

Index

a

Abramovich reaction 1570
 acanthifolicin 110
 acceptor-donor charge-transfer organic complex salt 2311
 acenaphthylene
 – azonia derivative 2048
 3-acetamino-1,2,4-oxadiazole
 – photolysis of 1118
 acetonitrile 32, 33, 95
 acetophenone azines 657
 3-acetoxymethyl cephalosporins
 – transformations 2161
 acetylaminooacetone 343
 2-acetylaminoo-5-benzylmercapto-
 1,3,4-thiadiazole 1373
 C-acetyl-N-arylnitrilimines
 – 1,3-dipolar cyclocondensation of 1022
 4-acetylbenzofurazan 1144
 2-acetyl-5-bromo-1-methyl-4-
 nitroprrole 312
 acetylcholinesterase 1867
 acetylene
 – [2+2+2] cycloaddition of 1439
 acetylenic alcohol
 – treatment of 933
 acetylenic dipolarophiles
 – thermal reactions 1070
 acetylenic glycosides 993
 acetylenic Grignard reagents 936
 2-acetyl-2-ethoxycarbonyl-1,3-dioxolanes 955
 acetylidy anions 32
 N-acetyl indoles 511
 1-acetyl-2-methylbenzimidazole 885
 5-acetyl-4-phenyl(methyl)-2-phenyl-2H-1,2,3-
 triazole 1-oxide
 – oximes of 1160
 3-(4-acetylphenyl)syndnone

– Claisen-Schmidt condensation of 1073
 2-acetylpyrrole 333
 3-acetylpyrrolidines 345
 Achmatowicz rearrangement 567
 acid/base-mediated cyclization 610–618
 acid catalyst 2238
 acid-catalyzed cyclization 432
 acid-labile benzylether grafting 2341
 acid-labile oxazole derivatives
 – synthesis of 828
 acryloylcarbamates 1718
 acryloyl chloride 51
Actinomadura madurae IFM 12
 acyclic C-nucleoside 5-(1,2-dihydroxyethyl)-
 3H-[1,3,4]oxadiazole-2-thione 1195
 N-acylamidoximes 1089
 o-acylamidoximes 1084
 – cyclization of 1084
 – cyclodehydration of 1083
 α-acylamino amide 2190
 2-acylamino ketones
 – cyclodehydration of 824
 o-acylanilines condense 1537
 o-acylated amidoximes
 – formation of 1084–1085
 3-acylated indolizines
 – preparation 2007
 N-acylation 698
 – of pyrroles 302
 acylation reaction 451, 452
 – quantum mechanical and molecular
 mechanical (QM/MM) modeling 2146
 N-acylbenzenesulfonamides
 – ortho-deprotonation–cyclization 770
 1-acyl benzotriazole 874
 N-acyl-1H-benzotriazole-
 1-carboximidamides 1027
 N-acylbenzotriazoles 1013

- benzotriazole-mediated methodology
of 1013
- C-acylation of 1013
- preparation of 1012
- synthesis of 1013
- use 452
- N*-acylbenzotriazoles 303
- 1-acyl-2-bromoacetylenes 309
- acylcarbazates
 - cyclization of 1192
- acyl chlorides 1084, 1090
- N*-acyl-*N*-cyanoguanidines 1823
- 5-acyl-2,3-dihydro-2-imino-3-(3-phenyl)
pyrazol-5-yl)-1,3,4-thiadiazoles 1359
- acyl 1*H*-benzotriazol-1-
 - carboximidamides 1027
- 1-acyl-1*H*-1,2,3-triazoles 1006
- 4-acyl-1*H*-1,2,3-triazoles 1000
- acylhydrazines 1019
- N*-acylhydrazones
 - oxidation of 1177, 1179
- N*-acylimidic chlorides 1089
- N*-acyliminium ions 349
- N*-acylindoles
 - catalytic asymmetric hydrogenation 478
- N*-acylisquinolinium cations 1588, 1611
- 3-acylisoxazoles
 - (*Z*)-oximes of 1143
- 4-acylisoxazolin-5-ones 751
- 3-acyl-2-methoxy-3*H*-azepines synthesis 775
- 3-acyl-1-oxa-2-azoles
 - oximes of 1141
- 3-acyl-1,3,4-oxadiazoline derivatives 1228
- γ -acyloxybutyanoates 552
- N*-acylpyridinium salts 1470, 1501
- 4-acylpyrrole-2-carboxaldehydes 302
- acylpyrroles 303
- 3-acyl-substituted furazans
 - oximes of 1143
- 3-acyl-substituted indoles 409
- N*-acyl-tetrazoles, thermal
decomposition 1183
- adamantyl alcohols 969
- Adams catalyst 2042
- addition-elimination pathway 534
- 1,4-addition-elimination reaction 1481
- adrenergic β -blockers 736
- AgOTs-CuCl₂-TMEDA
 - catalytic system 622
- Agrobacterium* 1751
- aicemicin 13
- ailanthoidol 609
- alane (AlH₃) 2138
- alcoholysis of 2-(trichloroacetyl)pyrroles 303
- Aldol reaction
 - *anti*-selectivity 321
 - of aziridine and α,β -epoxyaldehydes 549
 - reductive 321
- aldoximes 1819
- alkali metal/lead/indium halides 932
- alkaline potassium permanganate 1591
- alkaloid coralyne 2026
- alkaloid (+)-vinblastine 424
- alkene
 - epoxidations using chiral salen metal
catalysts 71, 72
 - nucleophilic attack 435
- alkene-nitrosyl chloride adduct
 - formation 748
- ω -alkenylaryl azide 29
- alkenyl epoxide 92
- alkenylindoles
 - intramolecular cyclization 444
- 3-alkenyl-1,2,4-oxadiazoles 1123
- 5-alkenyl-substituted 1,2,4-oxadiazoles 1124
- alkenyl sulfonamide 19
- 2-alkoxy-2-amino-1,3,4-thiadiazoles 1344
- 2-alkoxy-3,1-benzoxazin-4-ones 1556
- alkoxycarbonylation reactions 1763
- 2-alkoxycarbonylazolium *N*-ylides-
N-aminides 893
- 1-alkoxycarbonyl-1*H*-azepines 1911
- alkoxycarbonyl-*N*-imidazolium-*N*-methyl
amides
 - metallation of 894
- alkoxycarbonyl tetrazoles
 - thermal decomposition of 1185
- 2-alkoxy-1,3-dithioles 961
- 4-alkoxy-2-quinolones
 - intermolecular [2+2] photocycloaddition
of 1566
- alkoxystyryl boronates 858
- β -alkoxyvinyl trichloromethyl ketones 741
- cyclocondensation 662
- trifluoromethyl analogues 663
- 2-alkyl-3-alkylthio-5-arylisothiazolium
halides 793
- 3-*N*-alkylamino-5-alkyl-1,2,4-
oxadiazoles 1099
- alkylammonium salts 1407
- 2-alkylated-1*H*-1,2,3-triazoles 1006
- N*-alkylated pyridones 1499
- N*-alkylated thiadiazolimine 1376
- alkylation 1733, 1738
- N*-alkylation 697
 - of 3-methylpyrrole 308
- alkyl azides
 - [3+2]-cycloadditions of 995

- alkyl-1,3-azoles 890
 – synthesis of 890
 2-alkyl-1,3-azoles 890
 alkylbenzenediazonium
 tetrafluoroborates 682
 alkyl 4-bromo-3-alkoxy-2-butenoates 339
 o-alkyl 2-
 carbamothioylhydrazinecarbothioate 1344
 4-alkyl-4-carboxy-2-azetidinones
 – asymmetric synthesis 2133
 alkyl diazoacetates 1165
 5-alkyl-2,5-dihydro-1,2,4-oxadiazoles
 – chemical shifts 1081
 alkyl Grignard reagents 845, 851
 alkyl halides 1732
 alkylhydrazine 1209
N-alkylhydroxylamines 1103
 2-alkylenetetrahydrofurans
 – DDQ oxidation 607
 2-alkylidene-1,3,4-thiadiazolines 1370
N-alkyl imidazole 835
 α -S-alkyliminium salt 830
 alkyl iodides 1603
N-alkylisoquinolinium-1-carboxylic
 acids 1609
 alkylolithium reagents 92, 116, 946, 1477,
 1478, 2264
 alkynylcarbene complexes
 – [3+3] cycloaddition reaction 1454
 5-alkyl-1,2,3-oxadiazole 3-oxides 1052
 2-alkyl-1,2,5-oxadiazol-3(2*H*)-ones
 – formation of 1130
meso-alkyl porphyrins 2268
 alkylpyridines 1431, 1472, 1504
 – side-chain hydrogens of 1505
 4-alkyl pyridines 1475
 alkylpyridinium salts 1469
 alkylpyrimidines 1758
 alkylpyrroles 303
 3-alkylpyrroles 304
 4-alkylquinolines 1530, 1541
 3-alkyl-1,2,4-thiadiazole-5-carboxylates 1324
 2-alkylthiazoles 890
 2-alkylthio-5-alkylamino-1,3,4-
 thiadiazoles 1346
 alkyl-1,3,5-triazines 1832
 1-*N*-alkyl triazoles 1031
 (η^2 -alkyne) organopalladium complex 409
 alkynes
 – [2+2+2] cycloaddition of 1443
 – hetero-Diels–Alder cycloaddition 1658
 – intermolecular titanium amide-catalyzed
 hydroamination reactions 393
 1-alkynes
 – palladium-catalyzed cross-coupling of 601
 alkynethiolates, formation of 1279
 alk-4-yn-1-ones
 – gold-catalyzed cyclization of 1658
 2-(1-alkynyl)-2-alken-1-one
 – regioselective gold-catalyzed
 cyclization 554
 o-alkynylanilides
 – carboamination 410
 alkynylaniline
 – aminopalladation of 407
 o-alkynylanilines
 – indolization 410
 – intramolecular hydroamination of 407
 o-alkynylbenzaldehydes
 – cycloisomerization 1640
 2-(1-alkynyl)benzaldimines
 – palladium-catalyzed carbonylative cyclization
 of 1582
 2-alkynyl benzofurans formation 605
 alkynylcarbene complexes 664
 alkynyl ketones
 – CuI-catalyzed cycloisomerization 548
 o-alkynyl-*N,N*-dialkylanilines,
 cycloisomerization 502, 503
 o-alkynylphenol
 – palladium/bpy-catalyzed annulation 599
 2-alkynylphenols
 – 5-*endo*-dig-iodocyclization 598
 – palladium-catalyzed annulation 606
 o-alkynylphenols
 – carbonylative annulation 600, 1670
 o-alkynylphenylisocyanide
 – Pd-catalyzed three-component coupling
 reaction 412
 alkynylpyranosides 1894
 alkynylpyrazines 1762
 alkynyl-substituted pyrimidines 1714
 β -allenamine
 – regiocontrolled cyclization 2141
 allenic alcohols 68
 allenic anilines
 – gold-catalyzed intramolecular
 hydroarylation of 1550
 allenic nitriles 1714
 α -allenylcyclopentenone
 – isomerization 556
 allenyl ketone
 – intermolecular reaction 547
 allyl-2-allyloxy)benzene 618
N-allylated indole 449
 allylaziridine 51
 allylic alcohols 69, 97, 99, 117, 1614
 N-allyl-o-haloanilines

