

Index

Symbols

o-aminobenzaldehyde 393
 1,4-benzenedicarboxylic acid
 (BDCA) 67, 103
 4,4'-bipyridine-hexafluorosilicate-
 copper(II) (Cu-BPY-HFS) 225
 4-*tert*-butylbenzaldehyde 384
tert-butylcarbamate-functionalised
 4'-biphenyldicarboxylate
 (bpdc-NHBoc) 4, 32
 2-chloroethyl ethyl sulfide (CEES) 211
 2,5 dihydroxytere-phthalic acid
 (DOBDC) 125
 4-nitrobenzaldehyde 385
 2D-polymer
 bidimensional networks 82
 bottom-up methodologies
 LB method at water/air
 interface 92
 liquid/liquid interfacial
 synthesis 100
 merits 92
 on-surface synthesis 92
 catalysis 113
 catalytic activity 113
 chemical vapor deposition 115
 compositional characterization
 rotation electron diffraction
 (RED) 92
 X-ray diffraction (XRD) 91
 X-ray photoelectron
 spectroscopy 88
 conductive properties 112

criteria 81
 direct colloidal formation 104
 for electronic devices 112
 for gas separation 111
vs. graphene 115
 membrane thickness and pore size 111
 morphological characterization
 AFM 87–88
 scanning electron microscope 85
 simulated STM 86
 transmission electron
 microscopies 84
 UHV-STM 85
 as prototype devices 116
 surfactant mediated synthesis 104
 top-down methodologies
 delamination processes 105
 inorganic materials 105
 liquid phase exfoliation (LPE) 106
 micromechanical exfoliation 110
 α -Pinene oxide isomerisation 391
 4-*tert*butylcyclohexanone (TBCH) 367
 1,3,5,7-tetramethyl-4,4-difluoro-8-
 bromomethyl-4-bora-3a,4a-
 diaza-s-indacene (BODIPY) 45
 4,4',4"-*s*-triazine-2,4,6-triyl-tribenzoate
 (TATB) 5
 $[Zn_4O(BDC)_3]$ 67

a

Al-based MOFs
 MOF-519 and MOF-520 186
 soc topology 186

- academia 58
 acetaldehyde 393
 activated carbons (AC)-MOF
 composites 255
 adsorbed natural gas (ANG) 164
 advantages of MOF 57
 atomic force microscopy (AFM) 344, 355
 atomic layer deposition 401
 azolate-based MOF 9
- b**
 benzenecarboxylic acid 43
 benzenedipyrazolate (BDP) Fe(III)
 MOF 11
 benzene-1,3,5-tribenzoate
 (BTB) 138
 bidimensional networks for MOFs 82
 biocatalysis
 esterification and
 transesterification 463
 heterogeneous catalysts 447
 hydrolysis 464–465
 immobilization 469
 immobilization and
 applications 460
 industrial biocatalysts 447
 oxidation 466–467
 warfarin synthesis 468
 biomimetic catalysts
 Cu-hemin 449
 metalloporphyrins 449
 organic ligand and metal precursors,
 and catalytic reaction 450
 phosphotriesterase (PTE) 452
 polyvinyl pyrrolidone (PVP) 449
 post-synthetic modification
 processes 454
 UiO-66 methanolyses 452
 biosensors 44
 bis-BINOL ligands 387
 bottle-around-shipBAS approach 304
 breathing effect 18
 Brønsted acid/base catalysts 39
 Brunauer-Emmet-Teller (BET) 359
 bulk modulus 18
- c**
 capillary-force-driven destruction 17
 capillary-force-inert MOFs 18
 carbon capture and sequestration
 (CCS) 123
 carbon capture and storage (CCS) 281
 carbon ink electrode (CIE) 468
 carbon nanotubes (CNTs)
 fabrication 254
 MOF-CNTcomposites
 applications 252–253
 functionality 252–253
 MOFs incorporation on CNT
 surface 254
 synthesis methods 252, 253
 structure 252
 carboxylic acid derivatives 385
 catalysis with MOF
 host matrices 41
 metal active sites
 hydrogenation reactions 39
 hydroxyl groups to alkoxides
 conversion 39
 node-based linker 38
 on organic ligands 37
 photocatalytic activity 37
 pre-synthetic functionalization 307
 with reactive, organic functional
 groups 39
 catalysts
 esterification reaction 276
 heterogeneous 276
 hydrogenation reaction 276
 oxidation reaction 274
 photocatalysis 275
 research studies 277
 cetyltrimethylammonium bromide
 (CTAB) 104
 chemical stability
 cation-ligand interaction 19
 competing agent 3
 coordination bond 4
 effect of water 3
 inert gas sorption isotherms 3
 modulators 19
 under noninert conditions 2

