## Index

*Note:* Page numbers followed by f indicate figures and t indicate tables.

A	ASTM International's Subcommittee on
Acetyl tributyl citrate (ATBC), 19-20, 20f	Recycled Plastics, 73
Acrylonitrile-butadiene-styrene (ABS),	ATBC. See Acetyl tributyl citrate (ATBC)
98–100	Atmospheric pressure chemical ionisation
Active and intelligent materials (AIMs), 113	(APCI), 12
active barrier films, 194	Atmospheric pressure photoionisation
anticounterfeiting solutions, 194	(APPI), 12
antimicrobial activity, 184–185	Australia New Zealand Food Authority
antimicrobial packaging, 191–192	(ANZFA), 126
avoiding food wastage, 185	Azobisisobutyronitrile (AIBN), 23-24
CFR, 191, 196–197	
DGSANCO, 191–192	В
EFSA, 190–191	
FD&C Act, 195, 196–197	Barrier coatings, 165
global market for, 185–186, 186f	Beer's law, 11
growth drivers for, 185–186, 187f	Benzophenone, 26f
HACCP, 183–184	BfR. See German Federal Institute for Risk
Japanese regulations, 197	Assessment
market growth of, 185–186, 186 <i>f</i>	2,2-Bis[4-hydroxyphenyl]propane bis[2,3-
odor absorbers, 193	epoxypropyl] ether (BADGE),
oxygen absorbers, 192, 193	17–18
Regulation (EC) No. 10/2011, 187, 190	Bisphenol A (BPA), 17–18, 68, 71
Regulation (EC) No. 450/2009, 187, 189	
Regulation (EC) No. 1935/2004, 187,	C
188–189	CAN. See Andean Community of Nations
silver, 195	(CAN)
US FDA regulations, 191, 195, 196-197	Canada
AIMs. See Active and intelligent materials	food contact rubber, 154
(AIMs)	HPFB (see Health Products and Food
Alicyclic compounds, 16–17	Branch (HPFB))
1-Allyl-3-methylimidazolium chloride	nanomaterial, 70
(AmimCl), 127–128	regenerated cellulose, 119
Aluminum, 165–167	Canadian Food Inspection Agency
Amosorb, 193	(CFIA), 79
Andean Community of Nations	food contact rubber, 154
(CAN), 122	regenerated cellulose, 119
Anti-Drug Abuse Act of 1986, 67–68	Carbon black, 49, 50t
Antimicrobial films, 185–186	Cellophane, 109, 118
Antimicrobial packaging, 191-192	CFIA. See Canadian Food Inspection Agency
Antimony trioxide (Sb <sub>2</sub> O <sub>3</sub> ), 24	(CFIA)
Aromatic amines, 48	Charged aerosol detector (CAD), 13