- Pd-catalyzed cyclization 418
- π -allylpalladium azide complex 412
- 2-allyl-1,2,3-triazoles 995
 - allylvinyl sulfonate
 - ring-closing metathesis reaction of 968
 - almitrine 1817
 - aluminium dodecyl sulfate trihydrate 310
- Alzheimer's disease 1330, 1533
- Amanita muscaria* 1867
- ambuic acid 57
- 2-amide derivatives
 - formation of 1164
- amidines 1115, 1116
 - cyclization 821
- amidinothioureas 1298
- amidoximes
 - 1,3-dipolar cycloaddition of 1108
- amidoximes, acylating reagent for 1087
- amidrazones 1358
 - electrophilic carbon compounds 1022
- N-amination 700
- amine-assisted mechanism 2119
- amines, ring closure of 27–29
- aminoalcohols 100, 874
 - cyano group 875
- 2-aminoalcohols 27
- β -aminoalcohols 33
 - palladium-catalyzed oxidative carbonylation of 901
- α -aminoalkenyl azides 47
- 2-(1-aminoalkyl)aziridines
 - Ritter reaction of 875
- 2-amino-5-alkylfluorinated-1,3,4-oxadiazoles 1186
- 1-amino-3-alkylimidazolium, synthesis 892
- aminoalkylimine 119
- 2-amino-3-(alkyl or aryl)amino-2*H*-indazoles 679
- amino/amido/alkoxy/alkylthio-methylbenzotriazoles
 - structures of 1015
- 2-amino-5-aryl-5-hydrothiazolo[4,3-*b*]-1,3,4-thiadiazoles 1363
- 2-amino-5-aryl-1,3,4-oxadiazoles 1182
 - hydrochloric reaction of 1214
 - Schiff bases of 1181
- 3-amino-6-arylpydrazines 1756
- α -aminoaziridine 35
- aminoazirines 52
- 2-amino-1,3-azoles
 - synthesis of 818
- 2-aminoazoles, reactivity of 898
- α -aminobenzaldehydes 1537
- aminobenzimidazoles 1714
- 2-aminobenzimidazoles 897
- 3-amino-1,2-benzisoxazoles
 - solid phase synthesis 764
- 3-amino-1,4-benzodiazepines synthesis 2197
- 3-amino-1,5-benzodiazepines synthesis 2216
- 2-aminobenzoic acid 1010
- 2-aminobenzophenones 1538
 - α -aminobenzophenone treatment 2185
- 2-aminobenzothiazoles 896
 - γ -aminobutyrate (GABA) receptors 728, 736
 - γ -aminobutyric acid (GABA) 1689, 2176
 - benzodiazepine's modulation 2176
 - α -aminocarbonyl compounds 818
 - 7-aminocephalosporanic acid (7-ACA) 2153
 - esterification 2160
 - silylation 2158
 - 2-amino-5-chloro-1,3,4-thiadiazole 1368
 - 5-amino-4-cyano-3-(methylthio)-1*H*-pyrazole-1-carbothiohydrazide 1348
 - 2-amino-3-cyanopyridines 1718
 - 2-amino derivatives, synthesis of 820
 - 4-amino-1,4-dihydroquinolinide ion 1561
 - 4-amino-2,6-dimethylpirimidine 1731
 - α -amino ester 2187
 - β -aminoethanethiol 115
 - 2-aminoethanethiol
 - nucleophilic addition-elimination 880
 - N-aminoethyl amides dehydrocyclize 873
 - 3-[(2-aminoethyl)amino]propylfunctionalized silica gel
 - 1,4-disubstituted-1,2,3-triazoles, generation of 996
 - aminofuran intermediate
 - MW-promoted intramolecular [4+2] cycloaddition 507
 - α -aminoglycine derivatives 2196
 - 3-amino-1*H*-indazoles 690
 - 2-amino-4*H*-pyrans synthesis 1658
 - aminohydrazones
 - electrophilic carbon compounds 1022
 - 2-amino-4-hydroxythiazoles 895
 - 2-aminoimidazole
 - alkylation of 898
 - containing natural products 894
 - preparation of 897
 - 5-amino-2-imino-3-phenacyl-1,3,4-thiadiazolines 1370
 - aminoindoles 500
 - 2-amino-6-iodo-4-tosyloxypyrimidine 1760
 - 2-aminoisoquinolinium iodide 1605
 - aminoketone, cyclization 398
 - aminolysis reaction 2156
 - α -amino malonamides 1725

- aminomethylated polystyrene resins 2333, 2334
 2-aminomethyl-4,5-dihydrooxazoles 874
 5-aminomethyl oxadiazoles 1124
 2-amino-5-(*m*-nitrophenyl)-1,3,4-thiadiazole
 – bond lengths and angles 1335
 aminonitrones 1102
 2-amino-5-(5-nitro-2-thienyl)-1,3,4-thiadiazole 1344
 aminoxyadiazole derivatives
 – tautomeric imino form 1077
 2-amino-1,3,4-oxadiazoles 1024
 3-amino-1,2,4-oxadiazoles 1089
 2-amino-1,3-oxathiolium salt 973
 aminopalladtion/reductive elimination
 domino reaction 407
 6-aminopenicillanic acid 810, 2150, 2160
 2-aminophenols
 – diazotization of 1057
 o-aminophenols 895
 aminophenylfurazan 1131
 3-amino-4-phenylfurazans 1140
 aminophenylfuroxan
 – cyclocondensation of 1131
 3-amino-5-phenyl-1,2,4-oxadiazoles
 – photoinduced ring-isomerization of 1078
 2-amino-4-phenylpyrimidine 1744
 3-(4-aminophenyl)sydnone moieties 1057
 2-amino-5-phenyl-1,3,4-thiadiazoles 1367, 1373
 5-aminophenyl-1,2,3,4-thiatriazole 1297
N-aminophthalimide, as nitrogen donor 21
 aminopropylsilica gel (APSG) 95
 2-aminopyrazine 1741
 3(5)-aminopyrazole
 – acylation 699
 2-aminopyridine 1502
 4-aminopyridine
 – nitration of 1503
 2-aminopyridine N-oxides
 – acylations of 1102
 aminopyridines 1500, 1501, 1503
 – nitration of 1502
 4-aminopyridines
 – diazonium salts of 1503
 4-aminopyrimidine 1741
 aminopyrimidinethiones 1718
 2-aminopyrrole-3-carbonitriles 342
 aminopyrroles 342
 2-aminopyrroles 342
 aminoquinoline derivatives 1530
 3-amino-4*R*-furazans
 – dipole moments 1132
 3-aminosouquinolines 1580
 2-amino substituted 1,3-dithiolanes 955
 2-amino-4-substituted oxazoles 827
 amino-substituted 1,3-pyrimidines 1720
 2-amino-5-substituted-1,3,4-thiadiazoles
 – from Merrifield resin 1382
 5-aminotetrazoles
 – parallel solid-phase synthesis of 1416
 aminothiadiazole 1310
 2-amino-1,3,4-thiadiazole (ATDA) 1386
 3-amino-1,2,4-thiadiazole 1312
 5-amino-1,2,4-thiadiazole-3-ones 1305
 2-amino-1,3,4-thiadiazoles 1340, 1382
 5-amino-1,2,4-thiadiazoles 1287, 1288, 1307, 1312, 1325
 – methylation of 1312
 5-amino-1,3,4-thiadiazole-2-thiols 1342
 5-amino-1,2,4-thiadiazolin-3-one 1290
 2-aminothiazoles
 – with aromatic aldehyde 898
 – synthesis of 896
 2-aminothiazole-5-sulfonic acid
 – heating rearranges 839
ortho-aminothiobenzoic acid
 – oxidative cyclization 771
ortho-aminothiophenol 1263
 2-amino-1,3,5-triazine 1831
 6-amino-1,3,5-triazine-2,4-diones 1825
 2-amino-1,3,5-triazines 1821
 4-amino-1,3,5-triazin-2-yl ketones 1822
 5-amino-4-trifluoroacetylloxazoles 752
 7-amino-3-trityl-3*H*-azepines 1875
 3-amino-1-tritylpyrrole 344
 ammonia acceptor reagent 1088
 ammonia, loss 1360
 ammonium trifluoroacetate 821
 AnBOX ligands 22
 Angeli rearrangement 1161
 angiotensin-converting enzyme (ACE) 2023
 aniline derivatives 885
 – cyclization of 1535
 anilines
 – synthesis 1645
 – treatment 404
N-(anilinocarbonyl)-5-(2,4-dichlorophenyl)-1,3,4-oxadiazole-2-sulfonamide 1225
 anilinosulfonium salt 395
 α -anions
 – formation of 1124
 o-anisole imine 27
 annelation effects 643
 annulation mechanism 413
 ANRORC cascades 1641
 anthocyanidines 1633, 2275, 2277
 antibacterial fluoroquinolones 1533

- anticoagulant activities 1330
 anticonvulsant effect 2180
 anti-inflammatory activity 1182
 anti-inflammatory agent
 – bendazac 645
 antiviral agents 1127
 aoyl copper reagents 855
 apigenin
 – structures of 1674
 Aplysinidae 57
 α -pyrones 1660, 1662
 arachidonic acid cascade
 – cyclooxygenase (COX)/lipoxygenase (LOX)
 pathways 647
 arene oxides 1892
 aromatase 624
 aromatic carbonyl compounds reactions 620
 aromatic 1,2-dialdehydes 1581
 aromatic five-membered systems
 – attack on pyrrole by nucleophiles 6
 – resonance hybrids of pyrrole 5
 – structure and reactivity 5, 6
 aromatic heterocycles 2
 aromatic heterocyclic aldehydes
 – asymmetric Michael addition of 1034
 aromaticity
 – fundamental concept 2253
 – Huckel's $4n+2$ rule for 2231
 aromaticity of 1,2,3-thiadiazole 1,1-dioxide 1255
 aromatic nitrile oxides 1148
 aromatic 30π heptaphyrins 2252
 aromatic pyrylium salt 1665
 aromatic six-membered systems
 – electrophilic attack on pyridine 8
 – nucleophilic attack on pyridine 7
 – resonance hybrids of pyridine 7
 – structure and reactivity 6–8
 1-aryl-2-arylidene hydrazines 1181
 arsetanes 244, 245
 artocarpol 1868
Artocarpus rigidus 1868
 arylacetylenes
 – palladium(II)-catalyzed cyclization 596
 3-aryl(alkyl)-1-(3-R-furan-4-yl)amidines 1160
 arylaminoketone 416
 α -(N-arylaminoketones)
 – cyclization 415
 arylammonium salts 1543
 arylation 1738
 N-arylation 35, 697
 – oxygen-containing ligands 860
 – using DCC 36
 arylaziridines 35
 4-arylazobenzofuroxans 1162
 3-aryl-2,1-benzisoxazoles hydrogenolysis 783
 2-arylbenzo[b]furans 612
 – synthesis 615
 N-arylbenzophenone hydrazone 395
 aryl benzophenone hydrazones 664
 arylbiguanidines 1827
 4-aryl- β -lactams
 – palladium-catalyzed hydrogenolysis 2140
 arylboronic acids 35, 604
 aryl bromides, Pd-catalyzed cross-coupling of 395
 3-aryl-2-bromo-1-syndronylpropenones
 – with 3-arylaminomethyl-4-amino-5-mercapto-1,2,4-triazoles 1068
 3-aryl-4-carbohydroximic acid chlorides 1069
 aryl carboxylic acid 885
 3-aryl-5-C-glucosyl-1,2,4-oxadiazoles 1095
 5-aryl-2-chloroacetamido-1,3,4-oxadiazoles 1225
 1-aryl-5-chloro-1H-1,2,3-triazoles 1006
 arylcyclopropanes
 – photooxygenation of 926
 1-aryl-4,6-diamino-1,2-dihydro-1,3,5-triazines 1827
 aryl diazonium salts coupling 392
 4-aryl-3,3-dichloro-2-azetidinones
 – halogen–lithium exchange reaction 2136
 2-aryl-2,5-dihydro-1,2,4-oxadiazoles 1103
 5-aryl-4,5-dihydro-1,2,4-oxadiazoles 1077
 aryl dihydrotiazines 1827
 4-arylethynyl sydrones 1067
 3-aryl-4-formylsydnone-4'-phenylthiosemicarbazones 1069
 4-aryl-3-formylsydrones 1068
 3'-aryl-4-formylthio-semicarbazones 1069
 aryl halides
 – catalyzed cross-coupling 430
 – one-pot Suzuki coupling 547
 2-aryl-2H-benzotriazoles 1011, 1012
 6-aryl-3-hloro-1,2,4-triazine 1704
 arylhydrazines 1209
 arylhydrazones
 – palladium-catalyzed cyclization 685
 – N-arylhydrazone halides
 – dehydrohalogenation 669
 2-aryl-2-hydroxyethanamines 1577
 1-arylimidazole-5-carboxylates 818
 N-aryliminotriphenyl-phosphoranes 1190
 N-arylisoquinolinium 1604
 aryl isothiocyanate 885

