

INDEX

A

Acid gels, 55–56
 Aerosols
 for insects, 270–271
 Alar apple scare, 128
 Almond moth, 249, 266, 270, 271
Anagasta kuehniella, 274
 Angoumois grain moth, 246
Anisopteromalus calandrae, 279
 Apple
 vacuum impregnation response of, 215
Aspergillus niger, 84
 Asymmetric stretching
 vibrational motion of water, 16

B

Bacillus thuringiensis, 273
 BCFM. *See* Broken corn and foreign material
Beauveria bassiana, 277
 Beef, hormone-fed, 140
 Beef jerky
 moisture content in, 37
 Beetles
 cigarette, 248, 266, 273
 confused flour, 246, 266, 271
 dermastid, 247–248, 274
 drugstore, 248
 grain/flour, 246–247
 hairy fungus, 248
 khapra, 247
 merchant grain, 246
 red flour, 246, 266, 271
 saw-toothed grain, 246, 266
 spider, 248
 warehouse, 247, 266
 Bending
 vibrational motion of water, 16

Blatella germanica, 272
 Boiling point
 of water, 8–9
 Boltzmann constant, 17
 Bovine spongiform encephalopathy (BSE), 104, 113, 120
 Bread
 moisture content in, 37
 Brine vacuum impregnation (BVI), 219
 Broken corn and foreign material
 (BCFM), 154
 Brownian motion, 16–18, 19
 BSE. *See* Bovine spongiform encephalopathy
 1,3-Butylene glycol
 Staphylococcus aureus and, 35
 BVI. *See* Brine vacuum impregnation

C

Cadra cautella, 249, 271, 279, 280
Callosobruchus, 279
 Candy, hard
 moisture content in, 37
 Carrot
 vacuum impregnation response of, 215
 Carr-Purcell-Meiboom-Gill (CPMG)
 sequence, 44
 Cavendish, Henry, 2
 Central route of attitude formation, 116
 Centrifuge system, 159
Cephalonomia ferrugineus, 280
Cephalonomia waterstoni, 280
 Cereal
 moisture content in, 37
 CGF. *See* Corn gluten feed
 Cheese
 moisture content in, 37
 Chemical shift, 88

- Cheyletus eruditus*, 281
 Chicken, dioxin in, 129
 Cigarette beetle, 248, 266, 273
 CJD. *See* Creutz-Jakob disease
 Clausius-Clapeyron equation, 25
 Coca-cola, contamination of, 104, 129
 Cockroach, German, 272
 Coffee, pancreatic cancer and, 128
 Confused flour beetle, 246, 266, 271
 Consumer
 behavior and
 false assumptions
 education fallacies, 130–138
 profiling and response, 121–122
 accountable, 122, 123, 125
 alarmist, 123–124, 125
 concerned, 123, 125
 conservatives, 123, 125
 Consumer associations
 source credibility of, 112
 Contagious swine fever, 104
 Cookies, crisp
 moisture content in, 37
Corcyra cautella, 266, 270
Corcyra cephalonica, 266
 Corn gluten feed (CGF), 156
 Corn kernel
 composition of, 153–154
 structure of, 153–154
 Corn kernel. *See* Enzymatic corn wet milling
 process
 CP. *See* Supercritical point
 CP/MAS. *See* Cross-polarization/magic-angle
 spinning nuclear magnetic resonance
 CPMG. *See* Carr-Purcell-Meiboom-Gill
 sequence
 Crackers
 moisture content in, 37
 Cranberry scare, 127
 Creutz-Jakob disease (CJD), 113
 Cross-polarization/magic-angle spinning
 (CP/MAS) nuclear magnetic
 resonance, 53
 Cross-relaxation spectroscopy (CRS), 56
 CRS. *See* Cross-relaxation spectroscopy
Cryptolestes ferrugineus, 246, 253, 259
Cryptolestes pusillus, 246
 Cyfluthrin, 271–272
 Cytoplasmic polyhedrosis virus, 277
- D**
- DDGS. *See* Distiller dried grains with solubles
 DE. *See* Diatomaceous earth
 DEA. *See* Dielectric analysis
 Dehydration and impregnation by drenching
 (DID), 218
 Dermastid beetles, 247–248, 274
 Dewatering-impregnation-soaking in
 concentrated solutions (DIS), 175
 Diatomaceous earth (DE), 272, 275
 DID. *See* Dehydration and impregnation by
 drenching
 Dielectric analysis (DEA)
 temperature observation and, 75
 Diethylstilbestrol, beef and, 127
 Differential scanning calorimetry (DSC)
 temperature observation and, 74
 Diffusion-ordered nuclear magnetic resonance
 spectroscopy
 (DOSY), 56
 Dioxin, in chicken, 129
 DIS. *See* Dewatering-impregnation-soaking in
 concentrated solutions
 Distiller dried grains with solubles (DDGS),
 166–167
 DMA. *See* Dynamic mechanical analysis
 DOSY. *See* Diffusion-ordered nuclear magnetic
 resonance spectroscopy
 Dried meat
 Staphylococcus aureus and, 35
A Drop of Water, 3
 Drugstore beetle, 248
 Drying
 characteristics of
 aroma compound retention, 204
 color, 199, 200, 201, 202
 rehydration, 204
 shrinkage, 202–204
 osmotic treatment after, 199
 techniques of
 air, 192–196
 infrared, 197–199
 microwave, 197–199
 DSC. *See* Differential scanning calorimetry
 DVS. *See* Dynamic vapor sorption instrument
 Dynamic mechanical analysis (DMA)
 temperature observation and, 74
 Dynamic vapor sorption (DVS)
 instrument, 30

