

Index

- absinthe 234–235
 absorption 29, 31–36
 barriers to 28
 kinetics 55, 56
 of metals 22, 137, 140, 143
 Acceptable Daily Intake (ADI) 260, 261–262
 acesulfame K 223
 acetylcholinesterase (AChE) 44, 63–64, 170, 174, 175, 176
 ackee 102–103
 acrylamide 24, 196–199
 active transport 34, 50
 Acute Reference Dose (ARfD) 2
 additives *see* food additives
 adenosine receptors 105
 Adequate Intake (AI) 134
 ADI (Acceptable Daily Intake) 260, 261–262
 adipose tissue 37, 168
 ADME (Absorption, Distribution, Metabolism and Excretion) 28–30
 absorption 29, 31–36
 barriers to 28, 37–38
 distribution 29, 36–37, 57
 excretion 30, 49–52
 kinetics 53–60
 metabolism 29–30, 40–48
 of metals 22, 137, 140–141, 143, 146–148
 advanced glycation end-products (AGEs) 210
 aflatoxins 27, 151–155, 266–267, 275
 agent orange 21, 180, 187
 agriculture 9–11
 Ah (aryl hydrocarbon) receptor 63, 187
 AI (Adequate Intake) 134
 air pollution 8, 21, 207
 alcohol
 distilled products 210–211
 elimination of 44, 56–57, 240
 aldrin 167
 algae 9
 cadmium in seaweed 133
 toxins 27, 65, 129–130, 255–256
 alimentary toxic aleukia 157–158
 alkaloids 100–101, 103–138
 analysis of 246
 ergot 13, 24, 151, 158–161
 see also glycosides
 allergies 139, 193, 213, 225, 238–239, 271
 Amadori compounds/rearrangement 196, 210
 amaranth 226
 amatoxins 128
 Ames test 83, 94
 amines
 biogenic 211–214
 HAAs 13, 209–210
 amino acids 102–103
 aminopyridines 209–210
 amitraz 263
 amnesic shellfish toxins (AST) 130
 anaemia
 favism 35, 126–127
 lead poisoning 141
 analytical chemistry
 bioassays 255–257
 of elements 251–254
 gas chromatography 244–247
 HPLC 247–251
 immunoassays 254–255
 regulation 241–242
 sampling procedures 242–244, 252
 androgens 189
 aneuploidy, tests for 83, 94–95
 animal feed, contamination 11, 25–27, 156, 266–267, 273–274
 animals
 as food 6–7, 10–11
 used in toxicity testing 30, 82, 85–87, 93
 see also fish; meat; shellfish
 anthranoids 113–114
 anthraquinone (AQ) 113, 114
 anti-nutritional compounds 17, 97, 112
 antioxidants 227, 230–232
 AOAC INTERNATIONAL 242
 apples 162, 267
 ARfD (Acute Reference Dose) 2
 arsenic 134, 135–136, 253
Artemia salina (brine shrimp test) 88–90
 aryl hydrocarbon (Ah) receptor 63, 187
 ascorbic acid (E300) 227, 231
 aspartame (E951) 221, 221–222
Aspergillus species 151, 153, 155–156
 atomic absorption spectroscopy (AAS) 251–252
 autotrophs 4–5

- auxin herbicides 180–181
 azo colouring agents 225–226, 275–276
 azorubin 226
- babies *see* infants
 bacterial amines 212–224
 bacterial tests for mutagenicity 83, 94
 bacterial toxins 20
 barley (*Hordeum vulgare*) 25, 158
 beeswax 237
 Belgium, contaminated chickenfeed 273–274
 Benchmark Dose (BMD) 261
 benzo[*a*]pyrene 206, 207
 BHE (butylated hydroxyanisole) (E320) 230–231
 BHT (butylated hydroxytoluene) (E321) 231
 biliary excretion 51–52, 56
 bioassays 255–257
 biogenic amines 211–214
 biolistics 269–270
 biological warfare 158
 see also chemical warfare
 bisphenol A (BPA) 194–195
 bitterness 106, 111, 116, 123, 126
 black PN 226
 bladder cancer 124, 221
 blood
 distribution and 36, 37, 38
 toxicokinetics and 53–55, 56, 58, 59
 blue baby syndrome 202
 BMD (Benchmark Dose) 261
 bone 37
 cadmium and 136–137
 lead and 133–134
 Bordeaux mixture 182
 boron 134
 BPA (bisphenol A) 194–195
 bracken fern (*Pteridium* species) 124
 brain 38
 see also neurotoxins
Brassica species 118–120
 breast-feeding 52, 217
 brick tea 150
 brine shrimp test 88–90
 bufadienolides 115
 butylated hydroxyanisole (BHA) (E320) 230–231
 butylated hydroxytoluene (BHT) (E321) 231
- CAC (Codex Alimentarius Commission) 70–72, 241
 cadmium 132–133, 136–138
 caffeine 103, 105–106
 calcium 134
 Canada, mercury poisoning 145
 [L]-canavanine 102
 canned food 149
 carbamates 175, 176
- carbaryl 175
 carbon tetrachloride 231
 carboxyatractyloside 114
 carcinogens (or potential carcinogens)
 acrylamide 198–199
 alkaloids 107, 108
 arsenic 135
 chromium 139
 dioxins 186–187
 glycosides 113, 124
 HAAs 13, 210
 3-MCPD 214
 mycotoxins 152, 156
 nitrosamines 202–204
 PAHs 206–209
 saccharin 221
 urethane 210
- cardenolides 114–116
 cardiac glycosides 114–116
 cardiovascular disease 205–206
 carnauba wax 70–71, 236–237
 cassava (*Manihot esculenta*) 13, 24–25, 117, 118
 cassia gum 13, 113–114
 cathartic toxicants 113–114, 124
 cell membrane 32, 33–35, 65
 central nervous system (CNS) 38
 see also neurotoxins
 ceramics 136, 191
 certification systems 267–268
 α -chaconine 120–121
 cheese 8, 213–214
 chemical compounds 15–17, 19–21
 chemical warfare 21, 158, 171–172, 180, 187
 chickens, contaminated feed 26–27, 273–274
 children
 allergies 239
 caffeine 105
 lead 2–3, 142
 mercury 145
 nutritional requirements 2
 phthalates 31
 see also infants
 chilli peppers 275
 China
 edible mushrooms 7
 gossypol intoxication 109, 243
 melamine in infant milk formula 274–275
 selenium deficiency/intoxication 146, 148
 chlorophenoxy herbicides 180–181
 chromium 18, 134, 138–139, 253
 chromosomes, structural anomalies 83, 94–95
Cinchona species 106
 citric acid (Krebs) cycle, inhibition of 64, 102, 135
 citrus fruits 108, 123, 229
 citrus oils 232, 233
Claviceps purpurea 158–159
 see also ergot alkaloids