- aryllithium reagents 2256
 2-aryloxadiazolinethiones 1204
 5-aryloxazoles
 – resins used 828
 – synthesis of 827
 5-arylpyrimidine 1758
 4-arylpyrrole-2-carboxaldehydes 335
 2-arylpyrroles 334
 3-aryl 2-quinolinones 1549
 aryl radical, cyclization of 1555
 aryl-substituted alkynes
 – metal-catalyzed intramolecular cyclization 596
 aryl-substituted 1,2,4-oxadiazoles
 – UV spectra of 1082
 4-aryl-substituted 1,2,3-thiadiazoles 1261
 1-aryl-5-substituted-1,2,4-triazoles
 – synthesis of 1021
 1-(arylsulfonylamino)-1*H*-1,2,3-triazoles 1002
 2-aryl-1,2,3-thiadiazole-4*H*-5-imines 1273
 arylthioamides 1305
N-arylthioureas
 – oxidation of 1300
 6-aryl-1,3,5-triazine-2,4-diones 1825
 aryl triflates 1011
 3-aryl-4-[2-(2-vinylphenyl)ethenyl]sydnone 1063
 aryne [4+2] cycloaddition reactions 1585
Aspergillus fumigatus 57
 asperlicin C synthesis 2203
Aspidosperma alkaloids
 – pentacyclic skeleton 484
 asymmetric alkene aziridination, chiral catalysts for 17
 asymmetric aziridination
 – of cinnamate esters 23
 – of styrene, reaction conditions for 16, 17
 asymmetric epoxidation of chalcone 85
 asymmetric induction in azirine formation 45
 asymmetric *N*-aminophthalimide-mediated aziridination 21
 attack by nucleophile–ring opening–ring closure (ANRORC) sequences 1633
 attack on pyrrole by nucleophiles 6
 aulosirazole 735
 arylboronic acids
 – with imidazoles 858
 1-aza-2-azonia allene salts 686
 aza-Baylis–Hillman reaction 348
 azabenzimidazoles 1170
 aza-Cope rearrangement 1882
 azacycloheptatriene 1865
 aza-Darzens reaction 25
 2-azadienes
 – hetero-Diels–Alder reaction 1443
 – photocyclization 1587
 azadienophiles, Diels–Alder cycloaddition 1453
 aza-*ortho*-quinodimethanes 771
 aza-Wittig cyclization 2204
 aza-Wittig [2+2] process 1584
 aza-Wittig reaction 827, 828, 2192
 – quinazolobenzodiazepine alkaloids synthesis 2204
 azepane 1865, 1870
 azepines
 – boat-like conformation in 1871
 – NMR data for 1872
 – partially reduced azepine derivatives, reactivity 1934
 -- dihydroazepines 1934–1937
 -- dihydroazepin-2-ones 1938–1941
 -- dihydroazepin-3-ones 1941–1943
 -- tetrahydroazepines 1937, 1938
 – reactivity 1911
 -- and benzofused derivatives 1911
 -- cycloaddition reactions 1911–1914
 -- with electrophiles 1923–1927
 -- hydrogenation and hydrogen transfer 1932–1934
 -- with metal carbonyl complexes 1914–1916
 -- with nucleophiles 1927–1929
 -- with oxidants 1929–1932
 -- pericyclic reactions 1917–1923
 -- through metal carbonyl complexes 1916, 1917
 – synthesis 1898
 – tautomerism in 1874
R/S-Azetidine-2-carboxylic acids 163
 azetidines 163, 164
 – chemical shifts 165
 – cleavage of the azetidine ring 186
 – cyclization reactions 166–173
 – cycloadditions 176–177
 – enzymatic resolutions of azetidines 186–188
 – oxidizing reactions 180, 181
 – physicochemical data 165
 – reactions
 -- of C-metallated azetidines 182
 -- at nitrogen atom 177–180
 -- with nucleophiles and bases 181, 182
 – ring expansions 182–186
 – ring transformations 173–176
 – synthesis 166

- azetidino[1,2-*d*][1,4]benzodiazepines
synthesis 2211
- 2-azetidinone
– *ab initio* calculations 2117
- 2-azetidinone nucleus synthesis
- β-amino acids cyclization and derivatives 2126, 2127
- chromium carbene-imine cyclization 2126
- hydroxamate cyclization 2127
- isocyanate-alkene cyclocondensation 2125, 2126
- ketene-imine cycloaddition (*see* Staudinger reaction)
- metal-catalyzed insertions of diazo compounds 2127, 2128
- metalloester enolate-imine condensation 2124, 2125
- multicomponent reactions 2129
- photochemical, and radical methods 2130, 2131
- synthesis from carbo/heterocycles 2131–2133
- terminal alkynes and nitrones coupling (*see* Kinugasa reaction)
- 2-azetidinones 3
- 2-azetidinones. *see* β-lactams
- azetidin-2-ones (β-lactams) 163
- 2-azetidinone-tethered imines
- aza-Diels–Alder reaction 2141
- 4-aziadamant-1-amine 124
- azide addition 29
- azide–alkyne cycloaddition reaction 992
- azide-containing amino acids 993
- azide-functionalized glycosides 992
- azides, cycloaddition reaction 895
- ortho*-azidoaryl ketones
- thermolysis 766
- azidocinnamates 1906
- 2-azido-4,6-dichloro-1,3,5-triazine,
photolysis 1830
- azido esters 898
- 4-azido-5-nitrothiophene-2-carboxylic acid ester
- photolysis 1149
- azinomycin 11
- azinomycin A 13
- azinomycin B 13
- aziridinyl anion chemistry 37, 38
- aziridinates *N*-tosyl pivaldimine 26
- aziridination
- of diactivated alkenes 23
- of epoxyalkenes 19
- of imines 23–27
- aziridination of alkenes 12–23
- asymmetric aziridination of styrene 16
- bromine-catalyzed aziridination 18
- catalysts for racemic aziridination 15
- chiral catalysts for asymmetric alkene aziridination 17
- general synthetic routes to 14
- reaction conditions
- for asymmetric styrene aziridination 17
- for bromine-catalyzed aziridination 18
- for styrene aziridination 15, 16
- aziridinecarboxylate esters 30
- aziridines 11, 447, 875
- azirdinyl anion chemistry 37, 38
- general synthetic routes 14
- geometry 12
- naturally occurring 13
- *N*-elaboration reactions 35, 36
- nucleophilic ring opening 30–35
- reactivity 30–38
- from ring-closing protocols 28
- ring closure of amines 27–29
- ring contraction of other heterocycles 29, 30
- ring expansions 38–41
- ring opening 449
- synthesis 12–29
- meso*-aziridines 31
- aziridinyl alcohol 37
- aziridinyl esters 29
- aziridinylmagnesium bromide 38
- aziridinyl sulfide 53
- azirines 41, 48
- addition of nucleophiles 50–53
- cycloadditions 54–55
- Neber route 42–45
- from other heterocycles 48–50
- from oximes with activating groups 43
- properties 41, 42
- from quaternary hydrazonium salts 44
- reactivity 50
- rearrangements into other heterocycles 55
- synthesis 42
- from vinyl azides 45–48
- 2*H*-azirines. *see* azirines
- azirinyl aldehyde 55
- azirinyl phosphonate 50
- azobenzenes, photoreduction 1200
- azofurazan annulated macrocycles 1135
- azoisobutyronitrile (AIBN) 2329
- 1,3-azole derivatives
- arylation 855
- azole functionalization 856
- azole-*N*-oxides
- reactivity of 904

- azole ring 836
 azoles
 – acidity 697
 – basicity 697
 1,2-azoles
 – class 636
 – derivatives 704–710
 – electrocyclic reactions 704
 – importance 636
 – indazoles synthesis 678–696
 – nomenclature 637, 638–644
 – number of publications 636
 – pyrazoles synthesis 651–678
 – reactions
 – of C-metallated pyrazoles 702
 – with electrophilic reagents 697–701
 – of N-metallated pyrazoles 702
 – with oxidizing agents 701, 702
 – with radicals 702
 – with reducing agents 703
 – reactivity 696–704
 – relevant natural/useful compounds 644–651
 – ring transformations 703, 704
 1,3-azoles 809
 – alkyl-1,3-azoles 890–891
 – anticancer properties 810
 – azole N-oxides 902–904
 – azoline N-oxides 902–904
 – benzo-1,3-azoles 880–886
 – computational chemistry 810–814
 – Diels–Alder reactions 866–870
 – dihydro-1,3-azoles 871–880
 – 4,5-dihydroazoles 871
 – 1,3-dipolar cycloadditions 866–870
 – direct electrophilic silylation of 840
 – five-membered ring systems 809
 – free radical reactions 864, 865
 – IUPAC nomenclature 810
 – NMR data 810–814
 – order of reactivity 838
 – oxy/amino-1,3-azoles 894–902
 – photochemical reactions 870–871
 – physicochemical data 810–814
 – pK_a values of 814
 – quaternary 1,3-azonium salts 891–894
 – reactions with reducing agents 865, 866
 – reactivities of 834
 – structure 812
 – tautomeric equilibrium of 815
 – tautomerism 814, 815
 – tetrahydro-1,3-azoles 886–889
 – transition metal mediated reactions 855–864
 – use of 861
 azole silanes 852
 azoles, N-arylation of 858
 1,3-azoles, synthesis of
 – imidazoles 815–824
 – oxazole 824–834
 1,3-azole structure
 – natural compounds, contains 812
 azolic stannanes 853
 azolic zinc derivatives 854
 azolides 706
 azolidin-2-ones 898
 azolinium salts
 – synthesis of 891
 azolium ions
 – pK_a values of 814
 2-azolylstannanes 854
 azomethine imines 670
 azomethine nitrogen
 – electrophilic attack 834
 azomethinimines
 – 1,3-dipolar cycloaddition of 1201
 azoxyfurazans 1135
 – crystal structure simulations 1134
 azulenes synthesis 1646
- b**
- Bacillus cereus* 1205
Bacillus subtilis 1222
 Bader's AIM theory 2146
 Baeyer–Villiger oxidation 1899
 Baeyer–Villiger type rearrangement 565
 Banert cascade 994
 Barbier-type allylation 2161
 barbituric acid 1690
 Bartoli protocols 398
 Bartoli reaction 397
 Bartoli synthesis 397
 base-catalyzed rearrangement of epoxides,
 – to allylic alcohols 99
 base-promoted processes 382
 batch-fill and withdraw system 2151
 bauhinastatin 1868
 Baylis–Hillman adducts 662, 1542, 2135
 – α -substituted γ -butenolides 581
 Beckmann transformation of ketoxime 1819
 Beirut reaction 1162
 benzaldehyde 1577
 benzaldehyde N'-(5-benzoylmethyl-1,3,4-thiadiazol-2-yl)hydrazone 1346
 1*H*-benzazepine 1586
 2*H*-2-benzazepine 1904
 1*H*-2-benzazepine derivative 1867

- 1*H*-1-benzazepine derivatives 1902
 benzazepine ring
 – 1,2,3-thiadiazole ring 1262
 benzazepines 1867, 1902
 3*H*-3-benzazepines 1904
 benzazirine 1883
 benzobromarane analogs 623
 benzene
 – catalytic hydrogenation of 1489
 benzenecarbothiohydrazide 1353
 benzene, complex alkyl-substitution in 433
 benzene-1,2-diamine derivatives
 – diazotization of 1009, 1010
 benzene ring 880
 – electron-withdrawing nature of 886
 benzenesulfonic acid 821
 benzils, electrochemical reduction 934
 5-benzilylene-1,3,4-thiadiazole-2,2(5H)-dicarbonitrile 1364
 benzimidazoles 882, 886, 1118, 1164
 – oxides 1164
 – synthesis of 883
 benzimidazolium salts 892
 1,2-benzisothiazole 1,1-dioxides. *see* saccharins
 2,1-benzisothiazole 2,2-dioxides 771
 1,2-benzisothiazoles 768–770, 769, 770–772
 benzisothiazole saccharin 736
 1,2-benzisoxazole 763
 – base-promoted intramolecular displacement reactions 762
 – isosteric relationship 735
 2,1-benzisoxazole
 – 1,3-dipolar cycloadditions 782
 1,2-benzisoxazole-3-acetic acid 765
 benzisoxazoles, chemical behavior 772
 1,2-benzisoxazoles synthesis 761–765, 768
 – bond 7a-1/3-a formation 764, 765
 – bond 7a-1 formation 761, 762
 – bond 1-2 formation 762, 763
 – bond 2-3 formation 763, 764
 – from other heterocycles 765
 2,1-benzisoxazoles synthesis 765–772
 – bond 1-2 formation 765–766
 – bond 2-3 formation 766–768
 – by introduction of C-3 768
 2,1-benzisoxazolium salt reaction 780
 benzoalium salts 892
 benzo analogues 928
 benzo[*a*]quinolizinium systems
 preparation 2054
 benzoazoles 882
 benzo-1,3-azoles
 – formation of 881
 benzo[*b*]furan-3-carboxylic acids
 – synthesis 600
 benzo[*b*]furans 617
 – electron populations 594
 – investigation 593
 – skeleton 595
 – structure 594
 – UV and NMR data 594
 benzo[*b*]quinolizinium derivatives
 synthesis 2055
 benzo[*c*]quinolizinium system 2056
 benzo-15-crown-5 1642
 benzo-derivatives 3, 1631
 benzodiazepine 1127
 1,4-benzodiazepine-*N*-oxides
 – as dipoles for [3+2] cycloadditions 2208
 benzodiazepine-quinazoline scaffold 2182
 benzodiazepines 3, 2175, 2192
 – 1,4-benzodiazepine-2,5-diones
 synthesis 2186–2192
 – 1,4-benzodiazepine ring
 modifications 2193, 2194
 – 1,4-benzodiazepines 2177–2179
 – 1,5-benzodiazepines 2213–2217
 – 2,3-benzodiazepines 2217–2222
 – 1,4-benzodiazepines ring synthesis 2182
 – 1,4-benzodiazepines synthesis, cycloaddition reactions 2206–2210
 – 1,4-benzodiazepines with fused heterocycle 2198–2210
 – 1,4-benzodiazepines with heterocycle condensed at sides *a* or *d* 2179–2181
 – 1,4-benzodiazepin-2-ones ring synthesis 2182–2186
 – clinical application 2181
 – [2+2] cycloadditions 2208–2210
 – [3+2] cycloadditions 2206–2208
 – functionalization at C3 2196, 2197
 – general introduction 2175–2177
 – with heterocycle fused at side (N1-C2 position) 2198–2204
 – naturally occurring 2181, 2182
 – pyrrolo[2,1-*c*][1,4]benzodiazepines (PBDs) 2210–2213
 – reactions of C2 carbonyl group 2194, 2195
 – structural classification 2177
 – structure 2176–2178
 1,4-benzodiazepines
 – hydroxylation of 2196
 benzo-1,3-dithioliylum ion
 – ^{13}C chemical shifts 949
 12*H*-benzo[*e*]indolo[3,2-*b*]benzofuran 626
 benzofuran
 – derivatization 593

