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AR226-1650

May 29, 1981

ANALYTICAL RESEARCH MONTHLY REPORT
MAY, 1981

SECTION I - NYLON-TEFLON®

A. FC-143 in Teflon® Products - M. A. Forte, A. M. Mokhtar

Objective: Establish the levels of FC-143 in Teflon® products and that which can be removed under conditions of use.

Status: FC-143 can be removed by aqueous extraction both in the Teflon® process at the wash reel and by water extraction of "I" products. The sodium salt form of FC-143 in "I" products is water soluble so this result was anticipated. The acid form of FC-143 is also sufficiently soluble to be partially removed from yarn after the acid bath.

The data in Table I show the quantity of FC-143 which can be removed from "I" product from a non-agitated extraction at around human body temperature.

TABLE I

WATER EXTRACTION OF "I" PRODUCTS @37°C

	<u>Time, Hrs.</u>	<u>ppm Removed</u>
I&T 9450 Denier	2	185
"	3	185
I&T 9450 Denier	64	180
I only 9450 Denier	64	130
I only 8100 Denier	64	130
I&T Kevlar®	64	180

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The amount extracted represents, on the average, 30-35% of the available FC-143. This is an indicator of the quantity which might be transferred on handling the yarn.

From the results in Table II, it appears that ~ 90% of FC-143 is removed from SM-3 regenerated yarn while ~ 50% is removed from SM-2 regenerated yarn.

TABLE II
FC-143 IN TEFLON® SPINNING

<u>Location</u>	<u>ppm in Wash Water</u>	<u>ppm in Regenerated Yarn</u>
SM-2	~ 1	490
SM-3	4	60

The reason for the difference is the amount of washing the yarn receives. SM-3 has a wash reel while SM-2 does not. Levels of FC-143 in combined sewer were ~ 1 ppm and ~ 2 ppm for SM-2 and 3, respectively.

Since yarns are heated to ~ 300-350°C in sintering and ~ 100°C in the induction dryer, it was desirable to know the thermal behavior of FC-143 under these conditions.

The data shown in Table III are the results of a thermal treatment study.

TABLE III
THE EFFECT OF HEAT
ON EXTRACTABILITY OF
FC-143 FROM YARN

<u>Time of Heat in Minutes</u>	<u>% FC-143 Remains on Yarn</u>		
	<u>150°C</u>	<u>175°C</u>	<u>200°C</u>
10	75	41	N/D
20	72	12	N/D
30	72	N/D	N/D
40	47	N/D	N/D

N/D Not Detectable < 5 ppm

These are, of course, three possible reasons for the disappearance of FC-143. They are: Entrapment, volatilization and decomposition. IR spectra taken of the off gases indicate FC-143 decomposes. If the material is removed by volatilization, there could exist an operator exposure potential. Therefore, air sampling was performed in the work areas. The results in Table IV indicate there is no exposure at the 15 ppb level.

TABLE IV

<u>Date</u>	<u>Location</u>	<u>Level PPB V/V</u>
5/11/81	"I" Production Kevlar® Oven Exit	ND < 15
"	" " " " Entrance	"
"	" " Kevlar® North Vent	"
"	" Desk North end of Machine	"
"	" Product not running	"
5/8/81	SM-2 Wash Rolls	"
	SM-3 Wash Reel Face	"
5/7/81	SM-3 177°C roll	"
	" 371°C roll	"
	SM-2 193°C roll	"
	" 371°C roll	"

The exhaust air from the spinning machines is water scrubbed before it goes up the stack. If the FC-143 is volatilized off of yarn, it would collect in scrubber water. Based on water volume and air flow, there is less than 0.006 PPB FC-143 in the exhaust air.

Haskell Laboratory has set a 0.5 ppb provisional limit in air for FC-143. So, while it appears that there is none in the air in the spinning area, our limit of detection is 15 ppb for the air sampling done in the "I" production area. To guarantee we are meeting the 0.5 ppb limit, we plan to have a limited number of air samples quantitated at PPD in Wilmington, Delaware. Their electron capture detector is ~ 100X more sensitive than ours.

B. Teflon® Cost Reduction - H. P. Tannenbaum

" Assist in ?

Objective: Reduce Teflon® cost and conserve energy by shortening yarn bleaching cycles.

Status: The area continues to operate with new bath conditions to minimize residual zinc in yarn. This has resulted in reducing the bleaching time to 72 hours, for yarns with ~ 25 ppm zinc, from ~ 120 hours previously required to obtain an equivalent whiteness. Additional reduction in residual zinc to 10-15 ppm, characteristic of pre-1978 production, is necessary to obtain a 48-hour bleaching cycle. A method for determining residual zinc in yarn by x-ray has been developed to assist process in reducing and controlling yarn zinc levels.

C. Potassium Bromide Specification - E. H. Dettmer

Objective: Evaluate two proposed suppliers of potassium bromide against specification limits and the present material supplied by Dow Chemical Co.

Status: Analysis of potassium bromide from Dow Chemical Co., AmeriBrom, Inc., and Morton Chemical Co. show the materials to be chemically equivalent. The proposed suppliers are recommended as alternate vendors of KBr. (See table attached)

May 29, 1981

POTASSIUM BROMIDECHARACTERIZATION

Specification	Limit		Dow Chemical Co.	AmeriBrom, Inc.	Morton Chemical Co.
	Mfn.	Max.			
Assay, % (as KBr)	98.5	101	99.7	100.1	100.1
pH - 5% Soln.	-	-	6.73	6.48	5.45
Chloride, ppm		1000	109	12	12
Iron, ppm		5	3	2	2
Manganese, ppm		5	1	1	1
Calcium, ppm		100	12	1	3
Sulfates, ppm (SO ₄)		-	18	20	20
Acid Insolubles, ppm		-	82	72	78
Total Insolubles, ppm		-	89	80	85

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