E

- Eggplant
 - vacuum impregnation response of, 215
- Electric blankets, 129
- Electron spin resonance (ESR) spectroscopy
 - temperature observation and, 75
- Electron spin resonance (esr) spectroscopy, 53
- Empedocles of Acragas, 2
- Endosperm, 153
- Enzymatic corn wet milling process
 - benefits of, 163–164
 - development of, 160–163
 - future of, 166–167
 - issues with, 164–165
- Ephestia elutella*, 279
- Ephestia kuehniella*, 249, 274
- Escherichia coli*, 104, 106, 107, 146
- ESR. *See* Electron spin resonance spectroscopy
- Ethanol
 - Staphylococcus aureus* and, 35
- European institutions
 - source credibility of, 113
- Eutectic point (T_c), 89

F

- Fish
 - moisture content in, 37
- Flour beetles, 246–247
- Flour moths, 248–249
- Food(s). *See also special food*
 - nuclear magnetic resonance for, 50–59
 - acid gels, 55–56
 - casein dispersion, 55–56
 - chemical stability, 58–59
 - glasses, 51–53
 - measurements, 59–61
 - microbial stability, 58–59
 - rennet gels, 55–56
 - solid mobility measurement, 56–58
 - starch granules, 53–55
 - sugar solution, 51–53
 - processing of, 174
 - types of, 21–22
- Food facility landscapes, 250–254
- Food polymer science, 27
- Food protection regulations, 242–244
- Food salting process, 217–219
- Food scare(s), 104
 - behavior and
 - formation of, 115–118

- persuasion, 117–118
- risk perception and, 118–121
- consumer behavior and
 - false assumptions
 - education fallacies, 130–138
- consumer profiling and response, 121–122
 - accountable, 122, 123, 125
 - alarmist, 123–124, 125
 - concerned, 123, 125
 - conservatives, 123, 125
- crisis-related responses
 - complications, 146–147
 - institution response to, 144–145
 - irrational vs. rationale, 124–125
 - passive vs. aggressive, 124, 125
 - risk management measures development, 145–146
 - short-term vs. long-term, 125–126, 127–129
- impact of, 106–107
- managing
 - communication channels, 138–139, 140
 - hierarchical understanding, 138, 139
 - packaging and labeling, 139–141
 - product position, 141
 - public concern addressing, 142–143
 - single information authority, 143–144
- public panic and, 106–107
 - consumer response and, 108, 109
 - crisis communication, 108, 109–110
 - media and, 110–112
 - source credibility, 112–114, 115
- Foot-and-mouth disease, 104
- Formulation, 212–214
- Fourier transform infrared (FTIR) spectroscopy, 53
- Freezing
 - aroma compounds, 211–212
 - pigments, 210–211
 - texture, 205–210
 - vitamins, 210–211
- Fruit snacks
 - moisture content in, 37
- Fruits
 - moisture content in, 37
 - processed, 190–192