Chemical Abstract Service reference number	FCS, 21 CFR 170-189, 162, 163-164
(CASRN), 110, 125	food contact rubber, 151-154
Chemical hazards, 68	indirect food additives, 50-51
Chemiluminescent nitrogen (CLN)	migration testing, 55-64
detector, 12	multilaminates (see Multilaminate
Chimassorb® 81, 22–23, 22f	materials)
China	paper, 21 CFR Part 176.170,
EVA polymer, 101	170–171, 201
EVOH polymer, 103	regenerated cellulose, 118
food contact rubber, 155–156, 156t	resinous and polymeric coatings
HDPE, 85	(see Resinous and polymeric
LDPE, 85	coatings)
LLDPEs, 87	Colombian Ministry of Health and Social
paper and board, regulation of, 208-210	Protection, 122-123
PB-1 (see Polybutene-1 (PB-1))	Colorants, 48, 49t
plastics, regulation of, 80–81	Common Market of the South
PMP, 92	EVA polymer, 101
polyamides, 98	EVOH polymer, 103
polycarbonate, 100–101	HDPE, 86
polyesters (see Polyesters)	LDPE, 85
polypropylene, 88, 89	LLDPE resins, 87
polystyrene, 97	paper and board, regulation of, 203-204
PVC, 95	PB-1 (see Polybutene-1 (PB-1))
PVDC, 96	plastics, regulation of, 82-83
regenerated cellulose, 124-125	PMP, 92
Chinese Food Safety Standard, 66	polyamides, 98
Coatings	polycarbonate, 100–101
aluminum and steel, 165–167	polyesters (see Polyesters)
architectural coatings, 165–167	polypropylene, 88, 89
barrier coatings, 165	polystyrene, 97
21 CFR 175.300, 53, 55t, 56t	PVC, 95
21 CFR 175 and 176, regulations in, 165,	PVDC, 96
165 <i>t</i>	regenerated cellulose, 119–122
effective FCNs, 171–172, 171 <i>t</i>	Treaty of Asunción, 203
inorganic coating, 165, 167	Confederation of European Paper Industries
nonbarrier coatings, 165	(CEPI), 206
organic coating, 165, 167	Copolyamides (COPAs), 142
paper, 21 CFR Part 176.170, 170–171	Copolyesters (COPEs), 142
product coatings, 165–167	Council of Europe (CoE) resolutions
resinous and polymeric coatings	colorants, 49–50
(see Resinous and polymeric	food contact rubbers, 149–150
coatings)	paper and board, 206
special purpose coatings, 165–167	silicones, 150–151
water/solvent-based, 165	Crystallised PET (CPET), 16–17
Code of Federal Regulations (CFRs), 78–79	Cumulative estimated daily intake (CEDI),
active and intelligent materials, 191,	196–197
196–197	Czech Republic
coatings, 165, 165 <i>t</i>	food contact rubbers, 145
end tests, 52–54	paper and board, regulation of, 207

D	European Normalization Organization
Derivatisation reactions, 8-9, 8f	(CEN), 47, 47t
Di(2-ethylhexyl) adipate (DEHA), 19–20, 20f	European Union (EU)
Dietary concentration (DC), 163	AIMs (see Active and intelligent materials
Di-2-(ethylhexyl) phthalate (DEHP), 20–21	(AIMs))
Di-isobutyl phthalate (DIBP), 19–20	color release, 49-50, 51t
Di-isodecyl phthalate (DIDP), 20–21	EU Project No. SMT-CT98-7513, 30
Di-isononyl phthalate (DINP), 20–21	EVA polymer, 101
Di-isopropyl naphthalene (DIPN), 20, 21f	EVOH polymer, 102
Di-n-butyl phthalate (DBP), 19–20, 20f	food contact rubbers, 143, 144
Diode array detectors (DADs), 11	HDPE, 85
Direct food additive, 195, 196–197	LDPE, 85
Dutch legislation, 47–48	LLDPEs, 87
carbon black, 49, 50t	overall migration testing, 44-46, 44t, 45t
colorants, 48, 49 <i>t</i>	paper and board, regulation of, 205-207
Colorants, 40, 47t	PB-1 (see Polybutene-1 (PB-1))
	plastics, regulation of, 70, 79
E	PMP, 92
Effective barrier (EB), 177–178	polyamides, 98
EFSA. See European Food Safety Authority	polycarbonate, 100–101
(EFSA)	polyesters (see Polyesters)
Electrochemical impedance spectroscopy	polypropylene, 88, 89
(EIS), 28–29	polystyrene, 97
Electrospray ionisation (ESI), 12	purity requirements (see Purity
End tests	requirements)
coatings, 53, 55t, 56t	PVC, 95
paper, 52, 53t, 56t	PVDC, 96
plastics, 53–54	regenerated cellulose, 112–115
Epoxidised soybean oil (ESBO), 20–21	residual content determination, 46–47, 47
Estimated daily intake (EDI), 163	sensorial evaluation, 47–48
Ethylene-vinyl acetate (EVA), 101	specific migration testing, 46
Ethylene-vinyl acetate (E VA), 101  Ethylene-vinyl acetate-vinyl alcohol,	EVA. See Ethylene-vinyl acetate (EVA)
102–103	Evaporative light scattering detectors
Ethylene-vinyl alcohol (EVOH), 102–103	(ELSDs), 13
Ethylene vinyl hydroxide (EVOH), 30–31	EVOH. See Ethylene-vinyl alcohol (EVOH)
2-Ethylhexyl-4-dimethylaminobenzoate	Expandable polystyrene (EPS), 96–97
(EHA), 25, 26 <i>f</i>	External calibration curves, 5–6, 6f
EU. See European Union (EU)	External campitation curves, 5–0, of
	F
European Economic Area (EEA), 117	FCAs. See Food contact articles (FCAs)
European Environment and Health	
Information System (ENHIS), 68	FCNs. See Food contact notifications (FCNs)
European Food Safety Authority (EFSA), 68, 71	FDA. See Food and Drug Administration (FDA)
active and intelligent materials, 190-191	Federal Food, Drug and Cosmetic Act
food contact rubber, 144	(FFDCA)
paper and board, 207	active and intelligent materials, 195,
regenerated cellulose, 113-114	196–197
European Free Trade Association (EFTA),	FCS, definition of, 162
117–118	food additive, definition of, 162, 201

