

Index

a

academy of sciences for the developing world (TWAS) 17
 accra agenda for action 36
 acetylsalicylic acid 99f.
 active learning 139f., 142
 active pharmaceutical ingredient and intermediates (API) 216f.
 advanced oxidation processes (AOPs) 252, 254f.
 advancing chemistry by enhancing learning in the laboratory (ACELL) 140
 african network for the chemical analysis of pesticides (ANCAP) 39
 african union (AU) 24
 agenda 21 51
 agriculture 2, 47, 72
 AIDS 13, 15, 51, 109, 118, 127
 alkyl polyglycosides 189
 alternative feedstocks 195, 203ff.
 alternative reaction conditions 222
 alternative solvent 217ff.
 – areas of research 219f.
 american chemical society (ACS) 37, 194
 antarctica 311, 317ff.
 anti-cancer agent 163
 antibacterial agents 176f.
 antibiotics 175f.
 antinutrient 88
 antiviral agents 177
 arctic ozone 324
 arsenic 247ff., 256ff.
 arsenic species 248
 Aspirin 159ff.
 atmosphere 312f., 325
 atom economy (AE) 148, 226
 atom efficiency 148

b

Bacillus thuringiensis (Bt) 81
 bacterial capsular polysaccharide (CPS) 183f.
 bibliometric analysis 28
 bio-based economy 294
 bioavailability 88
 biocatalyst 216
 biochemical oxygen demand (BOD) 239f.
 biochemistry 100
 biodiesel 204, 291, 294
 biofuel 126f., 204, 244, 274, 281, 283, 290ff., 302
 – production 290
 – production alternatives 295
 biogas 301
 biomass 203, 205, 274, 290f., 295
 biomass conversion 301
 birth rate control 121
 brain drain 28
 Brazil 31ff.
 breakthrough 3ff.
 british antarctic survey 334
 bromine 324

c

caffeine 252f.
 cancer 161, 163, 174f., 182
 capability category 30
 capacity building 32ff.
 – evolution 32
 Capoten™ 163
 carbon capture and storage (CCS) technologies 261f.
 carbon cycle 245f.
 carbon footprint 293, 304
 carbon nanotube (CNT) 277ff., 284
 – use in sustainable energy applications 279

- carbon sequestration 261f.
 - carbon tetrachloride 327
 - catalysis 276, 294, 304
 - catalyst 213, 275, 285f.
 - catalytic cycle 315
 - Chapman reactions 314f.
 - chemical industry 99
 - chemical reactivity 145
 - chemical research 19
 - chemical research applied to world needs (CHEMRAWN) 19f.
 - purposes 19
 - chemical vapor deposition (CVD) 277f.
 - chemistry
 - breakthroughs 100
 - contribution to energy challenge 271
 - contribution to social and economic development 99ff.
 - development 1ff., 19ff.
 - education 135ff.
 - greening 189ff.
 - in context 146
 - innovation 1ff.
 - impact 1ff.
 - key requirements 32ff.
 - landmark examples 3ff.
 - rescue of threatened communities 132ff.
 - roles 50
 - role for development of society 272ff.
 - chemistry education 131ff.
 - global future 152ff.
 - sustainability themes 147f.
 - child mortality 11
 - chlorine 317, 323f., 328, 333
 - chlorine-based industry 223
 - chlorine derivatives 223f., 226
 - synthesis 224
 - chlorine dimer 323
 - chlorofluorocarbon (CFC) substitution 190
 - chlorofluorocarbons (CFCs) 317f., 321, 327, 329, 332f.
 - circular economy (CE) 197ff.
 - basic levels 198
 - concept 199
 - clean coal 280f.
 - climate change 49, 282, 311ff., 330ff.
 - climate science 150
 - CO₂-emission 224f., 262
 - coal 290
 - combating disease 16, 55
 - combinatorial chemistry 127
 - consorzio interuniversitario nazionale “la chimica per l’ambiente” (INCA) 191f., 196
 - cooperative networks 36
 - curriculum 138f., 143, 149
 - guidelines for curriculum planning 143f.
 - cyanobacteria 302
- d**
- Deepwater Horizon 244
 - demographic change 52
 - denitrification 322, 325
 - dentistry 6
 - Deutsche Forschungsgemeinschaft (DFG) 42
 - development 10, 15ff.
 - investments 22
 - development help 108
 - diammonium phosphate (DAP) 240
 - diet 85ff.
 - dimethyl carbonate (DMC) 206ff., 217f.
 - green production 211
 - dimethyl sulfate (DMS) 206f.
 - disability-adjusted life-years (DALYs) 91
 - Dobson spectrometer 316, 319
 - Dobson unit (DU) 316, 320
 - drug 159ff., 165ff.
 - mode of action 165ff.
 - structure 165
 - top 20 165
 - drug design 169ff.
 - drug development 159, 164, 169
 - expertise 172
 - technologies 172
 - drug discovery 159, 170, 186
 - drug dosage 173
 - drug metabolism 173ff.
 - phase I transformations 174
 - phase II transformations 174
 - drug resistance 173ff., 177, 182
 - mechanisms 175f.
 - drug screening 163
 - dye-sensitized solar cell (DSC) 298
- e**
- E factor 226f.
 - economic growth 107f.
 - economy 113
 - educational level 110
 - effective mass yield 226
 - effective yield 81
 - electrical energy 271
 - electricity 106f., 113
 - electricity loss 280
 - electrochemical method 289
 - electrochemistry 2
 - electrode, nanostructure 285