Frying, 217
 FTIR. *See* Fourier transform infrared spectroscopy
 Fumigants
 for insects, 268–270
 Functional foods, 214, 216
 Fusion, enthalpy of
 water and, 8

G

Gay-Lussac, Joseph, 2
 Gels
 acid, 55–56
 rennet, 55–56
 Germ, 153
 German cockroach, 272
 GIPSA. *See* Grain Inspection, Packers, and Stockyards Administration
 Glass, transition of
 assignment of, 69–72
 definition of, 69–72
 distance and, 77–78
 for foods, 78–85
 ingredient selection, 82
 measurement in, 85
 mobility/stability maps, 79–82,
 80, 81
 product behavior during processing,
 84–85
 product stability, 82–84
 shelf life, 82–84
 state diagrams, 79–82
 measurement methods of, 72–73, 74–75,
 75–77
 physical states in, 64–68
 timescales and, 77–78
 a_w and, 85–86
 Glycerol
 Staphylococcus aureus and, 35
 GM potato hox, 104
 Government
 public concern address in, 143
 Grain beetles, 246–247
 Grain borers, 245–246
 Grain Inspection, Packers, and Stockyards Administration (GIPSA), 258
 Grain weevils, 245
 Granary weevil, 245
 Granulosis virus (GV), 277

Grocers, small
 source credibility of, 113
 Gum, chewing
 moisture content in, 37
 GV. *See* Granulosis virus

H

H. *See* Hydrogen
Habrobracon hebetor, 279, 280
 HACCP. *See* Hazard analysis critical control points
 Hairy fungus beetle, 248
 Handel, George Frideric, 3
 Hazard analysis critical control points (HACCP), 243
 HDA. *See* High-density amorphous (HDA)
 HDM. *See* Hydrodynamic mechanism
 Heat
 for insects, 274–275
 Heat capacity
 of water, 8
 HFCS. *See* High fructose corn syrup
 High fructose corn syrup (HFCS), 151
 High-density amorphous (HDA) ice, 15
 Honey
 moisture content in, 37
 Horn, 245
 Hurdle technology, 89
 Hydrodynamic mechanism (HDM), 184
 Hydrogen (H)
 isotope, 11
 Hydrogen atom
 residence time of, 4
 Hydrogen bonding, 6–8
 duration of, 7, 8
 ice and, 7
 number of, 7, 8
 strength of, 7, 8
 vapor phase, 6
 water and, 7
 Hydrological cycle, 89

I

Ice
 high-density amorphous, 15
 hydrogen bonding and, 7
 low-density amorphous, 15
 very high-density amorphous, 15
 Ice cream, 21–22

