A DUAL MEETING

PLASTICS IN PACKAGING

National Technical Conference
November 13-15 1978
Hyatt Regency O'Hare - Chicago, Illinois

ACRYLONITRILE

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1978 National Technical Conference

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PLASTICS IN PACKAGING

SESSION 7

The Public Interest And You

Moderator: R. H. Belden
Allied Chemical Corporation

Panel Discussion

Papers Not Available

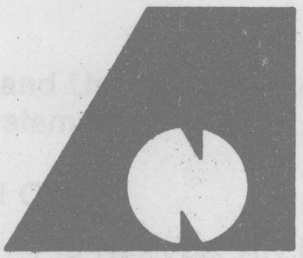
The Essentiality of Plastics
J. L. Isaacs
General Electric Co.

How To Deal With Legislators
M. R. Haley
The Martin Haley Companies

How To Deal With Government Agencies
R. Tiernan
Keller and Heckman

Corporate Involvement in The Public Interest
W. J. McCarville
Monsanto Co.

Resources Available in The Public Interest
R. H. Belden
Allied Chemical Corporation



ACRYLONITRILE

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原书模糊

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Plastic Packaging Materials

Moderator: R. Greisbach
Oscar Mayer & Company

SESSION 2

Packaging Applications & Techniques

Moderator: H. Landfield
Abbott Laboratories

SESSION 3

Plastic Packaging Materials

Moderator: R. Greisbach
Oscar Mayer & Company

SESSION 4

Diffusion and Migration in Plastic Materials

Moderator: V. T. Stannett
North Carolina State University

SESSION 5

Manufacturing Processes and Techniques

Moderator: R. Schoeller
Sarcol Inc.

SESSION 6

Packaging Applications and Techniques

Moderator: A. A. Schoengood
Plastics Engineering

SESSION 8

Analysis of Plastics & Packaging Materials

Moderator: A. Riga
Lubrizol Corporation

SESSION 9

Manufacturing Processes and Techniques

Moderator: D. Reber
Cincinnati Milacron

SESSION 10

Packaging Applications and Techniques

Moderator: H. Tschappat
Elgin Community College

SESSION 11

Manufacturing Processes and Techniques

Moderator: D. Reber
Cincinnati Milacron

SESSION 12

Waste Utilization and Recycling of Plastics

Moderator: L. Hawkins
Plastics Institute of America

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General Electric Co.

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Borg Warner Chemicals

SESSION 3

Moderator: J. C. Haarsma
U. S. Gypsum Co.

PERFORMANCE CONTRIBUTIONS OF NYLON 6 LAYERS IN MULTI-LAYER PACKAGES

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Introduction

Nylon has been used for almost twenty years as a packaging material. Recent developments in materials, processing and applications technology have greatly increased the potential value of nylon to package designers. This paper will review several of these developments and comment on their significance to the packaging industry.

Nylon brings several very valuable properties to a package: mechanical toughness, impact resistance, abrasion resistance, barrier to oxygen, other gasses, odors, flavors and petroleum. But the major weakness of nylon--poor resistance to permeation by water--requires that for most applications, nylon be used as a composite construction with other materials. Much of the recently developed technology relates to optimum materials to combine with nylon.

MATERIALS

Properties of Nylon 6

Chart I lists properties which may be considered representable for nylon layers.

Adhesion

Traditional nylon laminates have used adhesive laminations and extrusion laminations to achieve acceptable adhesion between layers of composite constructions. Nylon has very poor adhesion to polypropylene and polyethylenes.

CHART I

Nylon 6 Film Properties (1 mil @ 50% RH and 72°F)

I PHYSICAL AND MECHANICAL		
Melting Point, °F	424-428	Hot Stage Microscope
Specific Gravity	1.13	ASTM D 1505-60T
Yield, $in^2/lb/mil$	24,500	
Tensile Strength, psi	9,000-12,000 MD 10,000-13,000 TD	ASTM D 882-61T
Elongation, %	350-400 MD 400-500 TD	
Tensile Modulus, psi	90,000-110,000 MD 105,000-125,000 TD	ASTM D 1530-58T
Tear Strength, Initial (Graves), gm/mil	500-600 MD 470-520 TD	ASTM D 1004-61
Tear Strength, Propagated (Elmendorf), gm	50-90 MD 50-70 TD	ASTM D 1922-61T
Burst Strength	Does Not Burst (16-18 psi)	Mullen
Impact Strength (Ave) kg - cm	4.4	T.M. Long machine, 1/2" steel ball, velocity 270 ft/sec
Abrasion Resistance, mg (weight loss/1000 cycles)	2.7-2.9	Tabor abrader CS-10F wheel, 1000 gm per wheel
Flexibility	>250,000 MD >250,000 TD	MIT Fold Endurance Tester

II	THERMAL		
	Melting Point, °F	424-428	Hot Stage Microscope
	Thermal Coefficient of Linear Expansion per °F	4.6×10^{-5} (Dry)	ASTM D 696-44
	Coefficient of Thermal Conductivity - Btu/hr/ft^2/°F/in	1.7 (Dry)	
	Specific Heat - Btu/lb - °F	.4 (Dry)	
	Cold Brittleness, °F	< -75	Mashland (Com. Std. 192-53, Sec. 4.9)
	Service Temp., °F Continuous Short-time (15 min)	 ~200 ~350	
	Dimensional Change (Shrinkage), %	< 2 MD < 2 TD	ASTM D 1204-45 Exposed 30 min @ 300°F in air circulating oven
III	OPTICAL		
	Haze, %	1.5-4.5	ASTM D 1003-61
	Gloss	70-100	20% Gardner Gloss-Meter
IV	BARRIER (DRY)		
	O_2	2.6 cc/mil/100 in^2/24 hr/atm - 73°F	Linde Permeability Cell
	N_2	0.9	
	CO_2	9.7	
	Odors, Flavors	Excellent	
V	MOISTURE		
	Water Vapor Transmission Rate	0.6 gm/100 in^2/24 hr - 73°F and 50% RH	Pouch Method
	Water Resistance	Good to Poor	E 96
	High Relative Humidity	Good to Poor	D 756
	Water Absorption, 24 hrs, %	9.5	
VI	LIQUID PERMEABILITY - 72°F & 50% RH		
	Genesolv® (Trichlorotrifluoroethylene)	0.00 gm/100 in^2/24 hr	Pouch Method
	Vegetable Oil	0.00	
	Motor Oil	0.00	
	Trichloroethylene	0.05	
VII	CHEMICAL RESISTANCE		
	Strong Acids	Poor	D-543
	Strong Alkalies	Good	D-543
	Grease & Oils	Good	D-722
	Organic Solvents	Good	D-543
	Water	Good to Poor	E-96
	High Relative Humidity	Good to Poor	D-756
VIII	RADIATION		
	Sunlight	Fair to Good	D-1435