- in drug discovery 623–625
- in material science 625–628
- naturally occurring, isolation 594–596
- structure and reactivity 594
- synthesis 596–623
- transformation of 1676
- benzofurazans** 1134, 1143, 1144, 1150, 1152, 1154, 1165, 1167
- homocyclic ring of 1152
- benzofuroxans** 1134, 1136, 1150, 1154, 1155, 1156, 1158, 1164, 1165
- Boulton-Katritzky rearrangement of 1162
- benzofuran system** 1149
- benzo-fused derivatives**
 - NMR chemical shifts 1135
- benzonitrile derivatives** 817
- benzopentathiepine** 1272
- benzophenone** reacts 870
- 2H-1-benzopyran-2-ones** 1660
- 2H-benzopyran-2-ones.** *see* coumarins
- 4H-1-benzopyran-4-ones** 1674–1676
- 2-benzopyrylium salts** 1581
- 1-benzopyrylium ring**
 - synthesis of 1637–1639
- 2-benzopyrylium ring**
 - synthesis of 1639–1640
- 1-benzopyryliums**
 - synthesis 1639
- benzopyrylium salt** 1648
- 1-benzopyrylium salts, preparation** 1638
- 2-benzopyrylium salts, preparation** 1639
- 2-benzopyryliums** synthesis 1640
- 1,4 benzoquinone** 881
- 1,2,3-benzothiadiazole**
 - molecular dimensions for 1256
 - oxidation of 1282
- benzothiadiazoles**
 - photochemical decomposition of 1274
 - reduction 1283
- 1,2,3-benzothiazole** 1265
 - thermolysis of 1272
- benzothiepines**
 - synthesis 1907–1910
- 1,2,3-benzotriazine**
 - Hetero-Diels–Alder reaction of 1551
- benzotriazole**
 - acylation of 1-benzotriazoles and benzotriazole methodology 1012–1014
 - benzotriazole-mediated amino-, amido-, alkoxy-, and alkylthio-alkylations 1015
 - benzotriazole-mediated imidoylation 1014–1015
 - $^1\text{H}/^{13}\text{C}$ NMR spectra of 1009
 - physicochemical data and NMR data 1009
 - reagents 1016–1017
 - ring-closure reactions, synthesis 1009–1012
 - tautomeric forms of 1009
- 1H-benzotriazole-1-carboxamides** 1823
- benzotriazole imidates, synthesis** 1014
- benzotriazole mediated substitution** 1647
- benzotriazole methodology**
 - applications of 1012
- benzotriazoles**
 - $^1\text{H}/^{13}\text{C}$ NMR spectra of 1010
 - tautomerism in 1010
- N-benzotriazoles** 1014
- benzotriazole (Bt)-substituted pyrrole** 433
- benzotriazolyl carboximidoyl chlorides** 1014
- benzotriazolyl group, nucleophilic substitution** 888
- 5-benzotriazolyl-1,2,3-triazoles**
 - thermal rearrangement of 1271
- 1,2,3-benzoxadiazole** 1048, 1055
 - UV spectrum of 1055
- benzoxadiazole ring, UV irradiation** 1059
- 1,2,3-benzoxadiazoles** 1057
 - IR spectra of 1055
- 2,1,3-benzoxadiazoles** 1129
- benzoxazoleimines** 895
- benzoxepines**
 - synthesis 1648, 1906, 1907
- N-benzoylated hydrazone** 1226
- 1-benzoyl-cis-1-buten-3-yne**
 - cyclization reaction 549
- 2-benzoyl derivative** 891
- benzoylhydrazines** 683
- N-benzoylhydrazinium salts** 935
- 1-benzoyl-1-methylhydrazine hydrochloride** 1210
- 3-benzoyl-1,2,4-oxadiazoles**
 - phenylhydrazones of 1117
- 3-benzoyl-5-phenyl-1,2,4-oxadiazole** 1142
- N-benzoyl-5-phenyltetrazole** 1184
- benzoyl protected 3-ribofuranosyl-4-nitroisoxazole-5-carboxylate synthesis** 750
- 3-benzoyl-2-substituted-5-phenylfurans** 673
- N-benzylamidoxime**
 - oxidation of 1097
- benzylamine** 33
- 2-benzyl-1,3-azoles**
 - carbanions of 812
- 2-benzyl-5-chloro-1,2,4-thiadiazole-3-one** 1322
- benzylcyclohexanone** 937
- benzylidene carbonyl compound**
 - Friedel–Crafts acylation 1639

- 2-benzylidenehydrazinecarbothioamide 1344
 4-benzylisoquinolines 1592
N-benzylketenimines 1583
 1-benzyl-2-methylimidazole
 – with benzoyl chloride 891
 1-(benzyloxy)-1*H*-1,2,3-triazoles 1006
 3-benzyloxyisothiazole lithiation 796
 benzyloxy (OBn) *N*-protecting groups 1006
 benzyloxymethylthiirane 115
 5-[4-(Benzyloxy)phenyl]-3-(2-cyanoethyl)-1,3,4-thiadiazol-2(3*H*)-one 1356
 1-2-(2-cyanoethyl)hydrazine 1357
 2-benzyloxypropanal 1198
 benzylpenicillin, conformational properties 2146
 benzyl peroxide, photolysis 865
N-benzylpiperidine fragment 1330
 1-benzylpyrazole 1832
 1-benzylpyrrole 323
 2-benzylthio-4-fluorobenzaldehyde reaction 769
 5-(Benzylthio)-*N*-ethyl-1,3,4-thiadiazol-2-amine 1385
 berberine 2021
 Bergman cyclization 1749
 betaine 1609
 β -glycosides 1072
 bicarbonate-activated hydrogen peroxide (BAP) 67
 bicyclic β -lactam antibiotic
 – ^{13}C NMR spectra 2147
 bicyclic dioxolane, thermolysis 928
 bicyclic 4*H*-pyrans
 – synthesis 1660
 bicyclic imidazo[1,2-*d*][1,2,4]thiadiazol-3(2*H*)-one 1299
 γ -bicyclic lactams 1703
 bicyclic oxazolidinone 55
 bicyclic system
 – formation 2026
 bicyclic 1,2,4-triazolium salts 1034
 bi(4,5-dihydro-1,3,4-thiadiazol-5-imines) 1360
 Biginelli reaction 1706
 biguanidines 1823
 bipyridine–copper coordination 2292
 Birch reduction 567, 568
 bis(benzotriazolyl) carboximidamide 1014
 4,5-bis(benzoylthio)-1,3-dithiole-2-thione 959
 Bischler–Napieralski synthesis 1576
 Bischler synthesis 415, 416
 bis-chlorodibutyltin oxide 97
 bis(cyclooctadienyl) iridium(II) chloride complex 23
 2,5-bis(dimethylaminomethyl)pyrrole 331
 bis-dithiocarbonates
 – thermolysis of 973
 bis-1,2-dithiole dimers 944
 bis-dithiole salt 952
 bis(hydrazone)s
 – oxidation/cyclization 1002
 bis(hydroxyiminomethyl)furoxan 1155
 bis(isoquinoline-*N*-oxide) 1575
 bismetanes 254
 1-bis(methoxy)-4-bis(methylthio)-3-buten-2-one
 – cyclocondensation 661
 bismuth trichloride 32
 bismuth triflate 95
 bis-1,2,4-oxadiazoline complexes
 – *in vitro* cytotoxicity 1081
 bis-oxadiazolyl sulfides 1214
 bis(oxazolinyl)pyridine scandium(III) triflate complex 310
 bis(2-oxo-3-oxazolidinyl)phosphinic chloride (BOP-Cl) 1087
 2,5-bis(perfluoroalkyl)-1,3,4-oxadiazoles 1203
 3,6-bis(phenanthrenol-2-yl)-1,2,4,5-tetrazine 1837
 1,4-bis-2-(5-phenyloxazolyl)benzene (POPOP) 2285
 2,5-bis(phenylthiomethylene)pyrrole 331
 bis(pyrrol-2-yl)methane (dipyrromethane) 307
 bis(tributyltin) oxide 1407
 2,5-bis(trifluoromethyl)-1,3,4-oxadiazole 1216
 3,5-bis(trifluoromethyl)-1,3,4-oxadiazole 1023, 1204
N,O-bis(trimethylsilyl)hydroxylamine 1722
 1,2-bis(triphenylphosphonium)ethane dibromides 955
 bite-angle diphosphinine 1643
 bithiophene diols
 – acid-catalyzed condensation 2252
 bi/tricyclic heterocycles
 – synthesis of 865
 B3LYP/6-31G* level
 – DFT calculations 1148
 3-(boc-amino)isoxazole
 – direct lithiation 786
N-Boc-indole 455
N-Boc-protected amino aldehyde 2192
N-Boc-pyrrolidine 348
 Boekelheide reaction 1513, 1514

