Subject Index

A

composites, 13, 20

Acrylonitrile (AN) as oxygen barrier, 18 Adhesion, loss of, caused by wrong wetting agents, 93 Adhesives, 6, 69 application of, 96, 98 aqueous, 93 blistering of, 95 critical surface tensions (CST), 90, 94-96 graph, 95 illustration, 96 table, 94 EPA-complying flexible laminating, 89-91 illustration, 91 table, 91 equipment, 96 hot melt, graph, 72 rewinding, 97 tie layer adhesives, table, 19 Adsorption chromatography (see Chromatography, types of) Air drying, 24	high-barrier coextrusions, 13-23 high-barrier composites, 6-12 high-barrier copolymers, 6, 7 compared with Saran copolymers, 7 high-barrier resins moisture and oxygen barriers, 17-19 permeation rates graphs, 21, 57 tables, 17, 59 previous use limited by imbalance of properties, 14 metallized films (see Metallized packaging) PVDC film, unique in offering high barrier to oxygen and moisture permeation, tables, 8, 9 resins, 13 test methods, for permeant vapors, 49-62 apparatus, diagrams, 51, 53 Blistering, in adhesive coatings, 95
Aroma barrier (see Barriers) Aseptic packaging (see Packaging) ASTM standard D 2578-67(1979): 90	C
P	Calorimetry, differential scanning (DSC), in applying films for flexible packaging, 75
Barriers, 6 acrylonitrile (AN) as oxygen bar- rier, 18	Chromatography, gas, used to analyze membrane permeability, 51
characteristics and properties, 7-10, 50 tables, 8-10	Chromatography, high-performance liquid (HPLC), flexible packaging applications, 63-67

Chromatography, types of, 64, 65
diagram, 65
Coatings, 69, 93
laminating adhesives, EPA-complying, 89
oxidation, 92, 93
Coextrusions, 13-23
Properties, tables, 20
Copolymers, 6, 18
Critical surface tensions of wetting of substrates, tables, 91, 92
Crystallinity (see Packaging materials)

D

Differential scanning calorimetry (DSC) (see Calorimetry)
Drying, air, 24
adhesives, 97

\mathbf{E}

Ethylene vinyl alcohol (EVOH)
barrier decline when saturated
with moisture, 19
permeation rates, 17, 21
illustration, 21
table, 17
Exclusion chromatography (see
Chromatography)

F

Flexible packaging (see also Packaging materials), 1, 2, 6, 13, 24, 37, 50, 75
differential scanning calorimetry, value in selecting films, 75
flexible laminating adhesives, EPA-complying, 89
metallized films, 2
versus Saran copolymers, 7

sterilization with hydrogen peroxide vapors, 37

Foaming, caused by wrong types of wetting agents, 93

Food, aseptic packaging, 24

G

Gas transmission rate (GTR) (see also Oxygen permeation), 7-10 table, 9 GTR (see Gas transmission rate)

H HBPVDC (see High-barrier PVDC copolymer film) Heat seal, 13 High-barrier PVDC copolymer film (HBPVDC) for lamination, Properties, tables, 8-10 High-performance liquid chromatography (HPLC), 63, 65 applications, 66, 67 as tool for flexible packaging material evaluation, 64 diagram, 65 Homopolymers, HPLC evaluation as packaging material, 67 graph, 67 Hot fill, 13 HPLC (see High-performance liquid chromatography) Hydrogen peroxide (see also Packaging, aseptic; Packaging materials) as a sterilant for aseptic packag-

rials)
as a sterilant for aseptic packaging, 37-38, 42, 43
graph, 43
removal from food packaging material, 24-27, 47, 48