- pH 3
 powder X-ray diffraction (PXRD)
 patterns 3
 preformed inorganic building
 units 19
 sub-factors 3
 water stability 2, 4
 chemical vapor deposition (CVD) 266, 401
 chemical warfare agent (CWA) 201
 adsorptive property, MOF
 to Calgon BPL activated
 carbon 202
 colorimetric sensor
 properties 203
 computational studies 204
 humidity 203–204
 MPA adsorption 203
 pore structure and function 201, 205
 $[\text{Zn}_2\text{Ca}(\text{BTC})_2(\text{H}_2\text{O})_2]$
 (DMF)₂ 203
 catalytic property, MOF
 hydrolysis, nerve agents and their
 simulants 206
 multiactive catalysts for CWAs
 degradation 212
 oxidation of sulfur mustard and its
 analog 211
 chlorine gas 199
 MOF materials
 aluminum MOF particulate
 materials 214
 Cu-BTC particles 214
 halochromic NU-100-CF 215
 MOF–nanofiber textile
 composites 215
 plug-flow reactor 216
 UiO-66@LiOtBu 214–215
 UiO-66-NH_2 coated
 electrodes 216
 nerve agents
 acetylcholinesterase activity 199, 201
 structure 199–200
 physico-chemical parameters 200
 toxicity levels 199–200
 CNT 252
 COK-69 18
 composites
 applications 252
 catalysts
 esterification reaction 276
 heterogeneous catalyst 276
 hydrogenation reaction 276
 oxidation reaction 274
 photocatalysis 275
 research studies 277
 for CO_2 capture and
 separation 281
 features 286
 as gas adsorbent 282
 H_2 storage 281
 for liquid separation
 applications 285
 MOFs–carbon composites
 carbon nanotubes (CNTs) 252
 MOFs–activated carbons
 composites 255
 MOFs–graphite oxides
 composites 255
 MOFs–metal nanoparticle
 composites 262
 MOFs–metal oxide
 composites 266
 MOFs–silica composites 272
 MOFs–thin films
 ceramic foams support
 treatment 259–260
 MOF-101@ Al_2O_3 composites
 preparation 259, 261
 supersonic cold spray
 technique 259
 ZIF-8 crystals 259, 261
 synthesis 251
 toxic gases adsorption 285
 types 251
 compressed natural gas (CNG) 164
 confocal fluorescence microscopy
 (CFM) 356
 contact mode, AFM 87
 continuous flow process 70