- Clostridium botulinum*, curing process and 199, 200
 Codex Alimentarius Commission (CAC) 70–72, 241
 coeliac disease 239
 colchicine 108–109
 colon 35, 113
 colour additives
 in food 68–69, 224–226, 275–276
 in plastics 136
 comfrey (*Symphytum officinale*) 107
 contaminants in food 132–133, 191–194, 217
 see also individual metals/metalloids/compounds
 convicine 35, 126–127
 convulsive ergotism 160
 cooking
 acrylamide 24, 196, 198–199
 AGEs 210
 HAAs 13, 209–210
 Maillard reaction 196, 198, 210
 nitrosamines 203, 227
 oil used in deep-frying 257–259
 PAHs 206
 trans fatty acids 205–206
 copper 134, 139–140
 as a fungicide 182
 copra 266–267
 cosmetics 229
 cottonseeds 26, 109
 crisp bread 23–24
 cucurbitacins 116
 curing process
 salting 199–200, 203, 227
 smoking 207–209
 cyanogens 35, 116–118, 249
 in cassava 24–25, 117, 118
 in jojoba 122
 cycasin 35, 122–123
 cyclamate (E952) 35, 220, 223
 cyclodienes 167
 cytochrome P450 enzymes 40–41, 43–44, 92,
 153, 187
- Dahlgrenograms 100–101
 dairy products
 aflatoxins in 27, 153
 cheese 8, 213–214
 DEHP in 192
 excretion of toxicants into milk 52
 lead in 142
 melamine contamination in China 274–275
 milk intolerance 240
 zearalenone in 163
 1,3-DCP (1,3-dichloro-2-propanol) 214
 DDD (dichlorodiphenyldichloroethane) 166–167
 DDT (dichlorodiphenyltrichloroethane) 166, 167,
 168, 169–170
 DEHA (di-(2-ethylhexyl)adipate) 192, 193
 DEHP (di-(2-ethylhexyl)phthalate) 192
 Delaney Clause 69
 deoxynivalenol (DON) 61, 157, 158
 developmental toxicity *see* teratogenicity
 diabetes mellitus 18, 138, 210
 dianthron 114
 diarrhoeic shellfish toxins (DST) 129, 130,
 256, 257
 diazolidinyl urea 229
 dibenzofurans 181
 dicamba 181
 dichlorprop 180
 dieldrin 167, 168
 Dietary Reference Intakes (DRIs) 134
 diethylstilbestrol 189
 diffusion 34–35, 50
 dinitrophenols 64
 dioxin-like polychlorinated biphenyls 52, 185
 dioxins 21, 180–181, 185–187
 analysis 256–257
 public health incidents 186, 273–274
 diphenyl (E230) 229
 distillation
 alcohol 210–211
 essential oils 233
 distribution 29, 36–37, 57
 barriers 37–38
 kinetics 57–59
 of metals 141, 146
 diterpenes 109
 dithiocarbamates 183–184
 DNA, as a target 65, 107, 154
 DNOC (4,6-dinitro-*o*-cresol) 179
 dodecyl gallate (E312) 231–232
 domoic acid 130
 DON (deoxynivalenol) 61, 157, 158
 doramectin 72
 dose–response relationship 65–67
 LD₅₀ and alternatives 86–87
 DR-CALUX bioassay 256–257
 drinking water
 fluoridated 150
 metals/metalloids in 135–136, 139, 140
 nitrates/nitrites in 64, 201, 203–204
 DRIs (Dietary Reference Intakes) 134
 drugs
 human use 242
 veterinary *see* veterinary drugs
 DST (diarrhoeic shellfish toxins) 129, 130, 256, 257
- EBDCs (ethylenebisdithiocarbamates) 184
 EFSA (European Food Safety Authority) 11, 76,
 194–195, 222, 225, 236
 electrochemical detectors 249
 electroporation 270
 electrospray ionization (ESI) 249–251