- Bohlmann–Rahtz heteroannulation reaction 1462
 bond-switching reaction 1324
 bond-switching rearrangement 1320, 1321
 borane 849
 boron trifluoride di-Et etherate (BFEE) 625
 boron trifluoride etherate 1413
 Boulton–Katritzky rearrangement 1149, 1158, 1159
 bradykinin – receptors 1550
 – tetrazole analogs 1405
 B-Raf kinase inhibitors 1596
 bromide ion 843
 brominated/iodinated porphyrins 2259
 bromination 45, 1830
 bromine-catalyzed aziridination 18 – reaction conditions for 18
 bromine–lithium exchange methodology 849, 851
m-bromoacetophenone 463
 2-bromoalkylamine hydrobromide 27
N-2-bromoalkylimine 27
 1-(bromoalkyl)pyrroles 319
 1-bromobenzocyclobutene 1586
 bromocyclopropenes 1703
 2-bromo derivatives, reactivity of 895
 bromo enol ethers 819
 2-bromoindole – Bergman's synthesis 455
 3-bromo-2-isocyanoacrylate (BICA) 819
 4-bromoisoquinoline derivative 1597
 4-bromo-5-lithio-2-phenyloxazole intermediate 849
 2-bromo-3-methylfuran 535
 5-bromo-1-methyl-1*H*-1,2,3-triazole reacts 1006
 3-bromo-4-phenylfuroxan 1167
 bromopyridine 854
 bromopyrimidines 1759
 2-bromopyrrole 333
 3-bromoquinolin-2-ones 1565
 1-bromoquinolizinium bromide 2039
 4-bromo-2-stannylthiazoles – lithiation of 854
 bromo-substituted pyrrole – 6-exo-trig cyclization 433
N-bromosuccinimide (NBS) 535, 838, 2001, 2239
 5-bromo-1,2,3-thiadiazoles 1285
 2-bromothiazole 861, 863
 bromothiazole, dimerization 859
 Brønsted acids 872, 1468
 Buchwald–Hartwig amination 394, 464
 Buchwald–Hartwig arylation – applications 463
 Buchwald–Hartwig palladium-catalyzed aryl-amino coupling reaction 1547
 BuLi reagent 890
 Burgess reagent 1176 – use of 873
 (+)-butaclamol 2023
t-butanol 82
 ω -butenyl sulfonamide 18
 1-butenyl-2-vinylpyrinium salts – ring-closing metathesis (RCM) reaction 2036
t-butoxide 119
N-*t*-butoxycarbonyl)-*N*-(2-nitrobenzenesulfonyl) aminoalcohol 27
 1-(*t*-butoxycarbonyl)pyrrole 325, 334
trans-*t*-butyl cinnamate 22
 5-*tert*-butyl-3-(2,4-dichloro-5-isopropoxyphenyl)-1,3,4-oxadiazolin-2-one 1192
 5-*tert*-butyl-3-[2,4-dichloro-5-(2-propynylxyloxy)phenyl]-1,3,4-thiadiazol-2(3*H*)-one 1355
 3-*t*-butyl-2,3-dihydro-1,2,4-oxadiazoles 1104
 2-*tert*-butyldimethylsilylimidazole 852
o-*tert*-butyldimethylsilylimidazolyl aminals 852
 butyl (2-carbamothioylhydrazinylidene) ethanoate – oxidation 1342
t-butyl hydroperoxide (TBHP) 82
t-butylhypochlorite 15
t-butylhypoiotide 15, 50, 119, 126, 1145
n-butyl-lithium 1006 – hydrogen–metal exchange 1030
tert-butyl peroxide 1602
N-*t*-butyl-2-phenylaziridine 39
tert-butyl 2-(5-phenyl-1,3,4-thiadiazol-2-yl) acetate 1382
t-butyl phthalimidomalonaldehyde 2148
tert-butyl-substituted benzofuran trimer 626
t-butylsufinyl imines 25
t-butylsulfonyl (*Bus*) protected pentylaziridine 37
tert-butyl tetramethylguanidine (BTMG) 509
- c**
- calcium oxide 23
 C-alkyl derivatives 163
 camphorsultam – as chiral auxiliary in aziridination 27
 – mediated aziridination, yield data for 27
 camphorsultam bromoacetamide 26

- cancer therapy
– potent agent for 426
- cannabinoid receptor antagonists 646
- Canthine alkaloids 486
- N*-carbamoylguanidine hydrochloride 1823
- carbamoyl-1*H*-benzotriazole 1016
- carbanions
– X-ray crystal structure analysis 2091
- carbaporphyrinoids 2243
- carbazole-derivative p-type semiconductors 2311
- 5-carboalkoxydihydroazepines 1704
- carbocycles 1883, 1890
– synthesis 1644, 1645
- carbocyclic compounds 1
- carbocyclic-fused indoles 400
- carbodiimide 68
- carbon–carbon bond forming reactions 857, 1479
- carbon–carbon cross-coupling reactions
– catalyst 1516
- carbon–heteroatom bnd formation 857
- carbon monoxide 106
- carbon nucleophiles 844
- carbon tetrabromide (CBr_4) 599
- carbonyl insertions, into aziridines 40
- carbonyl tautomeric formation 1495
- 5-carboxamide-3-phenyl-1,2,4-thiadiazole 4-oxide
– X-ray structure of 1293
- N*-carboxy anhydrides (NCAs) 2140
- carboxylic acids 36, 269, 1012, 2346
– derivatives of 875
- carboxylic sulfonic anhydride 1012
- 4-carboxy-1,2,3-triazoles
– azides with methylene compounds 1000
- cardiovascular system 1329
- carzinophilin 11
- catalyst–substrate complex 81
- catalytic cycle 412, 466
- catalytic hydrogenation of pyrroles 321
- catenane synthesis 2287
- cation-exchange resins 2336
- cationic indolinylarylpalladium complex 468
- cationic zirconium species 932
- CB₁ receptor subtype antagonist 646
- C–C bond formation 937
- [CCN₂O] reactions 748
- C3/C6 cycloaddition
– regioselectivity of 1450
- C,N-diphenyl nitrilimine 1198
- cefuzonam 1286
- central nervous system (CNS) 1287
- cephalosporin C
- isochlorobutylformate (ICBF) ester 2152
- synthesis 2150
- Woodward's total synthesis 2149
- cephalosporins 2144–2161
– classical syntheses 2148–2150
– conversion 2158–2161
– industrial production 2150–2153
– with 3-morpholinosydnonimine 1072
– physicochemical data 2146–2148
– reactivity 2153–2158
- ceric ammonium nitrate (CAN) 33, 310, 2142, 2202
- cerium trichloride heptahydrate 33
- cesium fluoride 1011
- cetyl(trimethyl)ammonium hydroxide (CTAOH) 66
- c-glycosidic bond 1763
- chalcones 663, 664, 1635
- charge-transfer complexes 2311
– structures 2312
- cHBOX ligands 22
- chelating sulfonamides 19
- chemical markers
– as medical tracers 2283
- chemical shifts 189
- chemical vapor deposition (CVD) 2308
- chemotherapeutic agents 1168
- Chichibabin approach 2007
- Chichibabin reaction 1573, 2032
– of diazines 1741
- Chichibabin synthesis 2006
- chiral aldimine 25
- chiral aziridination using diazoesters 25
- chiral bis(oxazoline) (BOX) ligands 21
- chiral camphor-derived ligand 21
- Chiral capsules 2300
- chiral catalysts
– for asymmetric alkene aziridination 17
– and auxiliaries for electron-deficient alkenes 84
- chiral dihydroquinoline carbonitriles 1569
- chiral 1,2-dihydro-1,3,5-triazines 1830
- chiral Fischer-type furan carbene complex 563
- chiral γ -sultones
– asymmetric synthesis of 968
- chiral imidazolium salts 892
- chiral nonracemic aminoalcohol 27
- chiral 1,2,4-oxadiazoles 1087
- chiral pyridine derivatives 1441
- chiral S-benzyl sulfonium triflate 26
- chiral sulfur ylide approach 26
- chiral sulfur ylide precursors 88
- chiral tetrahydroisoquinoline alkaloid 1575

- chiral tetrazole compound 1427
- chiral thiepane derivatives 1901
- chiral thiourea organocatalyst 443
- chlordiazepoxide
 - Sternbach's synthesis 2183
 - structure 2176
 - synthesis 2182
- chlorinated porphyrins
 - examples 2258
- chlorination 347, 1830
- chloroacetamidine 1822
- α -chloroaldehyde bisulfite adducts
 - hetero Diels–Alder reactions of 1034
- chloroalkynes
 - Ti-catalyzed hydroamination 393
- 2-chloro-5-aryl-1,3,4-thiadiazoles 1382
- o-chloroarylacetaldehyde hydrazones
 - intramolecular cyclization 500
- 2-chloroaryl alkynes 604
- 2-chloro-N-(5-aryloxymethylene/aryl-1,3,4-thiadiazolo-2-yl)acetamides 1383
- chloroaziridine 51
- 4-chlorobenzaldehyde 86
- 2-(3-chloro-1-benzothien-2-yl)-1,3,4-thiadiazole 1345
- chlorocarbonyl isocyanate 1827
- N-chlorocarbonyl isocyanate 1827
- chlorocarbonyl isocyanates 1825
- chlorocyanogen oxide 1092
- 2-chloro-4,6-dimethoxy-1,3,5-triazine 1819, 1832
- chlorodithioformates 1266
- chloroesters, treatment 931
- chloroethanol 98
- 2-chloroethyl methyl carbonates 936
- 5-(4-chloro-3-ethyl-1-methyl-1H-pyrazole-5-yl)-1,3,4-oxadiazole-2-one 1214
- 4-chloro-2-(hydroxyamino)phenyl derivative 1213
- 1-chloroisoquinoline 1600
- chloromethylated polystyrenes 2330–2333
 - swelling properties 2331
- chloromethyl benzothiazole 25
- 1-(chloromethyl)benzotriazole
 - with sodium dialkyl phosphites 1015
- 3-chloromethyl-1,2,4-oxadiazole
 - Arbuzov reaction of 1123
- 5-(chloromethyl)-1-pyrrolidine derivatives 347
- 4-chloro-2-methylthiopyrimidine 1758
- 2-chloro-N-(5-aryloxymethylene/aryl-1,3,4-thiadiazol-2-yl)acetamides 1377
- 2-chloro nicotinic acid 2351
- 1-chloro-2-nitrobenzenes
- benzotriazol-1-ols from 1011
- 5-chloro-N-substituted-1,2,3-triazoles
 - nucleophilic displacement of 1007
- 2-chloro(or fluoro)-1,3,5-trinitrobenzene 1007
- m-chloroperbenzoic acid (MCPBA) 1327, 1599, 2144
- m-chloroperbenzoic acid (mCPBA) 64
- chloroperoxidase (CPO) 79
- 3-chloroperoxybenzoic acid
 - oxidation of 903
- 6-(2-chlorophenyl)-3-ethyl-[1,2,4]triazole[3,4-*b*]1,3,4-thiadiazole
 - crystal structure of 1336
- p-chlorophenyl isocyanate 1826
- 2-chloro-4-phenylpyrimidine 1744
- N-4-(*p*-Chloro)phenyl-1,2,4-triazole-3,5-dione 1033
- chlorophyll-*a* 273
- chloropyrazines 1760, 1762
- 3-chloropyridazines 1756
- chloropyridines 1485
- (6-chloro-3-pyridyl)acetylene derivative 324
- 2-chloropyrimidine 1745
- chloroquine 1532
- N-chlorosuccinimide (NCS) 1095, 1454
- N-chlorosuccinimide, manganese dioxide 1116
- chlorosulfonic acid 1576
- chlorosulfonyl isocyanate (CSI)
 - [2+2] cycloaddition 2126
- 5-chloro-1,2,3-thiadiazoles 1278
- chlorotriazolinone
 - synthesis of 1026
- cholinergic channel activator ABT-418
 - synthesis 740
- 4*H*-chromen-4-ones 1674–1676
- chromone
 - iron-promoted formation of 1675
 - structure of 1661
- chromones 1660, 1661
- chromophore
 - UV absorption spectra 2025
- chrysoperlin 2276
- ciguatoxin 1868
- Cinchona alkaloid organic catalysts 445
- cinnamate esters 22
 - asymmetric aziridination of 23
- cinnamic acid 1867
- cinnamylideneacetophenones 664
- cis-aziridine 51
- cis-2,3-divinyloxirane 1894
- Claisen condensation
 - with acetophenone, and condensation 1069

