellular rigid Geon materials burn with evolution of copious smoke. This report covers attempts to reduce the smoke output on burning as seen by the Rate of Heat Release (RHR) combustibility apparatus. Addition of 5.0 phr of Dawsonite or Molybdenum Oxide reduce the smoke output by 43% and 56%, respectively.

Conclusions

1. Addition of 5.0 phr of Dawsonite or Molybdenum Oxide reduce the smoke output of Geon 85721 Nat. 020 by 43% and 56%, respectively, when evaluated in the Ohio State RHR combustibility apparatus.

2. At the same levels and conditions as above, these two additives reduce the heat output by 50% and 47%, respectively.

3. Under the conditions of the testing, it appears that some volatilization of molybdenum chloride or oxychloride may take place when molybdenum oxide is used as a smoke suppressor in Geon 85721 Nat. 020.

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