- coordination bond
 - bulky and/or hydrophobic groups, shielding MOFs with 12
 - cation-ligand interaction 4
 - high valence cations and carboxylate based ligands 4
 - high valence cations and highly complexing ligands 11
 - hydrophobic matrices, coating MOFs with 13
 - low valence cations and highly complexing ligands 9
 - coordination networks, advantages 57
 - coordinatively unsaturated metal centers (CUSs) 341
 - coordinatively unsaturated metal sites (CUS's) 313
 - CO₂ adsorbents 34
 - CO₂ sorbents
 - amine grafting
 - alkanolamine compounds 132
 - diamines 136
 - 1,5-dioxido-2,6-naphthalenedicarboxylic acid (dondc) 132, 135
 - functionalization
 - strategy 132–133
 - limitation 136
 - MIL-101 136
 - routes for 132
 - TEPA loadings 136
 - cordierite monolith supports 144
 - features 150
 - graphene oxides-MOF composites 143
 - interaction strength 124
 - ionic liquids-MOF composites 139
 - open metal sites
 - affinity toward CO₂ 125
 - bonding geometry 125
 - drawback 132
 - HKUST-1 128
 - H4PTCA 131
 - M-DOBDC 125
 - MIL-101 130
 - MOFs 126
 - molecular simulation
 - accuracy 128
 - as stabilizing agent 125
 - ZIF-202 131
 - organic ligands effects 138
 - performance criteria 124
 - pK_a value 150
 - solid material composites 144
 - surface area and pore volumes 124
 - water stability
 - characteristics 144
 - hydrophobic organic ligands 147
 - MOFs with open metal sites 146
 - working capacity 124
 - covalent attachment
 - catalytic applications 316
 - separation
 - carbon dioxide capture 315
 - nitrogen compounds removal 316
 - U(VI) ions removal 316
 - technique 313
 - covalent organic frameworks (COFs) 116
 - covalent post-synthetic modification 31
 - cross-linked ligands
 - crystalline MOFs to polymer gels 49
 - enantiopure 48
 - IRMOF-1 47
 - microcrystalline porous network 47
 - MOF scaffold 48
 - Sada group 49
 - crystallinity of MOF 82
 - Crystal Violet (CV) 44
 - Cu-BTC MOF 203
- d**
- defective linkers (DLs) 355
 - defects
 - aromatic carboxylic acid linker incorporation strategy 348, 350
 - catalysis, role of
 - external surface linker vacancy 363
 - inherent linker vacancy 366
 - intentional implanted defects 367
 - defect dimensions 343
 - definition 342

- de novo synthesis 347
 distribution, size and state 343
 experimental methods
 assess presence of defects 352, 354
 chemical and physical
 environment 357
 imaging defects 355
 isolated local and correlated
 defects 358
 inherent defects
 inherent internal defect 344
 post-crystallization cleavage 345
 intentionally implanted defects, by
 defect engineering 346
 location 343
 non-aromatic carboxylic acid linker
 incorporation strategy 351
 post-synthetic treatment 351–352
 theoretical methods 359, 361
- delamination processes 105
 deliverable capacity 165
de novo approach 458
 dicopper paddlewheel-based MOFs
 NbO-type MOFs 172
 Rht-type MOFs 177
 tbo-type MOFs 172
 Diels-Alder cycloaddition 384
 Diethyl zinc (ZnEt₂) 380
 Diffusion 470
 dimethyl 4-nitrophenyl phosphate (DMNP,
 methyl paraoxon) 207, 209
 drug delivery materials 44
 DUT-49 18
 dynamic mode, AFM 87
- e**
 electrochemical biosensors 468
 electrochemical synthesis 69
 enzyme immobilization
 enzymes diffusion 456
 in-situ encapsulation/
 entrapment 457
 surface immobilization 455–456
 ethoxysuccinato-cisplatin (ESCP) 45
 ethylenediaminetetraacetic acid
 (EDTA) 492
 extrusion 74
- f**
 Fe₂(BDP)₃ 11
 flexible MOFs 190
 force modulation microscopy
 (FMM) 355
 Fourier Transform Infra-Red
 (FTIR) 355
 Friedel–Crafts acylation 383
 Friedel–Crafts alkylation 369
 Friedländer reaction 392–394
 functionalized metal organic
 frameworks
 amine groups 301
 carbon dioxide capture 300
 catalysis
 design parameters 300
 categories 298
 chemical stability 303
 covalent attachment/type 2 method
 catalytic applications 316
 separations applications 314
 technique 313
 in-situ reaction/Type-3 method
 catalytic applications 321
 separations applications 319
 technique 318
 issues 326
 ligand replacement/Type-4 321
 limitation 302
 metal addition/Type-5 method
 catalytic applications 325
 separations applications 325
 technique 322
 pharmaceuticals and pharmaceutical
 waste 301
 physical impregnation/type 1 method
 catalytic applications 312
 separations applications 310
 technique 309
 post synthetic modification
 (PSM) 298
 pre-synthetic functionalization 297
 catalytic applications 307
 separations applications 304
 technique 303
 separations
 design parameters 299

g

- gas infiltration method 266
 global warming 123
 grafting method 314
 graphene 81
 graphene oxides (GO)-MOF composite
 characteristics 143
 Henry's constant 144
 merits 143
 graphite oxides (GOs)
 composites 255
 Grinard reaction 308
 G-type nerve agents 199