- Claisen-like condensation 738
Claisen-like sigmatropic rearrangement 386
Claisen-like [3,3]-sigmatropic rearrangement 398
Claisen rearrangement 489, 512
Claisen–Schmidt reaction 1462
Clavulanic acid 2145
CLEAR resins 2343
clobazam 2181, 2214
– synthetic route to 2215
clomipramine 1867
C-metallated azoles, reactions of
– azolyl copper reagents 855
– copper azoles 855
– lithium azoles 847–850
– magnesium azoles 850–852
– silicon azoles 852–853
– tin azoles 853–854
– zinc azoles 854–855
C-metallated pyridines 1479
c-metallated pyrroles 314–318
CNS depressant 734
C-nucleophiles 2352
co-catalysis system 599
colchicine
– total synthesis 571
2,4,6-collidine 1470
Combes reaction 1534
combretafurazan 1169
[CONCC] reactions 750, 751
N-CONEt₂ protected indole
– treatment 456
N-confused porphyrin 2241
conjugated ene-yne-carbonyl 554
conjugated heterocyclic mesomeric betaines (CMBs) 2021
 π -conjugated nonsymmetrical liquid crystals, 1125
20 π conjugated pathway 2247
Conrad–Limpach synthesis 1534
Cope rearrangement 329
copper(II) hexafluoroacetylacetone 38
copper(II) permanganate 83
copper(II) sulfate 82
copper-zinc superoxide dismutase
– enzyme model for 2302
core-modified oxybenzoporphyrin 2245
core-modified sapphyrins 2251
Corey–Chaykovsky synthesis 86
corrphycene 2236
coumarins. *see* 2*H*-benzopyran-2-ones
– Pechmann condensation, synthesis of 1670
– synthesis of 1669, 1670
coumestrol synthesis 613
COX-2-selective inhibitors 1712
CpCo catalyst 1438
crisscross cycloadditions 670
cromoglicic acid 1674
cross-coupling protocols 410
cross-coupling reactions 464, 2051
cross-linked ethoxylate acrylate resins (CLEAR) resins 2343
crosslinked polystyrene
– chemical modification 2330
Crown ethers 2297
crystallographic data 1134
crystallographic techniques 1078
C–S bond 114
Cu-based chiral catalysts 447
Cu–Cr catalyst 1888
Cu^I/Cu^{III} system 510
C4-unsubstituted isoquinolines 1578
C4-unsubstituted-*N*-oxides 1579
cupric triflate 94
Curtius rearrangement 413
Cusmano–Ruccia/Boulton–Katritzky rearrangement 1117
5-cyanimino-4,5-dihydro-3-aryl-1,2,4-thiadiazoles 1309
cyanine dye 2279
– structure 2279, 2280
cyanoacetamide 1673
3-(cyanoacetyl)pyrrole 303
cyanoacetylureas 1719
N-cyanoamidines
– cyanamide 1089
1-cyanobenzotriazole
– electrophilic cyanations 1015
cyano compounds
– palladium-catalyzed three-component coupling reaction of 1409
 β -cyano enolate 848
cyanogen chloride 894
cyanohydrines 1090
5-(cyanoimino)thiadiazolines 1320
1-cyanoisoquinoline *N*-oxides 1606
cyanomethyl-1,2-dihydro-*N*-methylquinolines 1568
5-cyanomethyl-1,3-diphenylpyrazoles
– induced addition–elimination 692
5-(*p*-cyanomethylphenyl)-2-*n*-nonyl-1,3,4-oxadiazole 1227
2-cyano-1-methylpyrrole 339
1-cyano-4-(*N,N*-dimethylamino)-pyridinium bromide 841
cyanopyrazine 1760

- 2-cyanoquinolines 1560
 3-cyanoquinolines 1534
 cyanurates 1820
 cyanuric acid 1820, 1830
 cyanuric chloride 1818, 1820, 1832
 cyclic azomethine imines 1070
 cyclic β -ketoesters 392
 cyclic C-alkoxynitrones 903
 cyclic C-aminonitrones 903
 cyclic compounds 1
 cyclic diazo compound 491
 cyclic guanosine monophosphate (cGMP) 651
 cyclic imines 1102
 cyclic pyrrolo-2,3-quinodimethanes – Diels–Alder cycloaddition 435
 cyclic sulfides – ring contraction 970
 cyclization approaches 593
 cyclization-assisted cleavage strategy 2349, 2371
 – advantages 2348
 cyclization of hydrazones of 4-oxoalkenoic acid derivatives 1699
 cyclization reactions 385, 407, 424, 1995–1997, 2053
 cyclization-release strategy 2185
 cycloaddition cascades – applications 484
 cycloaddition–elimination process 1298
 [4+2] cycloaddition methodology 435
 – applications 482
 cycloaddition reactions 54, 480–487, 780–782, 791, 793, 1648–1652, 2000, 2042–2043, 2095, 2096
 – of aziridines 39
 – with azirines 55
 cyclobutadiene – tautomerization of 1221
 cyclodehydration method 2053
 β -cyclodextrin 94, 111
 cyclodimerization – of α -amino acids 1726
 – of α -amino carbonyl compounds 1726
 – of nitrile ylides 1728
 cycloheptatriene 1865
 cyclohexane spiroepoxide 57
 cyclohexanones 1557
 cyclohexene 82
 cyclohexene imine 36
 – conditions for N-elaboration 36
 cyclohexene oxide 110
 cyclohexenyl carbamate 19
 cyclohexylaziridine 34
 N-cyclohexyl-N-benzoylhydrazine 1213
 1,5-cyclooctadiene 1071
 cyclooxygenase-2 inhibitors 576
 cyclopentene oxide derivative 101
 cyclopropanes – with SO₂ 969
 cyclopropenyl ketone – Cu-catalyzed ring-opening cycloisomerization reaction 555
 cytotoxic effect 2210
 cysteine-derived chiral 4-amino-1,2-oxathiolane 2-oxide – nucleophilic attack on 971
Cystobacter violaceus 164
 cytochrome P450_{cam}, enzyme models for 2301
- d**
- DABCO 176, 177, 661, 683, 684, 1927, 2136
 Danishefsky's diene 483, 1672
 Davis' reagent 2351
 DBU/Lewis acid 1537
 Dean-Stark apparatus 689
 Debus' reaction 816
 decarboxylation 339
 – of pyrrole-3-carboxylic acids 337
 π -deficient heterocycles 1572
 dehydrobrominations 46
 dehydrochlorinations – of pyridazines 1736
 α -dehydrophenylalanine – irradiation of 1587
 4,5-dehydropiperidine 1509
 delocalization energies (DE) 2024
 demoxepam 2184
Dendrobates histrionicus 1558
 density functional theory (DFT) 1134, 1292
 – calculations 379, 1573, 2005, 2092
 deoxyglucitol-derived aziridine 32
 1-deoxymannojirimycin analogs 32
 deprotonation 5
 Dess–Martin conditions 98
 desulfurization 116–117
 – of thiranes 118
 Dewar phosphinines 2085
 Dewar pyridines 1495
 Dewar pyrimidine intermediate 1731
 DeWitt's solid-phase synthesis – of 1,4-benzodiazepine-2-ones 2187
 DFT/6-31G computational method – vs. experimental bond lengths 1332
 diactivated alkenes 23
 2,4-diacylpyrroles 304

- 6-dialkylamino-1,3,5-triazine-2,4-dithiols 1830
 3-*N,N*-dialkylamino-1,2,4-triazoles 1025
 dialkylation 1733
 2,3-dialkylaziridine residue 12
 1,2-dialkyl-1,2-dihydroisoquinolines
 – Grignard reagents 1610
N,N-dialkylidithiocarbamides 953
N,N-dialkylfurazanamidoximes 1143
 O,N -dialkylhydroxamic acids 1013
 1,3-dialkylisoquinolines 1608
 2,5-dialkyl-1,3,4-oxadiazoles 1203
 3,4-dialkylpyrrole-2,5-dicarboxaldehydes 302
 3,4-dialkylpyrrrole-2-carboxylic acids 302
 dialkyl-1,2,4-thiadiazoles 1306
 dialkylzinc reagents 1762
 diamides
 – Pd-catalyzed reaction 2192
 1,2-diaminoalkene 1724
 1,2-diaminobenzene 1017
 4,6-diamino-1,2-dihydro-1,3,5-triazine 1827
 1,2-diaminoethanes 1723
 diaminomaleonitrile (DAMN) 820
 2,4-diaminothiazole 896
 diaryl diselenides 1901
 1,3-diarylimidazolium chlorides 892
 4,6-diarylpyrimidine-2-ylamines 1712
 3,4-diaryl substituted 1,3,4-oxadiazolidines 1200
 3,6-diaryl-1,2,4,5-tetrazines 1840
 2,5-diaryl-1,3,4-thiadiazoles 1349
 2,4-diaryl-1,2,3-triazoles
 – preparation of 1002
 2,5-diaryl-3-trimethylsilylmethyl-1,3,4-oxadiazolium trifluoromethanesulfonates 1191
 diastereomeric mixtures 888
 diastereoselective epoxidations, with chiral auxiliaries 87
 diastereoselectivity 28, 79, 114
 3,6-diaza-bicyclo [3.1.0]hexane system 12
 1,2-diaza-1,3-butadienes 1260
 – Pd(0)-catalyzed carbonylation 672
 diazepam 2179
 – acylation 2196
 3,6-diazido-1,2,4,5-tetrazine (DiAT) 1836
 diazines 3, 1683
 – bicyclic variants 1683
 1,2-diazines 1757
 diaziridines
 – cis-trans isomerism in 119
 – diaziridines 122, 123
 – diaziridinimines 123, 124
 – diaziridinones 123, 124
 – geometry 118
 – other methods 121, 122
 – oxidative methods using hypohalites 119, 120
 – properties 117–119
 – reactivity 122
 – synthesis 119–122
 – via hydroxylamine derivatives 120, 121
 diaziridinimines 119, 123
 diaziridinones 122, 123
 – ring enlargement 671
 diazirines
 – properties 124
 – reactivity 126–129
 – synthesis 124–126
 3*H*-diazirines. *see* diazirines
 diazoalkanes 1265
 – dipolar cycloaddition of 1050
 α -diazoanhydrides
 – 1,3-dioxolium salts 930
 diazocarbonyl compounds
 – InCl₃-catalyzed 1,3-dipolar cycloaddition 668
 diazo compounds
 – decomposition of 931
 – 1,3-dipolar cycloaddition reaction 651
 – metal-catalyzed insertions 2127, 2128
 diazo coupling, nitrosation 701
 diazocyclohexadienone valence isomer 1049
 2-diazo-1,3-dicarbonyl compound
 – copper-catalyzed decomposition of 931
 2-diazo-1,3-dicarbonyl derivatives 1264
 diazo esters
 – rhodium-catalyzed reaction of 931
 diazoketones 1724
 diazomethane 1901
 – frontier molecular orbital theory prediction of 1256
 diazonium ions 840
 diazothiocarbonyl compounds 1263
 α -diazothiocarbonyl compounds 1264
 2-diazothione
 – isolation of 1254
 diazotization reaction 2046, 2047
 diazo(vinyl)methanes bearing a carbonyl group
 – reductive cyclization of 1700, 1701
 dibenzazepines 1867
 dibenzo[*b,e*]thiepines 1869
 dibenzylthiirane 115
 3,5-dibromo-2-aminopyrazine 1737
 dibromobithiazole
 – formation of 859
 1,3-dibromo derivative 971
 α,β -dibromoesters 29

- 1,6-dibromohexane 1901
 3,5-dibromo-1*H*-1,2,4-triazole 1032
 3-(2,4-dibromophenyl)-2-methylthio-5-phenyl-1,3,4-thiadiazolium methosulfate 1353
 2,4-dibromothiazole
 – chemoselective reaction of 863
 5,7-di-*t*-butyl-1,2,3-benzoxadiazole 1049
N,N-di-*t*-butyldiaziridinone 123
N,N-dibutyldiaziridine 119
 1,5-dicarbonyl/ammonia 1462
 1,2-dicarbonyl compounds
 – monooximes of 902
 1, 3-dicarbonyl compounds
 – ring construction, synthesis 926–927
 1,4 dicarbonyl compounds 821
 1,3-dicarbonyl derivative 1533
 1,5-dicarbonyl derivatives
 – cycloaddition of 1461
 1,2-dicarbonyl monohydrzones 1698
 1,4-dicarbonyl reagents
 – structures of 821
 dicarbonyl synthons 1713
 2,6-dichlorobenzaldehyde 87
 2,3-dichloro-5,6-dicyano-1,4-benzoquinone (DDQ) 1465, 1738, 2106
 2,2-dichlorodiethyl sulfide
 – imidazole, reaction 835
 1,2-dichloroethane (DCE) 1568
 4,5-dichloro-3-iodopyrrole-2-carboxylate 336
 dichloromethane (DCM) 1346, 1827
 2,4-dichloro-6-methoxy-1,3,5-triazines 1819
N,N-dichloro-o-nitrobenzenesulfonamide (2-NsNCl₂) 879
 2,6-dichloro-3-nitropyridine 1471
 2,3-dichloro-4-oxobut-2-enoic acid 1696
 2-(2,4-dichlorophenylamino)-5-(2,4-dihydroxyphenyl)-1,3,4-thiadiazole 1387
 2,4-dichloroquinoline 1563
 4,7-dichloroquinoline
 – palladium-catalyzed carbonylation of 1563
 3,5-dichloro-1,2,4-thiadiazole 1306
N,N-dichlorotosyl sulfonamide 29
 5,6-dicyano-1-methylindole 327
 4,5-dicyanopyridazine 327, 1748
 dicyclic 1,2-dithiolane 940
 dicyclohexylcarbodiimide (DCC) 36, 1086, 1182
 Dieckmann-type cyclization 1901
 1,3-dielectrophile
 – condensation of 1533
 Diels–Alder adducts 323, 704, 869
 Diels–Alder catalysis 2299
 Diels–Alder cycloaddition 693
 – of propargylic aldehyde 1697
 Diels–Alder cycloaddition–retro-Diels–Alder reaction strategy 542
 Diels–Alder cycloadditions 704, 793, 1453, 1670, 2078
 Diels–Alder (DA)/1,3-dipolar cycloaddition (1,3-DC) cascade 1218
 Diels–Alder/hetero-Diels–Alder cycloaddition 1551
 [4+2] Diels–Alder reaction 2076
 Diels–Alder reactions 54, 273, 324, 480, 482, 486, 533, 537, 570, 572, 616, 780, 781, 791, 866, 867, 1172, 1216, 1378, 1444, 1445, 1446, 1564, 1585, 1665, 1893, 2043, 2297, 2298, 2303
 – products 546
 – from 2-quinolones and butadiene compounds 1566
 Diels–Alder reagent 1131
 dienic system
 – of molybdenum carbonyl complexes 2078
 – reactivity 2077
 dienophile
 – LUMO 485
 – nucleophilic carbon of 1450
 dienophile (*p*-toluenesulfonyl)acetylene 324
 α -dienyl β -lactams
 – Diels–Alder reaction 2143
 1-(diethoxymethyl)imidazole
 – use of 847
 diethoxyphosphinyl acetic acylhydrazine 1020
 4-(diethoxyphosphoryl)methyl-*N*-(3-phenyl[1,2,4]thiadiazol-5-yl)benzamide 1331
 diethylaluminium azide 95
 diethylaluminium 2,2,6,6-tetramethylpiperide (DATMP) 98
 diethylaminoacetonitrile 1834
 3-diethylaminoacrylonitrile 669
 diethylaminosulfur trifluoride (DAST) 872
 diethyl azodicarboxylate 1823
 diethylazodicarboxylate (DEAD) 1403
N,N-diethylcarbamyl chloride 902
 diethylepisulfide 114
 diethyl ethoxymethylenemalonate 339
 σ,σ -diethyl hydrogen phosphodithioate 114
 diethyl (pyrrol-2-yl)methylphosphonate 331
N,N-diethyl-1-propynylamine
 – hetero-Diels–Alder reaction of 1449
 3,6-diethyl-1,2,4,5-tetrazine 1837
 5,5-difluoro-1-methyl-3-pyrrolin-2-one 339
N,N'-diformylhydrazine 1341
 4,5-dihydroazepines 1884