Federal Law on Food and Commodities,	rubbers (see Food contact rubbers)
118	structural components, 161
FFDCA. See Federal Food, Drug and Cosmetic Act (FFDCA)	Food contact notifications (FCNs), 51, 78–79
Fick's first law, 29	active and intelligent materials, 196-197
Fick's second law, 29, 30	coatings, 171–172, 171 <i>t</i>
Finite element methods (FEMs), 30–31	FCSs, 162, 163
Flame ionisation (FID), 11	multilaminate materials, 173t, 175t, 177
Flavor scalping, 165	paper and board, 202
Fluorescence (FL) detectors, 11–12	regenerated cellulose, 118
Food additive petition (FAP),	rubber, 152
78–79, 162	Food contact rubbers
Food additives	Belgium, 145
antimicrobial substances, 191–192	Canadian FCMs' regulation, 154
definition, 162, 201	Chinese requirements, 155–156, 156t
FCN program, 196–197	CoE resolutions, 149–150
FD&C Act, 195, 196–197	Czech Republic, 145
Regulation (EC) No. 1129/2001, 188	definition of, 141
Food Additives Amendment of	Directive 93/11/EEC, 143–144
1958, 201	EFSA report, 144
Food and Drug Administration (FDA),	EU Regulation 1935/2004, 143, 144
78–79	examples of, 141, 142 <i>t</i>
active and intelligent materials, 191, 195,	FDA requirements, 151–154
196–197	France, 144, 145–146
application and test conditions, 63, 64 <i>t</i>	Germany, 146, 147
chemical guidance document, 64	Italy, 147
EVA polymer, 101	Japanese requirements, 154–155
EVA polymer, 101 EVOH polymer, 102	Mercosur resolutions, 154
	Netherlands, 46, 144–145, 147
food contact rubber, 151–154	silicone (see Silicone rubber)
HDPE, 85	
LDPE, 84	Slovak Republic, 147
LLDPEs, 86	Spain, 147–148
paper and board, regulation of, 201–202	Taiwanese requirements, 156
PB-1 (see Polybutene-1 (PB-1))	vulcanized rubber, formulations for, 141
PMP, 92	Food contact substance (FCS), 69–70
polyamides, 98	21 CFR 170–189, 162, 163–164
polycarbonate, 100–101	definition of, 162
polyesters (see Polyesters)	FCN process, 162, 163
polypropylene, 87, 88	migration modeling, 179
polystyrene, 97	FOODMIGROSURE, 33
PVC, 95	Food Regulation Agreement (Australia), 126
PVDC, 96	Food Safety Basic Act
regenerated cellulose, 118	food contact rubber, 154–155
simulants, 63, 64t	regenerated cellulose, 123
Food contact articles (FCAs)	Food Safety Law, 66, 124
base substrate, 163	Food Sanitation Act (FSA)
definition, 161	plastics, regulation of, 81–82
migration modeling, 179	regenerated cellulose, 123
regulatory status of, 164–165	Food simulants, 44–45