IDK. *See* Insect-damaged kernels

Indian meal moth, 248, 266, 270

Infrared, vibrational motion and, 16

Insect-damaged kernels (IDK), 258

Insecticides

aerosols, 270–271

biological control

insect pathogens, 275–278

parasites, 278–281

predators, 278–281

fumigants, 268–270

heat, 274–275

pheromones, 273–274

sprays, 270–271

surface treatments, 271–272

Insects

insecticides for

aerosols, 270–271

biological control

insect pathogens, 275–278

parasites, 278–281

predators, 278–281

fumigants, 268–270

heat, 274–275

pheromones, 273–274

sprays, 270–271

surface treatments, 271–272

stored-product, pests

dermastid beetles, 247–248

flour beetles, 246–247

flour moths, 248–249

grain beetles, 246–247

grain borers, 245–246

grain weevils, 245

management tactics

housekeeping and exclusion,
263–265

insecticides. *See* Insecticides

packaging, 265–267

mealworms, 247

mites, 249–250

monitoring tactics, 257–262

psocids, 249

spider beetles, 248

Integrated pest management (IPM), 241,
254–257

Integrated sanitation management

(ISM), 263

IPM. *See* Integrated pest management

ISM. *See* Integrated sanitation management

J

J coupling. *See* Spin-spin coupling

Jams

manufacturing of, 216–217

moisture content in, 37

Jellies

moisture content in, 37

K

Khapra beetle, 247

Kiwi

vacuum impregnation response of, 215

L

Lariophagus distinguendus, 279

Lasioderma serricorne, 248, 266, 273

Latent heat, 89

Lavoisier, Antoine, 2

LC-NMR. *See* Liquid chromatography-nuclear
magnetic resonance

LDA. *See* Low-density amorphous

Lesser grain borer, 245, 266

Lewis, Gilbert N., 22

Liquid chromatography-nuclear magnetic
resonance (LC-NMR), 60

Listeria, 104, 107

Low-density amorphous (LDA) ice, 15

Lunchmeat

moisture content in, 37

M

Mad cow disease, 104, 134

Maize weevil, 245

Mandarin peel

vacuum impregnation response
of, 215

Mango

vacuum impregnation response of, 215

Margarine, 127

Market vendors

source credibility of, 113

Marshmallows

moisture content in, 37

Mattesia trogodemae, 274, 278

Meal moth, 249

Mealworms, 247

Meat

dried, 35

moisture content in, 37

Mediterranean flour moth, 249, 274

Melting point
 of water, 8–9
 Merchant grain beetle, 246
Metarhizium anisopliae, 277
 Methyl bromide, 268
Metschnikowia pulcherrima, 192
 Milk
 dried
 Staphylococcus aureus and, 35
 nonfat, 37
 whole
 moisture content in, 37
 Mites, 249–250
 Moisture content, 37
 Monarch butterflies, 104
 Monet, Claude, 3
 Moths
 almond, 249, 266, 270, 271
 angoumois grain, 246
 flour, 248–249
 Indian meal, 248, 266, 270
 meal, 249
 Mediterranean flour, 249, 274
 rice, 266

N

National authorities
 source credibility of, 112
 Natural-bond orbital (NBO), 6
 NBO. *See* Natural-bond orbital
 Nematodes, 280
 NFDM. *See* Nonfat dried milk, 9–11, 112
 NMR. *See* Nuclear magnetic resonance
 NOE. *See* Nuclear Overhauser effect
 Nonfat dried milk (NFDM)
 moisture content in, 37
 NPV. *See* Nuclear polyhedrosis virus
 Nuclear magnetic resonance (NMR)
 classes of, 45
 diffusometry, 45
 distance and, 48–50
 for foods, 50–59
 acid gels, 55–56
 casein dispersion, 55–56
 chemical stability, 58–59
 glasses, 51–53
 measurements, 59–61
 microbial stability, 58–59
 rennet gels, 55–56
 solid mobility measurement, 56–58

 starch granules, 53–55
 sugar solution, 51–53
 imaging, 45
 principles of, 38–45
 relaxation and mobility, 46–48
 relaxation rate of, 61–63
 relaxometry, 45
 timescales and, 48–50
 Nuclear magnetic resonance (NMR)
 spectroscopy
 temperature observation and, 75
 Nuclear Overhauser effect (NOE), 50, 89
 Nuclear polyhedrosis virus (NPV), 277

O

O. *See* Oxygen
 Orange peel
 vacuum impregnation response of, 215
 Organophosphate dichlorvos, 270
Oryzaephilus mercator, 246
Oryzaephilus surinamensis, 246, 266
 Osmosis
 definition of, 177
 Osmotic dehydration
 combined processes and, 190
 demand and, 176–177
 economic interest in, 176
 mass transport phenomena during, 174–175
 modeling, 185–190
 plant material nature, 179–181
 process control and, 176–177
 process of, 174
 raw material treatments and, 181–185
 solute penetration and, 175
 Oxygen (O)
 isotope, 11

P

Pancreatic cancer, coffee and, 128
 Parasites, 278–281
 Parmesan cheese
 moisture content in, 37
 Pasta
 moisture content in, 37
 PEC. *See* Proximity equilibration cells
 PEF. *See* Pulsed electric field
 PEG-200
 Staphylococcus aureus and, 35
 PEG-400
 Staphylococcus aureus and, 35