h

- Heck reactions 430
 Henry's coefficient (HCs) 205
 heterogeneous catalysis 37, 299
 HKUST-1 32, 46, 67
 continuous flow process 72
 CWA monitoring 206
 electrochemical synthesis 69
 HKUST-1/silica composites 273
 methane uptake 171
 with open metal cluster 128
 scale-up reaction 69
 HKUTS-1
 gas separation 225
 homogeneous catalysis 37
 hydrogen storage 35
 hydroxy esters 387

i

- Immediately Dangerous to Life or Health (IDLH) 200
 impregnation 263
 impregnation methods
 gas phase impregnation 401
 solid phase impregnation 401
 impregnation, physical
 catalytic applications 312
 separations applications 310
 technique 309
 incipient wetness impregnation 309
 incipient wetness method 263
 industrial patents 64
 inherent defects

- inherent surface defect 344
 inorganic post-synthetic modification 32, 34
 in situ encapsulation 470
 in-situ reaction
 catalytic applications 321
 separations applications 319
 technique 318
 internal porosity 18
 intramolecular carbonyl-ene reaction 392
 ionic liquids-MOF composite
 bmimBF₄@HKUST-1
 composite 140
 bmimPF₆@ZIF-8 composites 141
 characterization 140
 designing factors into
 consideration 141
 features 140
 preparation 140
 selectivity 141
 use of ionic liquids 139
 IRMOF-1 system 47
 IRMOF-1 ([Zn₄O(bdc)₃] bdc = 4-benzenedicarboxylate), 1, 203
 isostructural mixed linkers
 (IML) 347
 isostructural MOFs 125

k

- ketalization reactions 390
 Knoevenagel condensation 308, 388, 394
 Kubas-type interaction 36

l

- labile ligands 34
 Langmuir–Blodgett (LB) method
 extended films, MOF 92
 and layer-by-layer (LBL)
 methodologies 100
 monolayer, dense coordination polymer 93
 π-conjugated framework with reversible redox behavior 96
 THTNi 2DSP 96
 transmetalation 96

- lateral dimensions 81
 Lewis adduct 9
 Lewis type adsorption 367
 ligand replacement 321
 liquefied natural gas (LNG) 164
 liquid/liquid interfacial synthesis 100
 liquid phase exfoliation (LPE)
 exfoliation 108
 by sonication 107
- m**
- MAF-38 189
 Materials of Institute Lavoisier (MIL)
 compounds 5
 chain-based MIL-53 5
 Cr(III) 7
 linker 5
 MIL-100 5
 MIL-163 12
 rare earth trivalent cations 7
 trivalent cations 5
 mechanical stability 17
 mechanochemical synthesis 72
 membrane-aided gas separation
 systems
 applications 223
 characteristics, MOFs 224
 inorganic membrane materials 223
 membranes
 mixed matrix membranes
 (MMM) 226
 modelling of gas permeation 244
 thin-film MOF membranes 232
 molecules interaction with membrane
 material 224
 polymeric membranes 223
 size-sieving mechanism 224
 metal addition
 catalytic applications 325
 separations applications 325
 technique 322
 metal centers 297
 metalloporphyrins 449
 metal nanoparticles (MNPs) based
 MOFs composites
 approaches 262
 classification 262
 drawbacks 262
 gas infiltration method 266
 MOF structure 263
 physiochemical properties 262
 solid grinding method 266
 solution infiltration method 263
 synthesis 262
 synthesis method 264
 template assisted synthesis
 method 266
- metal/node replacement 322
 metal-organic frameworks (MOFs)
 acetals, ethers 389–390
 alcohols
 alcoholysis of epoxides 382
 aliphatic and cycloaliphatic
 epoxides 382
 chiral unsaturated alcohols 380
 diethyl zinc ($ZnEt_2$) 380
 Grignard reagent to
 dienophiles 381
 Henry addition 382
 vicinal alcohol derivatives 381
 biocatalysis 447
 carbonyl and hydroxy carbonyl
 compounds
 aldehydes 384
 aldehydes and ketones 383
 Diels-Alder cycloaddition 384
 Friedel-Crafts acylation 383
 hydroxy aldehydes and
 ketones 383
 L-proline 385
 thermo labile protecting
 groups 385
 carboxylic acid derivatives 385
 Friedländer reaction 392–394
 Knoevenagel condensation 394
 liquid phase reactions 395
 nanoparticles 399
 terpenoids 390, 392
- metal-organic frameworks (MOFs)
 defects
 definition 342
 experimental methods
 isolated local and correlated
 defects 360