emerging chemicals 251ff.
 endocrine disrupting compounds (EDCs)
 252
 energy 50, 269ff.
 – availability 269
 energy chain 270
 energy consumption 296
 energy resource 270
 energy saving 222f., 276
 energy system 270
 energy vector 280
 environment 50
 environmental assessment tool for organic
 synthesis (EATOS) 227
 environmental protection agency (EPA)
 191
 environmental sustainability 13
 enzyme 216
 equilibrium 136
 essential amino acid 86
 essential nutrient 72
 ester 209f.
 ethanol 204
 european sustainable chemistry award
 200

f

fatty alcohols 189
 federation of african societies of chemistry
 (FASC) 37
 fermentation 294
 fertilizer 77f., 80, 133, 240
 fixed capital investment (FCI) 291
 fluoride 247ff.
 folk medicine 159f.
 food 47, 71
 food access 82ff.
 food availability 75f.
 food & drug administration (FDA) 164
 food fortification 89f.
 food product pyramid 90
 food production 80f.
 food security 71ff., 93f., 147
 – role of chemistry 92
 food security mandate 74ff.
 food utilization 75, 85ff., 90, 92
 food vehicle 89
 fossil fuel 152, 153, 272, 304
 – sustainable use 276
 fractionation of knowledge 144f.
 freon-12 190
 Friedel-Craft acylation 225
 fuel cell 153
 fuel reserve 280

g

gender equality 12
 gender issues 43
 genetic engineering (GE) 80f.
 genetically engineered crops 80f.
 geography 107
 geopolitics 107
 global alliance for improved nutrition
 (GAIN) 89
 global responsibility licence (GRL) 116
 global warming 14
 global warming potential (GWP) 332
 globalization 15, 57
 glocal 46f.
 governance 108
 graduate 32
 gram-negative bacteria 176
 gram-positive bacteria 176
 green algae 302
 green and sustainable chemistry network
 award 200
 green chemistry 148, 189ff., 263
 – areas 202ff.
 – concepts 192f.
 – definition 191f.
 – father figure 193
 – future perspectives 227ff.
 – history 189
 – in the economy 197
 – IUPAC-conferences 196
 – journal 196
 – metrics 226f.
 green chemistry catalysis 214
 – practical elegance 214f.
 green chemistry institute (GCI) 193f.
 green chemistry research 195, 199, 202
 – awards 199f.
 – institutions and associations 201
 green metrics 226
 green revolution 12, 48, 76ff., 115
 greenhouse gas (GHG) 152, 261f., 282, 293
 gross domestic product (GDP) 22ff.
 Gulf of Mexico 243f.

h

Haber process 6, 242
 Haber-Bosch process 134ff., 148
Haemophilus influenza 184
 halogen 225
 hard-soft acid-base (HSAB) theory 208f.
 health 3ff., 51, 108, 147
 health impact 49
 health promotion 117f., 123
 herbicide tolerance (HT) 81