Pepperoni
 moisture content in, 37
 Pericarp, 153
 Peripheral route of attitude formation, 116
 Pests. *See* Insects
 PFGSTE. *See* Pulse-field gradient-stimulated echo sequence
 Phase diagram, 89
 Pheromones
 for insects, 273–274
 Phosphine gas, 268–269
 Pineapple
 vacuum impregnation response of, 215
Plodia interpunctella, 248, 253, 257, 266, 270, 271, 273, 277, 279
 Polyvinylpyrrolidone (PVP) system, 59
 Potato chips
 moisture content in, 37
 Producers
 source credibility of, 113
 Propyleneglycol
 Staphylococcus aureus and, 35
Prostephanus truncatus, 245, 252, 276, 277, 279
 Protozoa, 278
 Proximity equilibration cells (PEC), 29
 Psocids, 249
Pteromalus cerealellae, 279
 Ptinidae, 248
 Pulsed electric field (PEF), 181, 182, 183
 Pulsed vacuum osmotic treatments (PVOD), 211, 215
 Pulse-field gradient-stimulated echo (PFGSTE) sequence, 56
 PVOD. *See* Pulsed vacuum osmotic treatments
 PVP. *See* Polyvinylpyrrolidone system
Pyemotes tritici, 281
Pyralis farinalis, 249
 Pyrethroids, 270–271

R

Raisins
 moisture content in, 37
 Raman spectroscopy, 16
 Red flour beetle, 246, 266, 271
 Research institutions
 public concern address in, 143
Rhyzopertha dominica, 245, 266, 275, 279, 281
 Rice
 moisture content in, 37
 Rice moth, 266

Rice weevil, 245, 266
 Risk attitude, 119, 122
 Risk perception, 119, 122

S

Saccharin, 128
Salmonella, 106
 Salt mixtures
 Staphylococcus aureus and, 35
 Saw-toothed grain beetle, 246, 266
 SDS-PAGE. *See* Sodium dodecyl sulfate-polyacrylaxide gel electrophoresis
 Self-diffusion, 16–18
 Sensible heat, 89
 Single-point imaging (SPI), 57
 Single-point ramped imaging with enhancement (SPRITE), 57–58
Sitophilus oryzae, 266
Sitotroga cerealella, 279
 Smallgoods, Garibaldi, 146
 Sodium acetate
 Staphylococcus aureus and, 35
 Sodium dodecyl sulfate-polyacrylaxide gel electrophoresis (SDS-PAGE), 165
 Solution, management of, 220
 concentration restoration, 221–223
 mass and dilution, 221
 microbial contamination, 223
 recycling, 221
 spent solution discharge, 224
 spent solution uses, 223–224
 Soup, dried
 Staphylococcus aureus and, 35
 SPI. *See* Single-point imaging
 Spider beetles, 248
 Spin-spin coupling, 89
 Sprays
 for insects, 270–271
 SPRITE. *See* Single-point ramped imaging with enhancement
Staphylococcus aureus, 35
 Starch granules, 53–55
Stegobium paniceum, 248
Stitophilus granarius, 245
Stitophilus oryzae, 245, 266
Stitophilus zeamais, 245, 252
 Stored-product insect pests
 dermestid beetles, 247–248
 flour beetles, 246–247