- metal oxides nanoparticles (MONPs)
 classification 267
 facile pyrolysis 272
 hydrothermal method 270–271
 impregnation/infiltration
 methods 267
 one-step synthesis method 270
 solvothermal treatment 271
 synthesis approach 267
 synthesis method 267, 268
 template-assisted *in-situ* synthesis
 method 271
 two steps CVD process 270
- methane adsorbents
 Al-based MOFs 186
 dicopper paddlewheel-based MOFs
 NbO-type MOFs 172
 Rht-type MOFs 177
 tbo-type MOFs 172
 flexible MOFs 190
 gas adsorption/binding sites 194
 hydrostability 194
 MAF series 189
 methane adsorption property
 adsorption heat 170
 ligand functionalization 171
 open metal sites 170
 pore size 170
 surface area 169
 MOF materials 167, 192–193
 requirements
 adsorbing species 166
 gas transport rate 167
 methane deliverable capacity 165
 production costs 167
 stability 166, 194
 thermal management 166, 194
 working capacity, volumetric
 methane 193
 storage capacity 192
 storage target 165
 Zn₄O-cluster based MOFs 180
 Zr-based MOFs 182
 methyl isobutyl ketone (MIBK) 433
 methylphosphonic acid (MPA) 203
 micromechanical exfoliation 110
 M(II)-bistrizolate MOF 11
- MIL-53 35
 MIL-88B(Fe)-(CF₃)₂ 12
 MIL-91(Ti) 11
 MIL-101 34
 amine incorporation 136
 with open metal cluster 130
 MIL-101(Cr) 36, 41
 drug delivery 44
 mercury absorbing ability 42
 nanoparticles 42
 sulfation 43
 zwitterionic 40
 MIL-163 12
 mixed matrix membranes (MMM)
 CO₂/CH₄ selectivity vs. CO₂
 permeability 227
 cross-section of 226
 filler loading 231–232
 fillers 226
 materials 226
 modelling the gas permeation 244
 MOF/polymer 232
 mixture selectivity values 234
 single gas selectivity 233
 permeability of O₂, H₂ and CO₂, 230
 permeance and selectivity 231
 preparation 226
 Robeson plots for CO₂/CH₄ and H₂/
 N₂ 229
 ZIF-8/6FDA-durene membrane 228
- modulators 4
 MOF-808 8, 40
 CWA degradation 211
 sulfation 43
 MOFs, properties 482–483
 molecular baskets 309
 molecular sieving 300
 monolayer 2D-material 82
 Monte Carlo simulations 362
 Mukaiyama aldol reaction 388
 multilayer N₁ 100
- n**
- nanolayers, MOF 103–104
 nanoMOFs 46
 nanoparticles (NPs) 41
 assembly methods