- elements 15, 16, 18–19, 133–135
 analysis of 243–244, 251–254
see also individual elements
- elimination 55–57
see also excretion; metabolism
- embryonic stem cell test (EST) 95
- endocrine disruptors 189–190
 BPA 194–195
 growth promoters 11, 217
 nonylphenol 187–189
 organochlorines 169
 parabens 228
 phyto-oestrogens 127
 zearalenone 163
- endocytosis 34
- endotoxins 20
- enterohepatic recirculation 51–52
- enzyme-linked immunosorbent assay (ELISA) 254–255
- enzymes, inhibition of 63–64
- epoxide metabolism 43
- ergometrine 160
- ergot alkaloids 13, 24, 151, 158–161
- ergotamine 160
- erythrocytes, lead toxicity 29, 36, 141
- ESBO (epoxidated soybean oil) 193
- escolar (*Lepidocybium flavobrunneum*) 131
- essential elements 17, 18, 134
 life windows 19, 134, 135, 146
- essential oils 232–233
- esterases 44
- ethanol *see alcohol*
- ethyl carbamate (urethane) 210–211, 212
- ethylenebisdithiocarbamates (EBDCs) 184
- ethyl-*p*-hydroxybenzoate (E214) 228
- European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC) 73
- European Food Safety Authority (EFSA) 11, 76, 194–195, 222, 225, 236
- European Inventory of Existing Commercial Chemical Substances* (ELINCS) 20
- European Medicines Agency (EMA) 76
- European Union regulations and guidelines 20, 73–74, 75–79, 132–133
 cosmetics 229
 curing agents 200
 dioxins 187
 food additives 219–220, 225, 228, 230, 234, 235–236
 food contact materials 133, 136, 149, 185, 193–194
 metals 132–133, 138, 146, 149
 mycotoxins 152, 155, 157, 158, 161, 162
 nitrates 201
 oils used in deep-frying 258
 smoked foods 208–209
 testing and analysis methods 80–81, 242, 256
 veterinary drug residues 217
- excretion 30, 49–52
 kinetics 55, 56
- exotoxins 20
- exposure routes 31
- extraction
 analytical 242–244, 252
 processing of raw materials 13, 233
- eye irritation/corrosion tests 93–94
- faba bean (*Vicia faba*) 35, 99, 126–127
- facilitated transport 34
- false morel mushrooms (*Gyromitra* species) 9, 128–129
- FAO *see* Food and Agriculture Organization
- farming 9–11
- fatty acids 204–206, 230
 analysis of oil used in deep-frying 257–259
- favism 35, 126–127
- FDA (Food and Drug Administration) 68–69, 228
- feedstuffs, contamination 11, 25–27, 156, 266–267, 273–274
- FEMA (Flavor and Extract Manufacturers Association) (USA) 69
- feminizing toxicants 169, 188
- fertility, reduced 109, 169, 188
- filtration (membrane transport) 34
 glomerular 49–51
- first-order kinetics 55–56
- first-pass effects 29
- fish 6–7, 11, 12
 allergy to 213
 dioxins in 187
 escolar/oilfish waxes 131
 metals in 135, 144–145, 146, 150
 organochlorines in 170
 puffer fish 130–1
 scombroid poisoning 212–213, 214
 smoked 207–208
- flame atomic absorption spectroscopy (FAAS) 252
- flame photometry 251
- flavin-containing monooxygenases (FMO) 41–43
- Flavor and Extract Manufacturers Association (FEMA) (USA) 69
- flavour and flavour additives 17, 69, 106–107, 232–236, 275
see also bitterness
- flour 23–24, 145, 161, 182, 275
- fluorescence detectors 248–249
- fluorine 19, 134, 150
- fluoroacetic acid 64, 99, 102
- food additives
 antioxidants 227, 230–232
 colourings 68–69, 224–226, 275–276
 flavouring agents 69, 106–107, 232–236, 275
 functions 220
 numbering systems 71, 219
 preservatives 199–200, 226–230
 regulation 68, 219–220, 225, 228, 230, 234, 235–236

- sweeteners 35, 220–224
- waxes 70–71, 236–237
- Food and Agriculture Organization (FAO) 69
 - JECFA 70, 71, 163, 235
 - JMPR 70
- food chain 4–5, 17
- Food and Drug Administration (FDA) 68–69, 228
- food intolerance 240
- Food and Veterinary Office (FVO) 75
- fried food 198, 203, 205–206
 - analysis of the oil 257–259
- Fritest 258
- fruit
 - allergies to 239
 - glycosides in 117, 123
 - preservation of 229
- fruit juices 108, 149, 162, 233, 267
- fumonisin 162–163
- fungi 7–9, 12
 - see also* mushrooms; mycotoxins
- fungicides 145, 182–184, 229, 230
- furanocoumarins 108
- Fusarium* species 158, 162, 163