- hierarchical organized materials 286
 high-income countries (HICs) 8, 18, 21, 54
 HIV 13, 15, 51, 118
 human activity 145
 human reproduction (HRP) 20
 hunger 9f., 71ff., 75
 hydrochlorocarbon (HCFC) 318, 327f., 332
 hydrodesulfurization (HDS) 285f.
 hydrogen 283
 hydrogen economy 299
 hydrogen peroxide 212
 hydroxyapatite (HAP) 260
- i**
- Ijebu-Ode experiment 119
 impact 2ff.
 inclusive business model 116f.
 industrial biotechnology 126f.
 industrial revolution 16, 134
 industrialization 16
 infection 112
 influenza virus 177ff.
 infrastructure 107, 114
 innocuous reagents 206
 innovation 1ff., 10, 30f.
 innovative developing countries (IDCs) 24, 26
 institution of chemical engineers award 200
 instituto nacional de biodiversidad (INBio) 55
 intellectual property 53
 interactive learning 142, 150f.
 international association of science and technology for development (IASTED) 17f.
 international foundation for science (IFS) 38
 international organization for chemical sciences in development (IOCD) 20f., 40, 56, 58
 international science programme (ISP) 38
 international union of pure and applied chemistry (IUPAC) 19, 37
 international year of chemistry (IYC) 131f., 134, 137, 143, 153f.
 investment 22
 ionic liquids 220
 isosorbide 217
- k**
- Kaiser Wilhelm Gesellschaft (KWG) 42
 kerosene 273
 kwashiorkor 109
- l**
- labor productivity 105
 laboratory work 144
 larger grain borer (LGB) 82ff.
 lead validation 171
 learner 138, 140
 learner-centered education 139
 learning community 139f.
 learning environment 138f.
 learning levels 141
 Lewis-acid 214
 life cycle assessment (LCA) 292f.
 life expectancy 8f., 109, 111
 lignin 205
 Lipinski's rule 169f.
 liquid fuel 299
 lithium-ion battery (LIB) 287
 lithium-ion cells 287
 low- and middle-income countries (LMICs) 8, 12, 15, 18f., 21, 32f., 40, 44ff., 54
- m**
- maize production 79, 83
 malaria 13
 malnutrition 10, 73, 90, 109
 malnutrition prevention 117f.
 mass index (MI) 226f.
 maternal mortality 13
 maternal mortality ratio (MMR) 14
 medicinal chemistry
 – tasks and bottlenecks 170f.
 membrane 256f.
 mercury 249ff.
 – global cycling 249ff.
 methane 205
 methanol 204
 – green synthesis 208
 methanol economy 299f.
 methicillin-resistant *Staphylococcus aureus* (MRSA) 177
 methyl halide 206f.
 microcredit 116f.
 micronutrient 80, 88
 micronutrient fertilizer 79
 millennium development goals (MDGs) 9ff., 73, 76, 84, 101, 115, 120f., 131, 137, 235, 255, 292
 millennium village 84
 Mississippi river 243f.
 monoalkylation 209f.
 Montreal protocol 327ff., 332
 – effects 328
 mortality 13, 111

multi-walled carbon nanotubes (MWCNT)
227f.

n

nanocasting 287f.
 nanochemistry 122ff.
 nanomaterial 283ff.
 nanomembrane 289
 nanostructure 284, 288, 298
 nanotechnology 122ff., 271
 – applications 123f.
 national development 22
 national funding 42
 natural processes 215
 natural product 161, 169, 174
 natural products research network for
 eastern and central africa (NAPRECA) 39
 natural resources exploitation 54
 nematode 91f.
 network for analytical and bioassay services
 in africa (NABSA) 40f.
 neuraminidase 178f.
 new energy technology 283
 nitric acid 322, 330
 nitric acid trihydrate 320
 nitrile 209f.
 nitrogen 77, 80, 133, 239ff.
 nitrogen oxide 329
 nitrogen species 242
 – oxidation state 242
 non-communicable disease (NCD) 51
 nongovernmental organization (NGO) 17,
 19, 120
 non-methane volatile organic compounds
 (NMVOC) 218
 nuclear chemistry 281
 nuclear magnetic resonance (NMR) 7, 41,
 169
 nucleic acid 4
 nutrients 239ff.
 nutrition 47, 71f., 75, 93f.

o

obesity 104
 octane number 273f.
 oil 290
 oil refinery 272ff.
 – chemical processes 273
 open access 44
 open innovation 53
 organic chemistry 185f.
 organization for economic co-operation and
 development (OECD) 195, 202
 oxidant 212

oxidation 212
 ozone 312ff.
 – climate change 330ff.
 – measurement 316
 ozone depletion 311ff.
 – resources 334
 ozone hole 311, 317ff.
 – explanation 321f.
 ozone hole watch website 335
 ozone layer 313

p

pan african chemistry network (PACN) 37
 pandemics 52
 Paris declaration 36
 patent 28f.
 patent protection issue 172f.
 pathogens 246f.
 pedagogical content knowledge 141
 pedagogical strategies 140f.
 pedagogy 137ff., 145
 penicillin 101
 pesticide 78
 petroleum 205, 272ff.
 pharmaceutical chemistry 2, 5
 phase-transfer catalysis 190
 phosgene 206
 phosphorus 239ff.
 photoelectrochemical (PEC) approach
 302ff.
 photolysis 314f.
 photosynthesis 245
 photovoltaic (PV) cell 296ff.
 photovoltaic (PV) technology 297
 plasmid 175
 polar stratospheric clouds (PSCs) 320ff.,
 325, 330
 polylactic acid (PLA) 215
 post-harvest treatment 82
 poverty 8f., 99ff.
 – asymmetry of poverty in the world 104ff.
 – causes 106ff.
 – concept 102ff.
 – definition 102f.
 – historical evolution 102ff.
 – strategies against poverty 112ff.
 poverty penalty 113
 presidential green chemistry challenge
 199
 primary education 11f.
 professional association 36
 project kaleidoscope (PKAL) 141
 protein 4
 protein complementation 87