- Stored-product insect pests (*cont.*)
- flour moths, 248–249
 - grain beetles, 246–247
 - grain borers, 245–246
 - grain weevils, 245
 - management tactics
 - housekeeping and exclusion, 263–265
 - insecticides. *See* Insecticides
 - packaging, 265–267
 - mealworms, 247
 - mites, 249–250
 - monitoring tactics, 257–262
 - psocids, 249
 - spider beetles, 248
- STRAFI. *See* Stray field
- Strawberries
 - vacuum impregnation response of, 215
- Stray field (STRAFI), 57
- Sublimation, enthalpy of
 - water and, 8
- Sucrose
 - Staphylococcus aureus* and, 35
- Supercritical point (CP), 12–15
- Supermarkets
 - source credibility of, 113
- Surface tension
 - of water, 8
- Sweeteners, artificial, 128
- Symmetric stretching
 - vibrational motion of water, 16
- Synergized pyrethrins, 270
- T**
- Taco shells, 107
- Temperature, 178
 - observation of
 - dielectric analysis, 75
 - differential scanning calorimetry, 74
 - dynamic mechanical analysis, 74
 - electron spin resonance spectroscopy, 75
 - nuclear magnetic resonance spectroscopy, 75
 - thermomechanical analysis, 74
- Tenebrio molitor*, 247
- Tenebrio obscurus*, 247
- Teretriosoma nigrescens*, 276, 281
- Terrorism, 104, 143–144
- Thales, 2
- Theocolax elegans*, 275
- Thermal conductivity
 - of water, 8
- Thermomechanical analysis (TMA)
 - temperature observation and, 74
- Timescales
 - glass, transition of, 77–78
 - nuclear magnetic resonance and, 48–50
 - water, activity of, 28–30
- Tin cap, 153
- TMA. *See* Thermomechanical analysis
- TP. *See* Triple point
- Tribolium castaneum*, 246, 247, 266, 271, 281
- Tribolium confusum*, 246, 271
- Trichinosis, 125–126
- Trichogramma evanescens*, 279
- Trichogramma pretiosum*, 279
- Triple point (TP), 12–15
- Trogoderma glabrum*, 274, 278
- Trogoderma granarium*, 247
- Trogoderma variabile*, 247–248, 253, 266
- Twinkies
 - moisture content in, 37
- Tylenol
 - cyanide and, 106
- Typhaea stercorea*, 248
- U**
- University institutions
 - public concern address in, 143
- V**
- van der Waals diameter
 - of water molecule, 5
- Vaporization, enthalpy of
 - water and, 8
- Vegetables
 - moisture content in, 37
 - processed, 190–192
- Venturia*, 279
- Very high-density amorphous (VHDA) ice, 15
- VHDA. *See* Very high-density amorphous
- Vitamins
 - freezing, 210–211
- von Humboldt, Alexander, 2
- W**
- Warehouse beetle, 247, 266
- Water
 - activity of
 - development of, 22–24

- distance in, 28–30
 - foods and, 30–36
 - measurement of, 36
 - moisture content, 31
 - moisture transfer, 31
 - new product development, 31–32
 - process design and control, 35–36
 - shelf life of, 32–35
 - sorption isotherm, 36–38
 - stability of, 32–35
 - Staphylococcus aureus* growth, 35
 - pressure, constant, 24–27
 - temperature, constant, 24–27
 - thermodynamic equilibrium, 24–27
 - time scales in, 28–30
 - vapor pressure, 28
 - amorphous, 15
 - chemical properties of, 8–10
 - elemental composition of, 2, 3–5
 - forms of, 11–15
 - gas phase of, 15–16
 - hydrogen bonding and, 7
 - isotopic composition of, 11
 - liquid-phase density maximum of, 9
 - mobility of, 15–18
 - models of
 - cluster, 20
 - computer simulations of, 19–20
 - interstitial, 18
 - liquid-liquid phase transition hypothesis
 - in, 19
 - mixture, 18
 - singularity-free hypothesis in, 19
 - stability limit hypothesis in, 19
 - uniformist, 18
 - molecule of, 4–5
 - Perrier, benzene and, 107
 - phases of, 11–15
 - physical properties of, 8–10
 - proton exchange in, 4
 - rotational motion of, 16, 17
 - translational motion of, 16–18
 - vibrational motion of, 15–16
 - volume increase, freezing and, 9–10
 - Water Lilies*, 3
 - Water Music*, 3
 - Water, removal of
 - rate of, 177, 178
 - Weevils, 245
 - Wet milling process, 154–159
 - enzymes. *See* Enzymatic corn wet milling process
 - lactic acid-dominated stage, 155
 - sulfur dioxide-dominated stage, 155
 - sulfur-dioxide diffusion stage, 155
- X**
- Xylocoris flavipes*, 281
- Y**
- Yogurt
 - moisture content in, 37
- Z**
- Zucchini
 - vacuum impregnation response of, 215