- G-protein-coupled receptors (GPCRs) 62
- gaboxadol 34
- galantamin 176
- gallic acid esters 231–232
- gangrenous ergotism 151, 160
- garlic *see* wild garlic
- garlic breath odour 148
- 'garri' 24–25
- gas chromatography (GC) 244–247
- gastric absorption 32–33
- gastrointestinal tract
 - ADME 31–36, 51–52
 - colon cancer 113
- gender, nutritional requirements 2
- genetically modified organisms (GMOs) 76–77, 269–272
- genotoxicity
 - tests for 83, 93, 94–95
 - see also* carcinogens
- 'Ginger Jake paralysis' 275
- glass 191
- glazing agents 70–71, 236–237
- GLP (Good Laboratory Practice) 73, 81, 266
- glucosinolates 100–101, 118–120
- glucuronidation 45, 46
- glutathione conjugation 45, 46–47
- glycoalkaloids 120–121
- glycosides 111–113
 - anthranoids 113–114
 - carboxyatractylosides 114
 - cardiac (cardenolides and bufadienolides) 114–116
 - cucurbitacins 116
 - cyanogenic 24–25, 35, 116–118, 122, 249
 - glucosinolates 100–101, 118–120
 - glycoalkaloids 120–121
 - methylazoxymethanol (cycasin) 35, 122–123
 - naringin 123
 - nitriles 121–122
 - phyto-oestrogens 127
 - polyphenols 124
 - ptaquiloside 124
 - saponins 35–36, 65, 124–126
 - vicine 35, 126–127
- glycyrrhizinic acid 126
- glyphosate 181, 182
- GMOs (genetically modified organisms) 76–77, 269–272
- Good Laboratory Practice (GLP) 73, 81, 266
- gossypol 26–27, 109, 243
- grapefruit juice 108
- graphite furnace atomic absorption spectroscopy (GFAAS) 252
- GRAS list (generally recognized as safe) 68, 69
- grass pea (*Lathyrus sativus*) 103
- grayanotoxins (GTXs) 109
- growth-promoting hormones (GPHs) 11, 217
- Guam 122–123

- HAACP system 77, 265–267
- HAAAs (heterocyclic aromatic amines) 13, 209–210
- haem synthesis 141
- haemoglobin 64, 202
- haemolytic anaemia (favism) 35, 126–127
- hallucinogens 128
- hatters, mad 144
- hazard analysis (HACCP system) 77, 265–267
- heat exchange processes 12–13
- hepatic metabolism 29–30, 41, 42, 51–52, 56, 153
- hepatotoxins 107, 128, 152, 153, 202
- herbal products 9, 107
- herbicides 21, 179–182
 - GMOs resistant to 270, 272
- heterocyclic aromatic amines (HAAAs) 13, 209–210
- heterotrophs 5
- hexachlorobenzene 182
- high-performance liquid chromatography (HPLC) 247–251
- histamine 211, 213, 214
- honey 109
- hormone mimics *see* endocrine disruptors
- hydrogenation of oils 205, 206
- hydrolysis reactions 44
- hypoglycin A and B 102–123

- IARC (International Agency for Research on Cancer) 69–70, 152
- immunoassays 254–255
- immunotoxicity 61
- imports, into the EU 79
- in silico* studies 84

- in vitro* assays 82, 83, 91
acute toxicity 92–94
metabolism/toxicokinetics 91–92
molecular biology methods 95–96
mutagenicity 83, 93, 94–95
teratogenicity 93, 95
- in vivo* assays 82, 85–87, 93
- infants
BPA and 195
breast-feeding 52, 217
contaminated milk formula in China 274–275
kidney function 51
nitrate/nitrite toxicity 64, 202
- infertility 109, 169, 188
- insecticides 165–166, 184
carbamates 175, 176
in GMOs 270
organochlorines 166–170, 184
organophosphates 44, 63–64, 170–175, 176
pyrethrins/pyrethroids 165–166, 175–178
- intermediate syndrome 175
- International Agency for Research on Cancer (IARC) 69–70, 152
- International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) 81
- International Numbering System (INS) 71
- International Organization for Standardization (ISO) 242
- intestines
ADME 33–36
colon cancer 113
- intolerance to foodstuffs 240
- iodine deficiency 120
- ion chromatography (IC) 252–253
- ion-pair chromatography (IPC) 248
- ion-pair transport 34
- IQ compounds 209–210
- Iraq, mercury poisoning 145, 182
- Ireland, contaminated pigfeed 274
- iron 1, 134
- ISO Standards (ISO 9001 and ISO 22000) 267–268
- jack bean (*Canavalia ensiformis*) 102
- Japan
cadmium intoxication 136–137
indigenous foodstuffs 7, 8, 9, 124, 130–131, 214
mercury poisoning 144–145
- JECFA (Joint FAO/WHO Expert Committee on Food Additives) 70, 71, 163, 235
- JMPR (Joint FAO/WHO Meetings on Pesticide Residues) 70
- jojoba (*Simmondsia chinensis*) 121–122
- Kenya, aflatoxin contamination of flour 275
- keratin 65
- keshan disease 146, 148
- kidney
cadmium accumulation 11, 137–138
function 43, 49–51, 55
toxicants 142, 156, 274–275
- kidney beans 36, 99
- kinetics 53–60
in vitro testing 91–92
- konzo 24, 118
- Krebs (citric acid) cycle, inhibition of 64, 102, 135
- large intestine (colon) 35, 113
- latex allergy 193
- Lawes, John Bennet 177
- laxative toxicants 113–114, 124
- LC₅₀ values (lethal concentration 50%) 92–93
- LD₅₀ values (lethal dose 50%) 86, 89–90
- lead 140–143
in blood 36, 141
in bone and hair 133–134
in children 2–3, 142
regulations concerning 132–133, 143
tetraethyl lead (TEL) 2, 21, 142
- lectins 36
- legislation *see* regulations
- less developed countries 1, 79
- lethal synthesis 64
- lettuce 200–201
- lichens 8
- life windows for essential elements 19, 134, 135, 146
- ligand-gated ion channels (LGICs) 62–63
- limonoids 123
- linamarin 24–25, 117, 118
- lindane 167
- lipids 204–206, 230
analysis of oil used in deep-frying 257–259
in the cell membrane 32, 65
- liquorice (*Glycyrrhiza glabra*) 126
- lithium 55
- liver
biliary excretion 51–52, 56
metabolism 29–30, 41, 42, 153
as source of *in vitro* test material 91, 92
toxins 107, 128, 152, 153, 202
- liver pâté 25–26
- LOAEL (Lowest Observed Adverse Effect Level) 261
- lubricants 13, 191
- lung
excretion from 52, 148
toxicants damaging 136, 207
- lycopene 225
- lysergic acid 159
- Maillard reaction 196, 198, 210
- maize (*Zea mays*) 5, 148, 162–163