- dihydro-1,4-dithiins 963
 2,3-dihydrofuran 1893
 dihydrofuran-2,5-dione 1
 dihydrofuran-2-one 1
 3,5-dihydro-4*H*-2,3-benzodiazepin-5-ones reaction 2221
 1,2-dihydro-3*H*-indazol-3-ones 688
 2,3-dihydro-4*H*-pyran-4-ones 673
 2,4-dihydro-3*H*-1,2,4-triazolin-3-ones 1026
 4,5-dihydroimidazoles 873
 – synthesis of 871
 dihydroisoquinolines 1602
 1,2-dihydroisoquinolines 1604
 – diastereoselectively 1611
 3,4-dihydroisoquinolin-1-ones 1577
 2,3-dihydroisovalerate 1167
 4,5-dihydro-3-methyl-1,2,3-oxadiazolinium salts 1059
 2,5-dihydro-1,2,4-oxadiazin-5-ones 1102
 4,5-dihydro-1,2,4-oxadiazole 5-ones 1116
 – oxidation of 1116
 4,5-dihydro-1,2,3-oxadiazole 2-oxides 1052
 4,5-dihydro-1,2,4-oxadiazole ring 1080
 2,3-dihydrooxadiazoles 1198
 2,3-dihydro-1,2,4-oxadiazoles 1105
 – crystal structures for 1080
 4,5-dihydro-1,2,4-oxadiazoles
 – mass spectrometric analysis of 1083
 – synthesis of 1099
 4,5-dihydro-1,2,4-oxadiazoles ring 1076
 dihydro-1,2,3-oxadiazoline structures 1050
 4,5-dihydro-1,2,4-oxadiazol-5-ones 1099,
 1111
 4,5-dihydro-1,2,3-oxadiazolo 2-oxides 1052
 4,5-dihydro-1,2,4-oxadiazol-5-thiones 1099
 dihydrooxazaphosphole derivatives 50
 4,5-dihydro-1,2,3-oxazolidinium salts 1058
 dihydrooxepine 1894
 Δ^3 -dihydropyran derivatives 1654
 2,3-dihydropyrazines 1723
 dihydropyrazoles 1071
 4,5-dihydropyridazin-3(2*H*)-ones 1693
 1,4-dihydropyridine derivatives
 – formation of 1457
 1,4-dihydropyridines
 – Hantzsch synthesis of 1458
 3,4-dihydropyrimidine-2-(1*H*)-ones 1706
 1,4-dihydropyrimidines 1707
 1,6(1,4)-dihydropyrimidines 1716
 2,5-dihydopyrroles (3-pyrrolines) 320
 dihydroquinine–dihydroquinidine 1530
 2,3-dihydroquinolin-4-ones 1542
 4,5-dihydro-1,3,4-thiadiazole-2-carboxamides 1362
 2,3-dihydro-1,3,4-thiadiazole derivatives 1361
 2,5-dihydro-1,3,4-thiadiazoles 1379
 4,5-dihydrothiazoles
 – synthesis of 873
 4,5-dihydrothiepine 1896
 2,3-dihydro-[(thioacyl)methylene]thiadiazoles 1379
 dihydro-1,3,5-triazines 1835
 4,5-dihydroxazoles 871
 2,4-dihydroxy-6-methylpyrimidine 1736
 2,5-dihydroxypyrrole-O-benzoates 311
 4,5-dihydro-3-methyl-1,2,3-oxadiazolium tosylate
 – synthesis of 1058
 diisobutylaluminium hydride (DIBALH) 339, 1489
 diisopropyl carbodiimide (DIC) 2363
 1,5-diisopropyl substituted 6-oxo-verdazyls 1838
 diketones 2036
 1,4-diketones
 – Stetter reaction 1035
 α -diketones 816
 1,2-diketones, synthesis 816
 dimedone, coupling 608
 dimeric benzo[*b*]furans
 – split-pool synthesis 622
 4,6-dimethoxy-2-aminopyrimidine 1691
 1-(3,4-dimethoxybenzyl)pyrrolidines 345
 2,5-dimethoxy-2,5-dihydrofuran 537
 4-(4,6-dimethoxy[1,3,5]triazin-2-yl)-4-methylmorpholinium (DMTMM) chlorides 742, 1819
 dimethyl acetylenedicarboxylate (DMAD) 322, 323, 753, 781, 1070, 1884, 1885, 2365
 – Diels–Alder adduct 870
 – dipolarophiles 868
 – thiazoles 869
 dimethyl acetylene-dicarboxylate (DMAD) 1613
 N,N -dimethylacrylamide
 – copolymerization 2340
 5-(dimethylamino)benzofuroxan
 – nitrosation of 1162
 N' -(dimethylamino)methylidene- N,N -dimethylhydrazoneformamide 1340
 5-(dimethylamino)-4-methylisosyndone 1190
 2-(dimethylaminomethyl)pyrrole 308
 2-[4-(*N,N*-dimethylaminophenyl)-4-substituted-(3,4,5-trimethoxyphenyl)]- Δ^2 -1,3,4-oxadiazolines 1197

- dimethylaminopropenoates
– nitrosation of 1090
- 1-[3-dimethylamino]propyl-3-ethylcarbodiimide (DMAP) 178
- catalytic amounts 2363
- 1-[3-(dimethylamino)propyl]-3-ethylcarbodiimide (EDC) 1086
- 4-dimethylaminoquinoline
– acylation of 1559
- 4-dimethylamino-4-trichloromethyl-1,3-daza-1,3-butadiene 1822
- 2-dimethylamino-4-trichloromethyl-1,3,5-triazine 1822
- N,N*-dimethylaniline 303
- 2,3-dimethylbutane 137
- 2,4-dimethylcarbonohydrazide 1838
- 3,4-dimethylcoumarin 1668
- dimethyldioxirane (DMD) 70
– catalytic epoxidation using 60
– epoxidation of sensitive substrates 59
- 2,2-dimethyl-1,3-dioxolanes 935
- dimethylformamide 98, 106
- N,N*-dimethylformamide (DMF) 1480
- dimethylfurazan 1137
- 3,4-dimethylfurazan 1166
- 1,2-dimethylimidazole 869
– butyllithium reacts 890
– Diels–Alder adduct 870
- dimethylpyridazolyl 1838
- dimethylpyridine 1505
- trans*-2,5-dimethylpyrrolidine derivative 349
- dimethyl sulfoxide (DMSO) 87, 453, 991
- 1,3-dimethyl-3,4,5,6-tetrahydro-2-pyrimidinone (DMPU) 1553
- 2,4-dimethyl-1,2,4-thiadiazolidine-3,5-dithione 1317
- 2,4-dimethyl-1,3,5-triazine 1822
- 4,4'-di(morpholin-1-yl)azoxyfurazan 1134
- 2,5-di *m-/p*-tolyl-1,3,4-oxadiazoles
– oxidation of 1211
- Dimroth reaction 1282
- Dimroth rearrangements 1280, 1312, 1324, 1370
- 1,3-dinitrobenzene 1732
- 4,6-Dinitrobenzofurazan 1153
- 4,6-dinitro compounds 1158
- Diol formation 67
- 1,2-diols
– with oxalyl chloride and triethylamine 935
- 1,3-dioxane
– treatment of 935
- dioximes 1139
- 1,2-dioximes
– oxidation of 1149
- dioxirane-mediated sulfoxidation 139
- dioxiranes
– epoxidation of alkenes 137
– hydroxylation of alkanes 137, 138
– oxidation of sulfur 138–140
– properties 135, 136
– reactivity 137
– synthesis 136, 137
- 1, 2-dioxolane 925
– electron diffraction 926
– heterocycles, ring transformations of 927
– reactivity of 928
- 1,3-dioxolane
– derivatives 938
– ${}^1\text{H}$ NMR data 929
– with ferrous sulfate 937
- dioxolanes 933
- 1, 2-dioxolanes
– formation of 926
- 1,3-dioxolanes 928
– derivatives 938
– heterocycles, ring transformations of 935
– NMR spectroscopy 929, 930
– reactivity of 935–938
– ring construction, synthesis 930–935
– X-ray diffraction studies 929
- 1,2-dioxolan-2-yl cation
– X-ray diffraction studies 929
- 1, 2-dioxole 925
– heterocycles, ring transformations of 927
– reactivity of 928
- 1,3-dioxoles 928
– derivatives
– ${}^{13}\text{C}$ NMR data 930
– ${}^{17}\text{O}$ NMR data 930
– 1,3-dioxolane derivatives 938
– heterocycles, ring transformations of 935
– ketones 933
– NMR spectroscopy 929, 930
– reactivity of 935–938
– ring construction, synthesis 930–935
– X-ray diffraction studies 929
- 1, 2-dioxoles systems 926
- 1,3-dioxolium salts 928
- 2,5-diphenyloxazole (PPO) 2285
- diphenyl derivatives
– electrophilic reaction 1223
- 2,4-diphenyl-1,3-diazabuta-1,3-dienes 1823
- 3,7-diphenyl-5,6-dihydro-4*H*-1,2-diazepines 1705
- diphenylfurazan decomposes
– thermal process 1154
- diphenyl imidodicarboxylate 1825
- 1,3-diphenylisobenzofuran 330