protein-energy malnutrition (PEM) 109f.
 – involved factors 110
 proton exchange membrane (PEM) fuel cell
 299, 302

r

RACI green chemistry challenge award
 200
 raw material 203
 reactive chlorine compounds 323
 Relenza™ 179f.
 renewable energy 112ff., 277, 282
 renewable feedstocks 228
 research and development (R & D) 22,
 24f., 30, 303
 – outputs from investments 25
 researcher 27
 rich context learning 146
 river blindness 55
 royal society of chemistry (RSC) 37

s

safer chemicals, design 220f.
 sanitary conditions 110
 science 15ff., 22, 114ff.
 science and technology (S & T) 15, 18f., 22,
 25ff., 30, 269, 278, 291
 – national policies 33f.
 – responsibility 34ff.
 science, technology and innovation (ST & I)
 30 ff.
 scientific publication 28, 31
 scientific visualization studio 335
 scientist 3ff.
 scurvy 72
 selectivity 213
 smart energy house 275
 soda 16
 soil rehabilitation techniques 84
 solar concentrator 301
 solar energy 281f., 301
 solar fuel 296ff.
 solar light 274, 302
 solar water disinfection (SODIS) 254f.
 solventless reaction 219
 spectroscopy 7
 starting material 203, 206
 stoichiometric factor (SF) 227
 storage 82, 85
 stratosphere 311, 313f., 316f., 321, 324,
 328, 330
 sugar cane 204
 sulfone 209f.
 super-structure 289

supercritical fluids (SCFs) 219
 sustainability 147, 149f.
 sustainable development 50, 112
 sustainable energy 270f., 275ff.
 sustainable water conference 2009 56
 syngas (synthesis gas) 300
 synthetic carbohydrate chemistry 184
 synthetic chemical 4
 synthetic chemistry
 – impacts an human health 159ff.

t

Taiwan 34
 – development of chemical industry 35
 – economic miracle 35
 Tamiflu™ 179f.
 Tanzania 45f.
 – legal framework 46
 – policy/regulatory framework 45
 – technology policy instruments 46
 – transfer of technology 45
 technical progress 9
 techniques for separation 7
 technological development 17
 technological progress 114ff.
 technology 15ff., 22
 technology transfer 44
 – between academia and industry 44
 – between countries 45
 temperature 325
 tetrahedral chemistry education 145
 third world organization for women in
 science (TWOWS) 17
 total ozone mapping spectrometer (TOMS)
 317, 319
 toxic functional group 221
 toxicity 221
 trade-related aspects of intellectual property
 rights (TRIPS) 53f.
 transportation 101
 troposphere 313, 321, 330f.
 tropospheric warming 151
 Tshwane consensus 26f.
 turbidity 246f.

u

ultraviolet (UV) radiation 314, 332
 undernourished population 74
 undernutrition 91, 112
 underweight children 73f.
 united nations capital development fund
 (UNCDF) 117
 united nations development programme
 (UNDP) 120

- united nations educational, scientific, and cultural organization (UNESCO) 17, 21
- united nations environment programme 334
- united nations industrial development organization (UNIDO) 292
- university of Cambridge ozone hole tour 335
- urbanization 52, 57
- urine 260
- US environmental protection agency 334

- v**
- vaccine 182ff.
 - bacterial capsular polysaccharide vaccines 183
 - carbohydrate-based vaccines 182f.
 - synthetic vaccines 183
- vancomycin 177f.
- Viagra 180
 - chemical structure 181
 - chemical synthesis 182
- volatile organic compounds (VOCs) 218, 331

- w**
- waste 210
 - reduction 210ff., 214
- wastewater 259
- water 56f., 153f., 219, 235ff.
 - chemical concentrations 237
 - consumption 236
 - location of freshwater 236
 - nutrient loading 244
 - sources 237f.
 - volume 236
 - water footprints 238
- water electrolysis 300
- water fluoridation 6, 249
- water photoelectrolysis 302
- water pollution 239ff.
- water purification 124f.
- water quality 239ff.
- water reuse 259f.
- water treatment 254ff.
 - technologies 254ff.
- water vapor 331
- wealth 3ff.
- world food programme (WFP) 119
- world health organization (WHO) 20, 109, 247
- world intellectual property organization (WIPO) 53
- world meteorological organization 334
- world trade organization (WTO) 32, 53

- x**
- x-ray crystallography 169

- z**
- zeolite 212f.
 - application 213