- malaria 166
- malathion 173–174
- malnutrition 1
- mancozeb 184
- maneb 183, 184
- mannitol (E421) 223–224
- mass spectrometry (MS)
 - GC/MS 245–246
 - IC/ICPMS 253
 - LC/MS 249
- maximum residue limits (MRLs) 72, 216, 260, 262–263
- MCPA (2-methyl-4-chlorophenoxyacetic acid) 180, 181
- 3-MCPD (3-monochloropropane-1,2-diol) 214
- meat 6, 7, 10–11
 - cured 199–200, 203, 207–208, 227
 - smoked 207–209
- melamine, in infant milk formula 274–275
- melanoidins 210
- mercury 17, 38, 143–146
 - analysis of 253–254
 - dose–response relationship 66
 - in fungicides 22, 143, 145, 182
 - regulations concerning 132–133, 146
- metabolic syndrome 1
- metabolism 29–30, 40–48
 - aflatoxins 153
 - phase I reactions 40–44, 91–92
 - phase II reactions 44–48
 - selenium 147–148
 - see also* kinetics
- metalloids 18
 - analysis of 243–244, 251–254
 - see also* arsenic; selenium
- metallothioneins (MTs) 137–138
- metals 18, 133–135
 - analysis of 243–244, 251–254
 - in organometallic compounds 21–22
 - see also individual metals*
- methaemoglobin 64, 202
- methyl iodide 143–144
- methylazoxymethanol glycosides (cycasin) 35, 122–123
- methyl-*p*-hydroxybenzoate (E218) 228
- methylmercury *see* mercury
- methylxanthines 105–106
- metiram 184
- Michaelis–Menten kinetics 57
- micromass test (MM) 95
- micronucleus test 94
- microsomal fraction in toxicity testing 91–92
- milk
 - aflatoxins in 27, 153
 - DEHP in 192
 - excretion into 52
 - intolerance to 240
 - lead in 142
 - melamine contamination in China 274–275
 - zearalenone in 163
- Minamata disease 144–145
- mineral oils 237
- mirex 184
- mixed function oxidase (MFO) *see* cytochrome P450 enzymes
- monomethylhydrazine (MMH) 129
- morphine 104–105
- mould toxins *see* mycotoxins
- MRLs (maximum residue limits) 72, 216, 260, 262–263
- MTB (2-mercaptobenzothiazol) 193
- muscle toxicity 114
- mushrooms
 - edible 7, 8, 128
 - toxic 8–9, 12, 128–129
- mutagenicity
 - tests for 83, 93, 94–95
 - see also* carcinogens
- mycotoxins 151
 - aflatoxins 27, 151–155, 266–267, 275
 - analysis of 246
 - ergot 13, 24, 151, 158–161
 - fumonisin 162–163
 - hazard analysis for prevention of
 - contamination by 266–267
 - ochratoxin A 25, 155–157
 - patulin 161–162, 267
 - trichothecenes 61, 157–158
 - zearalenone 163
- naringin 123
- natamycin (E235) 230
- National Sanitation Foundation (NSF) 191
- NDMA (nitrosodimethylamine) 202–203
- neonates 51, 64
 - see also* infants
- neurotoxins 85
 - in absinthe 234–235
 - acrylamide 197
 - algal (in shellfish) 27, 65, 129–130, 255–256
 - cyanide 24, 118
 - in the diet in Guam 122–123
 - ergot alkaloids 160
 - in fish 130–131
 - lead 142
 - mercury 144–145
 - in mushrooms 128
 - β -ODAP 103
 - organochlorines 167
 - organophosphates 170, 175
 - potato alkaloids 120
- nickel allergy 239
- nisin (E234) 229–230
- nitrates 199, 200–201, 227–228
 - in drinking water 64, 201, 203–204
- nitrile glycosides 121–122