- bottle-around-the-ship approach 404
“ship-in-a-bottle” assembly method 402
- C–C cross coupling reactions 430
- dehydrogenation reactions H₂-release reactions 425
- metal organic chemical vapour deposition method (MOCVD) 425
- rhodium(I) precatalysts 425
- trimetallic synergistic effect 425
- gas and liquid phase oxidation catalysis alcohols 407
- Au-Pd/C catalyst 411
- catalytic cycle and poisoning mechanism 407
- CO oxidation activities 405
- synthetic conditions and catalytic activities 406, 408
- hydrogenation reactions acetophenone 416
- 1,4-butyne diol to 4-butenediol 1, 421
- cinnamaldehyde, 4-butyne diol and phenol 1, 422
- cyclohexene 420
- cyclohexene and benzene 420
- electron-donating groups 424
- industrial applications 411
- nitrobenzene 412
- nitrobenzene and carbonyl compounds 416
- olefins 417
- phenol 424
- synthetic conditions and catalytic activities 413
- impregnation methods gas phase impregnation 401
- solid phase impregnation 401
- tandem reactions 433
- nanosheets, CP 104
- natural gas advantages 163
- ANG 164
- challenge 163
- CNG 164
- LNG 164
- NENU-11 206
- nickel oxo-pyrazolate (Ni(DP)) bis-pyrazolate MOF 9
- N-rich azole derivatives 9
- o**
- one-pot reaction methodology 67
- on-surface synthesis 92
- open-close double door system 316
- Organisation for the Prohibition of Chemical Weapons (OPCW) 199
- p**
- patents 58
- PCN-222/MOF-545 211–214
- PCN-601 10
- phosgene 203
- phosphonate monoester based MOF 13
- phosphotriesterase (PTE) 452
- phosphotriesterase enzymes (PTE) 206
- photocatalysis 313
- inorganic semiconductors 477
- molecular photocatalysts and inorganic semiconducting materials 478
- oxidation and Au NPs 480
- photocatalytic CO₂ reduction 493
- photocatalytic H₂ evolution ethylenediaminetetraacetic acid (EDTA) 492
- porphyrins 492
- renewable transportation fuels 490
- role of platinum 490
- UiO-66 491
- UiO-66 structure 491
- photooxidation reactions 496
- photophysical pathways chemical energy 489
- d⁰ and d¹⁰ transition metal ions 485
- electron delocalization 487

- photocatalysis (*Contd.*)
- ligand centered absorption bands 483
 - MV⁺ radical cation 489
 - n-type semiconductors 487
 - optical absorption spectrum 483
 - $\pi-\pi^*$ electronic transitions 485
 - quenching experiments 487
 - terephthalate 485
 - terephthalate-Zn²⁺ pairs 485
 - UiO-66(Zr) 488
 - Wurster's NTP⁺ radical cation 489
 - Zr₆O₆(OH)₆ clusters 488
 - plasmon absorption band 480
 - pollutant degradation 496
 - TiO₂ photoelectrodes 477
 - zeolites and crystalline porous solids 481
 - photocatalytic reductions 37
 - photolytic cleavage 32
 - physical impregnation 309
 - pollutant degradation 496
 - polymeric binders, embedding particles in 19
 - polyoxometalates (POMs) 311
 - polyvinyl pyrrolidone (PVP) 449
 - porous coordination polymers (PCPs) 1, 164, 448
 - porous MOFs 165
 - CWA 201
 - post-crystallization cleavage 345
 - post-synthetic deprotection (PSD) reactions 32
 - post-synthetic exchange (PSE) 32
 - post-synthetic modification (PSM) 29
 - anion sequestration 43
 - carbon dioxide capture and separation 34
 - catalysis
 - host matrices 41
 - metal active sites 37
 - with reactive, organic functional groups 39
 - covalent attachment 313
 - cross-linked ligands modified nature of cross-linked MOFs 49
 - post-synthetic 47
 - pre-synthetic 47
 - crystallinity of MOF 29
 - frameworks, MOF 29
 - hydrogen storage capacity 35
 - in-situ reaction 318
 - ligand replacement 321
 - metal addition 322
 - metal ion sequestration 42
 - nanoMOFs 46
 - organic molecules removal from solution 43
 - physical impregnation 309
 - reactions
 - classes 30
 - covalent modification 31
 - extent of 33
 - linker ligands, substitution of 32
 - metal centres, exchange of 33
 - secondary building unit (SBU) 32
 - therapeutic MOFs and biosensors 44
 - powder X-ray diffraction (PXRD) 3
 - powder XRD (PXRD) patterns 354
 - pre-synthetic functionalization 298
 - catalysis
 - Grinard reaction 308
 - Knoevenagel condensation 308
 - mercury removal from flue gas 308
 - solid base catalysts 307
 - UiO-66 307
 - separation
 - biphenyl benzene dicarboxylic acid ligands 306
 - C3 functional groups, use of 305
 - photoresponsive SURMOF 307
 - UiO-66 304
 - technique 303
 - pyrene-1,3,6,8-tetracarboxylic acid (H₄PTCA) 131
 - r robustness 1
 - room temperature ionic liquids (RTILs) 139