diagram, 26 sporicidal properties, 47-48

I	Moisture sensitivity (see Water vapor transmission rate)
Immersion, in aseptic packaging of food, 24	Molecular weight profiling, 63
Ion-exchange chromatography (see Chromatography, types of)	o
Isostatic methods for determining permeability of organic vapors, 49-62 apparatus, diagram, 53 toluene vapor procedure, graphs, 60-62	Oxidation, in flexible laminating adhesives, 92 table, 92 Oxygen permeation, 7-10, 13 graph, 21
L	P
Laminates, 2 adhesives, 89, 97 tie layers, 19 table, 19 application of size-exclusion chromatography, 68 high-barrier PVDC, 6, 7 layer resins, 19 table, 19 physical properties, table, 8 plastic barrier materials, applications, 11-12 Laminating adhesives (see Adhe-	Packaging aseptic, with hydrogen peroxide 24-27, 33 diagram, 26 flexible, 2, 13, 37, 75 high-performance liquid chroma tography, applications, 66, 66 graph, 67 metallized films end uses and construction, 4 light-screening characteristics 3 use by food, drug, and indus trial packagers, 1
sives) Liquid chromatography (see High- performance liquid chroma- tography)	Packaging materials (see also Barriers; Packaging; Resins), 2, 3 24 barrier properties, 3, 11, 17 crystallinity, 87 evaluation of, using high-performance.
M	mance liquid chromatogra-
Medical packaging, 6 Metallized films versus foil, 2 Metallized packaging, 1-4 end uses, table, 4 structure, table, 3 Microorganisms, on polyethylene exposed to hydrogen peroxide, 37	phy, 66 coatings and adhesives, 69 differential scanning calorime- try (DSC) for analysis of ther- moplastic materials, 88 for laminate structures, 68-69 homopolymers, 67 polyester, 68

Misting, 24

polyester, 68

melt point, 76, 85, 87

Packaging materials (cont.)	Polyethylene, additives, illustration,
sterilization, with hydrogen perox-	73
ide, 25	as test material for hydrogen per-
spores, effectiveness on, 42-46	oxide sterilization, 39
graphs, 43-46	Polymer chemistry laboratories as
tables, 45, 46	producers of metallized film,
temperature during removal of	2
hydrogen peroxide, 28-34	Polymer membranes, diffusion of or-
illustration, 29	ganic vapors, 49
tables, 31, 32, 34, 35	Polypropylene (see Resins)
temperature of drying air during	Polyurethane, 6
removal of hydrogen perox-	Polyvinylidene chloride (PVDC)
ide, 33, 35	coatings, 6, 93
table, 35	as oxygen and moisture barriers,
test methods, need for, 73	18
HPLC, summary of packaging	
usages, 74	0
thermal analysis of, 75-88	Q
graphs, 77, 79-84, 86	Quasi-isostatic methods (see Iso-
polyethylene, graphs, 77, 78	static methods; Permeability
tables, 85, 87	test methods)
Partition chromatography (see Chro-	
matography, types of)	R
Perkin-Elmer Thermal Analysis	K
Data Station (TADS), 76	Residues, from hydrogen peroxide
Permeability (see also Isostatic	sterilization, 24
methods), 9, 17, 18, 50, 56	Resins (see also Barriers, high-bar-
analytical, based on gas chromato-	rier resins), 18-19, 87
graphic procedure, 54	graph, 71
tables, 9, 10, 17, 18, 56	layer resins (see Laminates)
test methods, 51-56	polycarbonate (see Polycarbonate
apparatus, diagrams, 51, 53	resins)
effect of humidity on toluene va-	table, 87
por, graph, 57	tie layers, 19
table, 56	table, 19
Peroxide (see Hydrogen peroxide)	Retort pouches, 6, 10, 13
Pharmaceutical packaging, 6	table, 10
Plastic film, 6, 20, 75	
table, 20	S
Polycarbonate resins, 13, 14-16	-
barrier resins, 17, 23	Saran polymers, 6
tables, 15, 16	Seals, 6
Polyester, 68, 70	Separation methods (see Chroma-
graph, 70	tography)

Shrink-stabilized packaging, 6 Size exclusion (gel filtration, gel perchromatography meation) (see Chromatography, types V of; Laminates, application of size exclusion chromatography) Solvents, use in adhesives, 93 Sporicide, hydrogen peroxide as a sterilant, 42-47 absorbed by polyethylene surface, 37 graphs, 43-45 tables, 42, 45-47 Spraying, in aseptic packaging of food, 24 W Sterilization, in aseptic food packaging, 24-27, 30-35 diagram, 26 tables, 31, 32, 34 7-10 using hydrogen peroxide vapors, tables, 9, 10 37 - 38Wetting test system, 39, 40, 41 agents, 93-96 diagram, 40 diagram, 96 Surface tension of adhesives, 93 graph, 95 Surfactants (see Wetting agents) table, 94 T

Temperature, in aseptic food packaging, 24

Thermal analysis by differential scanning calorimetry, 75

Vacuum metallizing technology, 1, 2 Vapors, organic, methods for determining permeability, 49, 52 analysis based on gas chromatography detection system, 54 Vinyl chloride copolymers (see Polyvinylidene chloride) Viscosity of adhesives, 94

Water vapor transmission rate (WVTR), of lamination film, tension, polyethylene and polypropylene films, ASTM D 2578-67(1979), 90 WVTR (see Water vapor transmission rate)