- nitrites 199, 201–203, 227
 in drinking water 64, 201
 in meat curing 199–200, 227
 N-nitroso compounds (nitrosamines) 202–204, 227
 nitrosylhaemochrome 199
 nivalenol (NIV) 157, 158
 NOAEL (No Observed Adverse Effect Level) 260–261
 non-protein amino acids 102–103
 noni juice 77–78
 nonylphenol 187–189
 novel foods 76–77
 see also genetically modified organisms (GMOs)
 nut allergies 239
 nutrition 1–2
 DRIs 134
 GM crops and 272
 see also anti-nutritional compounds

 OA (okadaic acid) 130, 256
 obesity 1
 ochratoxin A (OTA) 25, 155–157
 octyl gallate (E311) 231–232
 β -ODAP (β -N-oxalyl- α , β -diaminopropionic acid) 103
 OECD *see* Organisation for Economic Co-operation and Development
 oestrogens 189
 see also endocrine disrupters
 oilfish (*Ruvettus pretiosus*) 131
 oils 204–206, 230
 analysis of oil used in deep-frying 257–259
 ESBO 193
 essential oils 232–233
 mineral oils 237
 toxic oil syndrome in Spain 273
 okadaic acid (OA) 130, 256
 oleoresins 233, 275
 olfactory characteristics of food 17, 99
 oligosaccharides 123
 one-compartment model 57
 opium alkaloids 100–101, 104–105
 oral intake/absorption 31–32
 organic compounds 19–21
 organic farming 10
 Organisation for Economic Co-operation and Development (OECD) 72–73
 Guidelines for the Testing of Chemicals 73, 80, 84
 test 401 (LD₅₀) 86
 test 407 (repeated dose toxicity) 87
 organochlorines 166–170, 184
 organometallic compounds 21–22, 137–138, 146–148
 methylmercury *see* mercury
 organotins 149–150
 selenomethionine 65, 146
 tetraethyl lead 2, 21, 142
 organophosphate-induced delayed neurotoxicity 175
 organophosphates 44, 63–64, 170–175, 176

 organotin compounds 149–150
 OTA (ochratoxin A) 25, 155–157
 oxidation reactions 40–43
 Oxifritest 258

 packaging 13, 133, 149, 191–194, 255
 PAHs (polycyclic aromatic hydrocarbons) 206–209
 parabens 228–229
 paralytic shellfish toxins (poisons) (PST/PSP) 65, 129, 130, 256, 257
 parathion 172, 173
 patulin 161–162, 267
 PCBs (polychlorinated biphenyls) 52, 185
 PCCDs *see* dioxins
 PCDFs (polychlorinated dibenzofurans) 185
Penicillium species 151, 155, 161, 229
 periodic table of the elements 16
 permethrin 178
 persistent organic pollutants (POPs) 184–185
 DDT 166, 167, 168, 169–170
 dioxins 21, 180–181, 185–187, 256–257, 273–274
 nonylphenol 187–189
 pesticides 72, 164–165
 in flour 23–24, 145, 182
 see also fungicides; herbicides; insecticides
 phenylketonuria (PKU) 222, 240
 o-phenylphenol (E231) 229
 phosmet 2
 photodiode array (PDA) detectors 248
 phototoxicity 83, 94, 108
 phthalates 31, 192–193
 physostigmin 176
 phytic acid 17, 99
 phyto-oestrogens 127
 picrotoxin 63
 pig products
 contaminated feed 25–26, 156
 liver pâté 25–26
 skatole in meat 17
 see also curing process
 placental barrier 38
 plants
 imported into the EU 79
 processing 23–27
 production systems 9–10, 14
 as raw materials 5–6
 taxonomy 97, 98
 see also glycosides; secondary metabolites
 plasma membrane 32, 33–35, 65
 plastics 31, 136, 191–193, 212
 BPA monomer 194–195
 pollution 2, 8, 21, 207
 see also persistent organic pollutants (POPs)
 polychlorinated biphenyls (PCBs) 52, 185
 polychlorinated dibenzo-*p*-dioxins (PCCDs) *see* dioxins
 polychlorinated dibenzofurans (PCDFs) 185