Food Standards Australia New Zealand	GRAS. See Generally recognized as safe
(FSANZ), 126	(GRAS)
EVA polymer, 101	Greece, 207
EVOH polymer, 103	
HDPE, 85	Н
LDPE, 85	
LLDPEs, 87	Hazard Analysis and Critical Control Points
PB-1 (see Polybutene-1 (PB-1))	(HACCP), 183–184 HB 307, 15
plastics, regulation of, 80	HDPE. See High-density polyethylene
PMP, 92	
polyamides, 98	(HDPE) Health Canada, 71, 154
polycarbonate, 100–101	Health Products and Food Branch
polyesters (see Polyesters)	(HPFB), 79
polypropylene, 88, 89	EVA polymer, 101
polystyrene, 97	EVOH polymer, 102
PVC, 95	HDPE, 85
PVDC, 96	LDPE, 84
FRA. See Food Regulation Agreement	LLDPEs, 87
(Australia)	PB-1 (see Polybutene-1 (PB-1))
FSANZ. See Food Standards Australia New	PMP, 92
Zealand (FSANZ)	polyamides, 98
Functional barrier (FB), 177–179	polycarbonate, 100–101
	polyesters (see Polyesters)
	polypropylene, 88, 89
$\mathbf{G}$	polystyrene, 97
Gas chromatography (GC), 7-8, 7f	PVC, 95
Gaussian molecular weight distribution,	PVDC, 96
15–16	High-density polyethylene (HDPE), 85–86
Generally recognized as safe (GRAS), 51,	High-impact polystyrene (HIPS), 96–97
78–79	High-performance liquid chromatography
active and intelligent materials,	(HPLC), 9–10
196–197	Housewares, 106–107
paper and board, 201-202	HPFB. See Health Products and Food Branch
rubber, 153	(HPFB)
German Federal Institute for Risk	Hygiene Package of 2004, 183–184
Assessment, 73	23,81010 2 0011180 01 200 1, 100 10 1
paper and board, 207	T
regenerated cellulose, 115-117	I
silicone rubber, 148, 149	Indirect food additive, 195, 196–197
German Federal Ministry of Food,	Inductively coupled plasma atomic emission
Agriculture and Consumer Protection	spectrometry (ICP-AES), 28
(BMELV), 73	Inductively coupled plasma (ICP)
German Food, Consumer Articles and Feed	technique, 13
Code, 115	Institute for Health and Consumer Protection
Glass cells, 4–5, 5f	(IHCP), 113
Good manufacturing practices (GMPs),	INVIMA. See National Institute of Drug and
7–8, 43–44	Food Surveillance
paper and board, 203	Irgacure <sup>®</sup> 184, 26, 27 <i>f</i>
regenerated cellulose, 113, 114	Irgacure <sup>®</sup> 651, 26, 27 <i>f</i>