s

Sada group 49
 Safranin T (ST) 43
 SALEM 321
 scale-up MOF 64
Schottky or Frenkel defects 343
 Scotch tape method 105
 secondary building unit (SBU) 32
 self-limited deposition technique 402
 sequestration
 anion 43
 metal ion 42
 organic molecules removal 43
 shear modulus 18
 ship-in-bottle method 304, 310, 318
 silica composites 272
 solid acid catalysts 307
 solid grinding method 266
 solution infiltration method 263
 solvent-assisted ligand incorporation
 (SALI). 13, 32
 solvent-assisted linker exchange
 (SALE) 32
 solvent-free method 401
 Sonogashira coupling reactions 430
 space-time yield (STY) 65, 73
 stability
 applications 2
 chemical stability 2
 definition 1
 mechanical stability 17
 thermal stability 14
 thermal vs. chemical stability 2
 sulfur mustard (HD) 211
 supercritical CO₂ activation 17
 surface immobilization 455–456, 470
 Suzuki–Miyaura reaction 430
 synthesis of MOF/CP
 continuous flow process 70
 drying process 66
 efficiency 74
 electrochemical synthesis 69
 extrusion 74
 HKUST-1 67
 limitation 64
 mechanoochemical synthesis 72
 microwave-assisted synthesis 67

one-pot reaction methodology 67
 organic linker 65
 pre-requisites 65
 reaction parameters 64
 scale-up reactions 68
 schematic representation 66
 solvents 66
 space-time yield (STY) 65, 73
 scale-up reactions 69
 starting reagents 65
 [Zn₄O(BDC)₃] 67

t

tag 31
 template assisted synthesis
 method 266
 terpenoids 390, 392
 therapeutic MOF 44
 thermal stability
 definition 14
 factors 15
 industrial procedures 14
 metal ion, nature of , 15
 MOF structure 17
 organic linker, nature of 16–17
 techniques for 14
 during thermal treatment
 process 14
 thermogravimetric analysis (TGA) 352
 thin-film MOF membranes
 for CO₂ separation 241
 for hydrogen separation 237
 preparation 232
 for propylene separation 240–242
 requirement 235
 Robeson plot for CO₂/CH₄ and H₂/N₂
 gas couples 243
 stability 242
 thin films-MOFs composites
 ceramic foams support
 treatment 259–260
 MOF-101@Al₂O₃ composites
 preparation 259, 261
 supersonic cold spray technique 261
 ZIF-8 crystals 259, 261
 thiol-modified MOF 43
 THTNi 2DSP 100

- transmetalation 96, 322, 324
 triethanolamine (TEOA) 37
 truncated mixed linker (TML)
 approach 348
- u**
 UHV-STM 85
 UiO-66 7–8, 18, 34–35
 CEES degradation 212
 DMNP hydrolysis 207
 pre-synthetic functionalization 307
 UiO-66-(CF₃)₂ 12
 UiO-67 207
 Ullman and Suzuki–Miyaura
 couplings 38
 ultrahigh vacuum [UHV] infrared
 spectroscopy (UHV-FTIR) 358
- v**
 variable temperature PXRD (VT-PXRD)
 experiments 14
 V-type nerve agents 199
- w**
 water stability
 characteristics of MOF 144
 functionalization of MOFs
 structures 149
 hydrophobic organic ligand 147
 MOFs with open metal sites
- metals clusters 146
 solvent removal 147
 UiO series using Zr-based metal
 clusters 147
 valence state 146
 working capacity 124
- x**
 X-ray diffraction (PXRD)
 patterns 354
- y**
 Young's modulus and Poisson's
 ratio 18
- z**
 zeolitic imidazolate frameworks (ZIFs)
 gas separation 225
 ZIF-8 9
 CO₂ capacity 149
 drug delivery material 46
 ZIF-8/silica composites 273
 Zn₄O-cluster based MOFs 180
 Zr-based MOFs
 advantages 182
 CWA degradation 209–211
 fcu, ftw, scu and *csq* topology based
 MOFs 183
 ftw topology based MOFs 183
 pbz-MOF-1 183, 185