- polycyclic aromatic hydrocarbons (PAHs) 206–209
 polyphenols, cathartic 124
 polyurethane 212
 polyvinyl chloride (PVC) 31, 136, 192
 Ponceau 4R 225, 226
 poppy seeds 104–105
 POPs *see* persistent organic pollutants
 postharvest technology 12
 potato (*Solanum tuberosum*) 120–121
 poultry, contaminated feed 26–27, 273–274
 pregnancy 38, 134, 189, 217
 preservatives 199–200, 226–230
 primary producers 4–5
 proanthocyanidins 99
 processing 12–13
 - acrylamide formation 24, 196, 198–199
 - biogenic amine formation 212–214
 - cooking *see* cooking
 - distillation 210–211, 233
 - equipment as a source of contamination 139, 140, 149, 191
 - examples of processing chains 23–27
 - extraction 13, 233
 - HAA formation 13, 209–210
 - Maillard reaction 196, 198, 210
 - packaging and other food contact materials 133, 149, 192–194, 255
 - preservatives 226–230
 - regulations 77, 193–194, 200, 208–209
 - salting (nitrosamines) 199–200, 203, 227
 - smoking (PAHs) 207–209
 - soy sauce manufacture 214
 - trans* fatty acid production 205–206
 proficiency testing schemes 242
 propyl gallate (E310) 231–232
 propyl-*p*-hydroxybenzoate (E216) 228
 prosulfocarb 181
 proteinase inhibitors 98, 99
 protein(s)
 - secondary metabolites 97, 98, 99
 - as targets 62–65
 proteomics 96
 psilocybin 128
 psoralens 108
 PST/PSP (paralytic shellfish toxins/poisons) 65, 129, 130, 256, 257
 ptaquiloside 124
 puffer fish 130–131
 PVC (polyvinyl chloride) 31, 136, 192
 pyrethrins/pyrethroids 165–166, 175–178
 pyrrolizidine alkaloids 107, 246
- quality assurance 77–79, 81, 265–268
 quantitative structure–activity relationship (QSAR) 83–84
 quillaia saponins 126
- quinine (*Cinchona* species) 106–107
 quinoa (*Chenopodium quinoa*) 126
- radioimmunoassay (RIA) 254
 rapeseed 118
 rate constant (*k*) 56, 57
 raw materials 4–14
 RDAs (Recommended Dietary Allowances) 134
 ready-cooked meals 193
 receptors 62–63
 red colouring agents 136, 225, 226
 red kidney beans 36, 99
 reduction reactions 44
 Reed–Muench method for calculating LD₅₀ 89–90
 Reference Dose (RfD) 260, 261–262
 refractive index (RI) detectors 249
 regulations
 - aflatoxins 152, 155
 - algal toxicants 129–130, 256
 - analytical methods 241–242, 256
 - cosmetics 229
 - curing agents 200
 - cyanide content of cassava 118
 - dioxins 187
 - European (general) 20, 73–74, 75–79, 132–133
 - food additives 219–220
 - colouring agents 68–69, 225
 - flavouring agents 234, 235–236
 - preservatives 228, 230
 - food contact materials 133, 136, 149, 193–194, 195
 - international standards and guidelines 69–72, 81, 91
 - metals 132–133, 138, 146, 149
 - mycotoxins 152, 155, 157, 158, 161, 162, 163
 - nitrates 201
 - oils used in deep-frying 258
 - quality assurance 266, 267–268
 - smoked foods 208–209
 - toxicity testing 73, 80–82, 84, 87, 194
 - in the USA (general) 68–69
 - veterinary drug residues 217- renal accumulation of cadmium 11, 137–138
- renal function 43, 49–51, 55
- renal toxicants 142, 156, 274–275
- resmethrin 176–177, 178
- reverse-phase liquid chromatography 247
- RfD (Reference Dose) 260, 261–262
- rice (*Oryza sativa*) 151, 272
- risk analysis 76–77, 260–264
- rotenone 166
- rubber 193
- rye (*Secale cereale*), ergot contamination 13, 24, 151, 158–161
- saccharin (E954) 220, 221
 Safety Factors 261, 262