216 Index

Irganox® 245, 22–23, 22f  Italy food contact rubbers, 147 paper and board, regulation of, 207 regenerated cellulose, 117  ITX chemical structure, 25, 26f	Limit of detection (LOD), 13–14 Limit of quantification (LOQ), 13–14 Linear low-density polyethylene (LLDPE), 28–29, 86–87 Liquid chromatography, 9–10, 13 Low-density polyethylene (LDPE), 84–85 Low limits of detection (LOQ), 8
J	
Japan active and intelligent materials, 197 EVA polymer, 101 EVOH polymer, 103 food contact rubbers, 154–155 HDPE, 86 LDPE, 85 LLDPEs, 87 paper and board, regulation of, 208 PB-1 (see Polybutene-1 (PB-1)) plastics, regulation of, 81–82 PMP, 92 polyamides, 98 polycarbonate, 100–101 polyesters (see Polyesters) polypropylene, 88, 89 polystyrene, 97 PVC, 95 PVDC, 96 regenerated cellulose, 123–124 Japan External Trade Organization (JETRO) food contact rubber, 155	M Mass spectrometer (MS), 10–11 Melamine/formaldehyde (MF), 103–104 MERCOSUR. See Common Market of the South Methylation, 8–9, 8f MHLW. See Ministry of Health, Labour and Welfare (Japan) MIGRATEST© EXP, 32–33 Migration modeling, 179–180 Migration testing analytes separation, 8–10 analytical test methods, 8 CFR 21, 55–64 FCN, 55–62 ionisation and detection of analytes, 10–13 mass transport processes, 29 metal boxes, 28 overall migration (OM) testing, 14–15 packaging stability, 28–29 photoinitiators, 25–26
regenerated cellulose, 123  Japan Hygienic Association of Vinylidene Chloride (JHAVDC), 81–82	plastics (see Plastics) primary aromatic amines, 27–28 semi-quantitative determination, 7–8
Japan Hygienic Olefin and Styrene Plastics Association (JHOSPA), 81–82	solution preparation, 4–5 specific determination, 5–6 Mineral oil aromatic hydrocarbons
Japan Hygienic PVC Association (JHPA), 81–82 Japan Paper Association (JPA), 208	(MOAH), 207 Mineral oil saturated hydrocarbons
K	(MOSH), 207 Ministry of Health, Labour and Welfare
Kinetic experiment, 32, 33f  Korean Food and Drug Administration  (KFDA), 125	(Japan), 208 plastics, regulation of, 81–82 regenerated cellulose, 123 Multilaminate materials 21 CFR Section 177.1390, 172–173, 173t
L	21 CFR Section 177.1395, 174–176, 175 <i>t</i>
Letter of no objection (LONO), 79, 119 LFGB. See German Food, Consumer Articles	co-extrusions, 172 effective FCNs, 173t, 175t, 177

<del></del>	
Multilayer materials, US regulations	environmental protection, 210
21 CFR 170-189, 162, 163-164	FCN program, 202
coatings (see Coatings)	Food Additives Amendment of 1958, 201
FCAs (see Food contact articles (FCAs))	GRAS status, 201–202
FCN process, 162, 163	Greece, legislation in, 207
FFDCA, 162	Italy, legislation in, 207
functional barrier, 177–179	Japan, regulations in, 208
migration modeling, 179–180	Mercosur resolutions, 203-204
multilaminates (see Multilaminate	mutual recognition principle, 205-206
materials)	Netherlands, legislation in, 207
PIM, 161–162	post-consumer recycled paper, 210
TOR exemption process, 162, 163	prior-sanctioned substances, 201-202
	Regulation (EC) No. 1935/2004, 205
N	Regulation (EC) No. 2023/2006, 205
Nanomaterials, 69, 70	Slovakia, legislation in, 207
Nanotechnology, 69	surface sizing agents, 170
National Center for Toxicological	surface treatment, 170
Research, 72	TOR exemption, 202
National Institute of Drug and Food	PB-1. See Polybutene-1 (PB-1)
Surveillance, 123	PE. See Polyethylene (PE)
Netherlands	Perfluorooctane sulfonate (PFOS),
food contact rubbers, 46, 144-145, 147	24–25, 24 <i>f</i>
paper and board, regulation of, 207	Perfluorooctanoic acid (PFOA), 24-25, 24f
N-methylmorpholine-N-oxide (NMMO), 127	Permeation, 3–4
Novolac glycidyl ethers (NOGE), 17–18, 18f	PET. See Polyethylene terephthalate (PET)
Nylon 6, 97–98	PFOA. See Perfluorooctanoic acid (PFOA)
-	Phthalates, 19–20
0	PLA. See Polylactides (PLA)
Ordinance on Food and Commodities, 118	Plasticiser, 19–22
Ordinance on Materials and Articles, 118	Plastics, 15–19
Organic coatings, 165–169	ABS, 98–100
Oriented polypropylene (OPP), 168	antioxidants and UV-absorbers, 22–23
Overall migration (OM) testing, 14–15,	Canada, HPFB, 79
44–45, 44 <i>t</i> , 45 <i>t</i>	21 CFR 177, 53, 57 <i>t</i>
OxyFresh, 192	China, 80–81
,	definition of, 77 EU Regulation, 79
P	EVA polymer, 101
	EVOH polymer, 102–103
PAAs. See Primary aromatic amines (PAAs)	FSANZ, 80
Packaging Utensils Regulations, 1979, 207 Paper and paperboard	housewares, 106–107
aqueous and fatty food, 21 CFR Part	Japan, 81–82
176.170, 52, 54 <i>t</i> , 170–171, 201	MERCOSUR resolutions, 82–83
BfR recommendations, 207	MF reins, 103–104
China, regulations in, 208–210	monolayer films, 104
CoE Resolution AP (2002)1, 206	monomers, 15–16, 17
Czech legislation, 207	multilayer structures/laminates, 104–106
dry food, 21 CFR Part 176.180, 52,	oligomers, 15–17, 18–19
53t, 201	PCR polymers, 107
554, 201	For/

Plastics (Continued)	Polytetrafluoroethylene (PTFE), 24-25
physical properties, 77	Polyvinyl chloride (PVC), 20–21, 95
plasticiser, 19–22	Polyvinylidene chloride (PVDC), 95-96,
polyamides, 97–98	110, 111
polycarbonate, 100-101	Postconsumer recycle (PCR) polymers, 107
polyesters (see Polyesters)	PP. See Polypropylene (PP)
polyolefins (see Polyolefins)	Primary aromatic amines (PAAs), 27-28
polystyrene, 96–97	Printing inks, 25–26
polyvinyl chloride, 95	Purity requirements
production aids, 23-25	carbon black, 49, 50t
PVDC, 95–96	colorants, 48, 49t
South Korea, 82	
USFDA regulations, 78-79	
Plastics Implementation Measure (PIM),	R
161–162	Radio frequency identification devices
PMP. See Polymethylpentene (PMP)	(RFID), 194
Polyamides (PAs), 15-16, 97-98	Rayon <sup>®</sup> , 109
Polyaromatic hydrocarbons, 49	Recycled food packaging, 72-74
Polybutene-1 (PB-1)	Regenerated cellulose (RC)
1-butene/ethylene/propylene terpolymers,	annual capacity production, 111
91–92	AU method, 127
copolymers, 89, 90-91	Australia and New Zealand FCMs'
homopolymer, 90	regulations, 126–127
Polycarbonates (PC), 17, 100-101	BfR recommendations, 115-117
Polydimethylsiloxanes (PDMS), 18-19	biodegradable and compostable, 127
Polyesters	biomass fractionation, 127-128
PET, 93	Canadian FCMs' regulations and
polylactides, 94	updates, 119
Polyethylene (PE)	CASRN of, 110
HDPE, 85–86	Chinese FCMs' regulations and updates,
LDPE, 84–85	124–125
LLDPE, 86-87	coating, 110
USFDA definition for, 84	Colombian FCMs' regulations and
Polyethylene terephthalate (PET), 16-17, 93	updates, 122-123
Polylactides (PLA), 94	conditioning, 110
Polymethylpentene (PMP), 92	definition of, 109
Polyolefin films, 168–169	drying, 110
Polyolefins	EFTA FCMs' regulation and updates,
olefins, 84–92	117–118
PB-1, 89-92	enzymatic method, 127
polyethylene (see Polyethylene (PE))	EU FCMs' regulations and updates, 112-115
polymethylpentene, 92	extrusion and regeneration, 110
polypropylene, 87–89	finishing, 110
Polyorganosiloxane (silicones), 18-19	food and sanitary applications, 111-112
Polypropylene (PP)	food components, sorption of, 111
copolymers, 88–89	Italian FCMs' regulation and updates, 117
homopolymer, 88	Japanese FCMs' regulations and updates,
USFDA definition for, 87	123–124
Polystyrene (PS), 96–97	lactic acid/sodium lactate, 128