- safety of food 76–79, 81, 265–268
 GMOs 270–272
- safety pharmacology 81
- safflower (*Carthamus tinctorius*) 124
- salt-cured meat 199–200, 203, 227
- sampling procedures 242–244, 252
- saponins 35–36, 65, 124–126
- sarin 172
- saxitoxin (STX) 63, 130, 256
- scombroid poisoning 212–213, 214
- seafood *see* fish; shellfish; whale meat
- seaweed 9, 133
- secondary metabolites 97–98
 alkaloids 100–101, 103–8, 246
 fluoroacetic acid 64, 99, 102
 furanocoumarins 108
 gossypol 26–27, 109, 243
 mono- and sesquiterpenes 109
 non-protein amino acids 102–103
 phytic acid 17, 99
 proteins 97, 98, 99
 tannins 99
see also glycosides
- secondary producers 5
- selenium 18–19, 64–65, 134, 146–149, 254
- selenomethionine 65, 146
- semicarbazide 255
- Seveso incident 186
- sewage treatment 188–189
- shellfish 6, 11
 algal toxins in 27, 65, 129–130, 255–256
 allergy to 239
 metals in 135, 139
- silicon carbide-mediated
 transformation 270
- silylation 246
- simmondsin 121–122
- skatole 17
- skin irritation/corrosion
 photodermatitis 108
 tests for 84, 93
- small intestine 33–36
- smallholders 9–10, 10
- smoking (curing process) 207–209
- smoking (tobacco) 137, 207
- α -solanine 120–121
- sorbic acid/sorbates (E200/E202/E203) 226–227
- sorbitol (E420) 223–224
- sorghum (*Sorghum bicolor*) 99, 118, 159
- soy sauce 214
- soybean (*Glycine max*) 8, 98, 123, 127, 239
 epoxidated soybean oil 193
- Spain, toxic oil syndrome 273
- speciation (of elements) 138–139, 244, 252–254
- stainless steel 139
- Standard Uncertainty Factors (UFs) 261, 262
- standards *see* regulations
- steroids 189
 growth promoters 11, 217
see also endocrine disrupters
- stevioside 224
- stomach, absorption of toxicants 32–33
- storage containers 136, 149, 191–193, 255
- STX (saxitoxin) 63, 130, 256
- subsistence farming 9, 10
- sucralose (E955) 224
- sucrose intolerance 240
- Sudan III dye 275–276
- sulfites (E221–E224, E226–E228) 227
- sulfur dioxide (SO₂)
 air pollution 8
 as a preservative (E220) 227
- sulfuric acid 164, 179
- sunset yellow 225, 226
- sweeteners 35, 220–224
- 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) (agent orange) 21, 180–181, 187
- T-2 mycotoxin 157, 158
- tannins 99
- target organs/molecules 61–65
- tartrazine 225–226
- TCDD (2,3,7,8-tetrachlorodibenzodioxin) 185–187
- TDE (1,1-dichloro-2,2-bis(*p*-chlorophenyl)ethane) 166–167
- TDI (Tolerable Daily Intake) 260
- tea 105, 150
- teeth 150
- tempeh 8
- TEPP (tetraethylpyrophosphate) 172
- teratogenicity
 potato alkaloids 121
 tests for 93, 95
- testis, blood–testis barrier 38
- tetraethyl lead (TEL) 2, 21, 142
- tetrodotoxin 130–131
- theobromine 105
- theophylline 105
- thiabendazole (E233) 229
- thiaminases 17, 97
- thiocyanate 120
- threshold of toxicological concern (TTC) 235
- thujone 234–235
- tin 149–150
- tobacco use 137, 207
- Tolerable Daily Intake (TDI) 260
- tonic water 106
- toxaphene 184
- toxic oil syndrome 273
- toxicity testing 80–82
 acute toxicity 85–87, 92–94
 brine shrimp test 88–90
 general assays 82, 85–87
 of GMOs 271–272

- in silico* studies 83–84
- in vitro* assays 82, 83, 91–96
- in vivo* assays 30, 82, 85–87, 93
- objectives 82
- QSARs 83–84
- regulations 73, 80–82, 84, 87, 194
- repeated dose toxicity 87
- toxicodynamics 53, 61–67
- toxicogenomics 95–96
- toxicokinetics 53–60
 - in vitro* testing 91–92
- trace elements 17, 18, 134
 - life windows 19, 134, 135, 146
- traceability 77, 265
- trans* fatty acids (TFAs) 205–206
- transport across the cell membrane
 - absorption 33–35
 - excretion 50, 51
- trichothecenes 61, 157–158
- triclopyr 181
- triphenylmethane colouring agents 226
- truffles 7
- TTC (threshold of toxicological concern) 235
- tuna 213, 214
- Turkey, fungicide poisoning 182
- two-compartment model 57–59

- United Nations (UN) 69–72
 - see also* World Health Organization (WHO)
- United States of America (USA)
 - agent orange compensation 187
 - chromium contamination 139
 - DRI guidelines 134
 - ‘Ginger Jake paralysis’ 275
 - parabens 228
 - regulations 68–69
 - fish consumption (mercury) 146
 - fumonisin 162
 - selenium toxicity 148–149
 - toxicity testing 87, 91
- unscheduled DNA synthesis test (UDS) 94
- Up-and-Down Procedure (UDP) 87
- urethane 210–211, 212
- urinary excretion 49–51, 55

- veterinary drugs 10–11, 72, 165, 216–217
 - MRLs 216, 262–263
- vicine 35, 126–127
- vinyl chloride 192

- Viscofrit 258–259
- vitamins 17, 220, 272
 - see also* ascorbic acid
- voltage-gated channels 63
- vomitoxin (DON) 61, 157, 158

- water quality
 - endocrine disruptors 188
 - fluoridated 150
 - metal/metalloid contamination 135–136, 139, 140
 - nitrates/nitrites in 64, 201, 203–204
 - seafood and 11, 27
- water spinach (*Ipomoea aquatica*) 17
- waxes
 - additives 70–71, 236–237
 - toxic 131
- wet ashing 252
- whale meat 145
- wheat (*Triticum* species)
 - allergy to 239
 - mycotoxins in 159, 163
 - pesticides in flour 23–24, 145, 182
- WHO (World Health Organization) 69
 - IARC 69–70, 152
 - JECFA 70, 71, 163, 235
 - JMPR 70
 - on nitrates in drinking water 201
- whole embryo culture test (WEC) 95
- wild fish 12
- wild fungi 8, 12
- wild garlic (*Allium ursinum*), toxic plants picked
 - mistakenly for 108, 115–116
- Wilson’s disease 139
- wine 25, 210
- withholding/withdrawing periods 263
- World Health Organization *see* WHO

- xenobiotics, definition 28
- xylitol (E667) 223–234

- yeast 8
- yellow agents (herbicides) 179
- yellow colouring agents 136, 225, 226
- yoghurt 27

- zearalenone 163
- zero-order kinetics 56