MERCOSUR FCMs' regulations and	Solid-phase extraction (SPE), 17-18
updates, 119–122	South Korea
modified RC membranes, 128	plastics, 82
nisin, absorption of, 128	regenerated cellulose, 125–126
NMMO method, 127	South Korea Ministry of Food and Drug
ripening, 110	Safety (MFDS), 125
South Korean FCMs' regulations and	Spanish legislation
updates, 125–126	carbon black, 49, 50t
steeping, 109	colorants, 48, 49t
thermoplastic films, 111	food contact rubbers, 147–148
trademark of, 109	silicone rubber, 149
traditional components, migration	Specific migration limits (SMLs), 13-14,
of, 111	203–204
US FCMs' regulations and updates,	Static headspace analysis, 9
118–123	Structure-activity relationship (SAR)
water vapor, gases and aromas,	analysis, 163
permeability of, 111	Styreneacrylic acid (SAA) copolymers, 170
xanthation, 110	Styrene-butyl acrylate (SBA), 170
Relative response factor $(Rf_{rel})$ , 5–6	Supercritical fluid extraction (SFE), 17
Resin Identification Code (RIC) Standard	•
system, 73	
Resinous and polymeric coatings	T
21 CFR Section 175.300, 165–167, 169t	Tenax®, 4-5, 9
polyolefin films, 21 CFR Section 175.320,	Tetramethyl succinonitrile (TMSN), 23–24
168–169	Thermodynamic equilibrium, 9
Rubbers. See Food contact rubbers	Thermoplastic elastomers (TPEs).
	See also Food contact rubbers
	definition of, 141
S	EU Regulation 10/2011, 148
Secondary packaging, 161	examples of, 141, 142 <i>t</i>
Self-Venting packaging, 185–186	France, 144
Silicone rubber	Netherlands, 144–145
CoE resolutions, 150–151	types, 142
Czech Republic, 148	Thermoplastic polyolefins (TPOs), 142
definitions, 148	Thermoplastic polyurethanes (TPUs), 142
French regulation, 148	Thermoplastic vulcanisates (TPVs), 142
FSA Project, 157–158	Threshold of Regulation (TOR), 152
German BfR recommendation, 148, 149	FCSs, exemption of, 162, 163
Italy, 149	migration testing, 55–62
Slovak Republic, 149	paper and board, 202
Spain, 149	Titanium compounds, 24 Toloroble deilu intele (TDI), 68
Switzerland, 149	Tolerable daily intake (TDI), 68
two-pack curing systems, 143	TOR. See Threshold of Regulation (TOR)
vulcanization, 143	Total diet studies (TDS), 68
Siloxanes D4, 18–19, 19 <i>f</i>	Total nonvolatile extraction (TNV) tests, 52
Silver, 195	TPEs. See Thermoplastic elastomers (TPEs)
Silylation, 8–9, 8f	Treaty of Asunción, 203
Size exclusion chromatography (SEC), 10	Treaty on the Functioning of the European
Society of the Plastics Industry (SPI), 73	Union (TFEU), 205–206

## U

UK Food Standards Agency (FSA)
FSA Project A03038, 157
FSA Project A03046, 157
MAFF, 157
silicone rubber, 157–158
Ultraviolet (UV) detector, 11
United States (US)
active and intelligent materials, 191, 195, 196–197
CFRs (see Code of Federal Regulations (CFRs))

FDA (see Food and Drug Administration (FDA))
food contact rubbers, 151–154
multilayer materials (see Multilayer
materials, US regulations)
paper and board, regulation of, 201–202
regenerated cellulose, 118–123
Uvitex® OB, 22–23, 22f

## V

Virtual safe dose (VSD), 55 Volatile organic compound (VOC) analysis, 9