- diphenylnitrilimine
 – prepared from 2,5-diphenyltetrazole 1193
 2,5-diphenyl-1,3,4-oxadiazole 1207, 1219
 3,5-diphenyl-oxadiazole fragment 1080
N,N'-diphenyl-oxalodihydrazoneyl dichloride 1361
 2,5-diphenyloxazole
 – irradiation of 870
 diphenylphosphinoferrocene (DPPF) 332
 diphenyl phosphorazidate (DPPA) 48
 3,6-diphenylpyridazine 1705
 2,6-diphenylpyridine
 – reduction of 1490
 2,6-diphenylpyrylium salt
 – synthesis 1635
 2,5-diphenyl-1,3,4-thiadiazole 1338
 3,5-diphenyl-1,2,4-thiadiazole
 – reduction of 1311
 4,5-diphenyl-1,3,4-thiadiazolium 2-thiolate 1372
 3,6-diphenyl-1,2,4,5-thiatriazine 1837
 3,5-diphenyl-1,2,4-triazole 1207
 diposphorus tetraiodide 27
 1,3-dipolar azomethyne imines 1054
 1,3-dipolar cycloaddition 877, 904, 1071, 1147
 – of azides to alkynes 991
 – of nitrile oxides 1083
 – of nitrones 1104
 1,3-dipolar cycloaddition 29
 dipolar cycloaddition reactions 1060
 – of 1,4-benzodiazepine-5-ones with nitrilimines 2207
 1,3-dipolar cycloadditions 1027
 – of alkynes 998
 – of azides and alkynes 992
 dipole–dipolarophile interaction 666
 dipole moments 270, 1132
 2,5-di(4-pyridyl)-1,3,4-oxadiazole
 – molecular dimensions for 1173
 di(pyrrol-2-yl)ethenes 309
 di(pyrrol-2-yl)methanes 332
 direct aziridination, with alkyl azides 30
 directing metallation groups (DMG) 1476
 discotic liquid crystals 2313
 2,5-disubstituted-1,3,4-oxadiazoles 1180
 3,3'-disubstituted-4,40-azofuroxans
 – transformation of 1160
 2,3-disubstituted benzofurans
 preparation 611
o,o-disubstituted biaryl systems 1645
 2,2-disubstituted-1,3-dioxolanes 934
 – to carbonyl compounds, hydrolysis of 936
 2,5-disubstituted furans preparation 548
 2,2-disubstituted glycines 52
 1,6-disubstituted hexanes 1899
 1,5 disubstituted imidazole-4-carboxylates 819
 4,5-disubstituted imidazoles 816
 2,3-disubstituted indoles 423
 – solid-phase synthesis 423
 1,3-Disubstituted isoquinolines 1584
 1,4-disubstituted isoquinolines 1580
 3,4-disubstituted isoquinolines 1582
 1,5-disubstituted 3-[1-nitroethyl(benzyl)]1,2,4-triazoles 1160
 2,5-disubstituted 1,3,4-oxadiazoles
 – synthesis of 1181
 2,5-disubstituted-1,3,4-oxadiazoles
 – synthesis of 1176
 3,5-disubstituted-1,2,4-oxadiazoles
 – photochemistry 695
 3,4-disubstituted 1,2,4-oxadiazoline-5-thiones 1300
N,N'-disubstituted oxamides
 – cyclization of 817
 2,4-disubstituted oxazoles 824, 826
 2,5 disubstituted oxazoles 827
N-(1,1-disubstituted propargyl)anilines 1544
 1,3-disubstituted pyrazole-4-carbonitriles 669
 2,4-disubstituted pyrimidines 1734
 2,5-disubstituted pyrrolidines 344
 1,1-disubstituted taurine 116
 1,5-disubstituted tetrazoles 1411
 2,5-disubstituted-1,3,4-thiadiazoles 1349
 4,5-disubstituted-1,3,4-thiadiazolium 2-thiolate 1351
 2,4-disubstituted thiazoles 834
 1,3-disubstituted 2-thioureas 1825
 1,4-disubstituted-1,2,3-triazoles 996
 1,5-disubstituted-1,2,3-triazoles 994
 3,5-disubstituted-1,2,4-triazoles
 – synthesis of 1028
 4,5-disubstituted-1,2,3-triazoles 991
 2,4-disubstituted-1,2,4-triazol-3-ones 1029
 2,5-disubstituted-3-trimethylsilylmethyl-1,3,4-thiadiazolium trifluoromethanesulfonates
 – ^1H and ^{13}C NMR data 1337
 1,4-dithiafulvenes 1276
 4-dithiafulvenes 1270
 1,3-dithianes 941
 – ring contraction of 941
 1,2,4-dithiazol-3-one 976
 dithiocarbamates 949
 – cyclized with conc. sulfuric acid 951

- 1,2-dithiolane
 - ^{13}C NMR chemical shifts 939
 - ^1H NMR spectrum of 939
- 1,3-dithiolane
 - enantioselective oxidations of 965
 - heterocycles, ring transformations of 956, 957
- 1,2-dithiolane-4-carboxylic acid 946
- 1,3-dithiolane derivatives
 - bond lengths 948
 - ^{13}C NMR data for 949
 - ethylenediamine reacts 966
 - ^1H NMR data for 948
- 1,3-dithiolane ring 956
- 1,2-dithiolanes 938, 939, 940, 941
 - carbenes react 946
 - compounds of interest 946, 947
 - cyanide ion 946
 - 1,2-dithiolium salts 942–944
 - heterocycles, ring transformations of 941, 942
 - physicochemical data 939
 - preparation of 940
 - reactions
 - with carbenes 946
 - with electrophiles 945, 946
 - with nucleophiles 946
 - ring construction, synthesis 940, 941
 - synthesis of 940
 - 1,3-dithiolanes 947, 964
 - acid and alkaline hydrolysis 963
 - cleavage of 964
 - electrochemical oxidation of 957
 - NMR spectroscopy 947–949
 - ring synthesis of 954–956
 - synthesis of 954, 956
 - theoretical methods 949
 - X-ray crystal structure 947
 - X-ray diffraction studies 947
 - X-ray methods for 939
 - 1,3-dithiolanes, reactivity of
 - cleavage reactions 963, 964
 - electrophilic attack at carbon 964
 - oxidations 964, 965
 - radical reactions 965
 - ring transformation reactions 965, 966
 - 1,2-dithiolane system 938
 - dithiolane, with WCl_6 965
 - 1,3-dithiolan-2-yl radical
 - intramolecular addition of 965
 - dithiolate disodium salt 755
 - 1,3-dithiole-2-one 960
 - decarbonylation 960
 - 1,2-dithiole-3-ones
 - acyclic ketones and thiones 944
 - 1,2-dithioles 938, 943, 944
 - 1,2-dithiolium salts 942–944
 - heterocycles, ring transformations of 941, 942
 - physicochemical data 939
 - reactions
 - with carbenes and nitrenes 945
 - with electrophiles 944
 - with nucleophiles 944, 945
 - ring construction, synthesis 940, 941
 - synthesis of 940, 941
 - 1,3-dithioles 947
 - coupling reactions 962, 963
 - heterocycles, ring transformations of 953, 954
 - NMR spectroscopy 947–949
 - reactions
 - with electrophiles 961
 - with nucleophiles 961, 962
 - reductions 962
 - synthesis of 949–953
 - theoretical methods 949
 - thermal and photochemical reactions 960
 - X-ray crystal structure 947
 - X-ray diffraction studies 947
 - 1,2-dithioles react 945
 - carbene and nitrenes 945
 - 1,2-dithiole system 938
 - 1,2-dithiole-3-thione
 - reaction of 945
 - 1,3-dithiole-2-thione 952
 - 1,3-dithiole-2-thiones 951, 953, 961
 - synthesis of 952
 - 1,2-dithiole-3-thiones react 944
 - 1,3-dithiole tributyl tin 962
 - 1,2-dithiolium cations 939
 - dithiolium salts 943
 - 1,2-dithiolium salts 942, 943
 - with carbon nucleophiles 944
 - electrochemical reduction of 944
 - formation of 944
 - 1,3-dithiolium salts 947
 - synthesis of 949–953
 - dithiolones
 - conversion of alkynes into 951
 - 1,3-dithiolones
 - synthesis of 949–953
 - 1,3-dithiol-2-ones 950
 - 1,2-dithiol-3-thione
 - geometry of 939
 - 1,3-dithiolylium bromides 950
 - 1,3-dithiolylium ions

- coupling reactions 962, 963
- reactions
- with electrophiles 961
- with nucleophiles 961, 962
- reductions 962
- thermal and photochemical reactions 960
- 1,3-dithiolylium-4-oate**
- photolysis of 960
- 1,3-dithiolylium-4-olates** 962
- 1,3-dithiolylium salts** 952, 958, 961, 962
- with nucleophiles 961
- preparation of 949
- diversity-oriented synthesis (DOS)**
 - libraries 2353
- divinylbenzene (DVB)** 2328–2330
- 1,2-dioxolanes** 927
- DMAD** 869, 1062, 1897
- DNA topoisomerases** 649
- 1-dodecyl-1-methyl-4-oxopiperidinium triflate** 61
- Doebner–Miller methods** 1535, 1536
- domino-reaction** 580
- donor–acceptor charge-transfer complex** 2310
- dopamine antagonist** 735
- Dost's bases** 1306
- Dysidea fragilis** 42

- e**
- Eaton's acid** 388
- Eaton's reagent** 1535
- Ehrlich carcinoma** 1074
- electrocyclic reactions** 570–573, 2018–2019
- electrocyclizations** 435, 488, 1729
 - of 2,3-dialkenyl-4-nitropyrrole 435
- electron-deficient nitriles** 1092
- electron-deficient olefins** 20
- electron-deficient oxadiazole ring carbon** 1203
- electron-deficient pyrazine ring** 1763
- electron density** 813
- electron diffraction** 926
- electron-donating groups** 1576
- electron impact ionization (EI) technique** 2026
- electron-poor nitrogen heterocycles** 2309
- electron-rich alkynes** 1658
- electron-rich arenes**
 - electrophilic Friedel–Crafts alkylation 2078
- electron-rich system** 2011
- electron spin resonance (ESR) spectroscopy** 1337
- electron-transfer process** 2013
- electron-withdrawing effect** 812
- electrophilic amide activation** 1578
- electrophilic attack on pyrrole** 6
- electrophilic cyclization reactions** 1578
- electrophilic reactions** 2255–2262
 - formylation 2255
 - halogenation 2257–2262
 - reactions of formyl porphyrins 2256, 2257
- electrophilic reagents** 834–842
 - at carbon 837–842
 - C-metallated azoles, reactions of 847–855
 - at N3 834–837
 - N-metallated imidazoles 846
 - nucleophilic reagents 843–846
 - oxidizing agents 842, 843
- electrophilic replacement reactions**
 - at C4 in sydnone 1066
- electrophilic ring** 849
- electropolymerization** 274
- electrostatic interactions** 2286
- elemental fluorine**
 - oxidative addition of 926
- Ellman's solid-phase synthesis**
 - of 1,4-benzodiazepine-2-ones 2186
- enamine ketone**
 - amine exchange reaction 738
- enamines** 1450
 - cyclocondensation synthesis o 1459
 - Michael-type addition 427
 - 1,2,4-triazines, [4+2] cycloaddition of 1451
- enamino derivatives**
 - Michael addition of 1455
- β-enamino ketoester** 740
- enamino ketones**
 - one-pot reaction 738
- enaminones**
 - cyclization 506
- enamino thioaldehydes** 754
- enantioenriched chiral triptophols** 448
- enantiospecific preparation, of episulfides from epoxides** 111
- 6-*endo*-dig cyclization** 1658
- energies of the LUMO (E_{LUMO})** 1589
- energy gap** 1701
- enolizable enones** 1585
- enolization, stabilizing effect** 574
- ensaculin** 1668
- enthalpy** 73
- entropy** 73
- enzyme interactions** 1127
- enzyme Rubisco model** 2302
- enzyme topoisomerase I** 1531
- (–)-ephedradine, synthesis** 604
- epoxidations**

- of alkenes using catalytic dioxiranes 61
 - of alkenes using hydrogen peroxide 67
 - of alkenes using other non-metal oxidizing agents 68
 - of alkenes using peracids 65
 - of allylic alcohol with performate 66
 - of carbonyl compounds 86
 - of carbonyls with methylene equivalents 88
 - with chiral catalysts and reagents 86
 - of 1,2-dihydronaphthalene 77
 - of (*E*)-2,3-diphenyl-2-propenol 78
 - of electron-deficient alkenes 83–86
 - with immobilized metal salen catalysts 77
 - of phenylstilbene 64
 - under Sharpless conditions 78
 - using metalloporphyrins 80
 - using methyltrioxorhenium (MTO) 82
 - using polyoxometallates (POMs) 81
 - epoxide 68
 - cyclized with triethylamine 969
 - epoxide–episulfide conversions 112
 - using other sulfur sources 112
 - epoxide ring opening
 - with carbon nucleophiles 93
 - with halide nucleophiles 98
 - with nitrogen nucleophiles 94
 - with oxygen nucleophiles 96
 - with sulfur nucleophiles 97
 - epoxides 447
 - activation using cyanuric chloride 112
 - from ring-closing reactions 91
 - 6,7-epoxygeraniol 66
 - Epstein–Barr virus early antigen (EBV-EA) 1530
 - Escherichia coli* 1222
 - esoteric *N*-iodo-*N*-potassio-*p*-toluenesulfonamide (TsN KI) 14
 - estazolam 2198
 - ethane-1,3-dithiol also reacts 956
 - ethanolic ammonia 1461
 - 3-ethoxyacryloylisocyanate 1718
 - 5-ethoxycarbonylamino-3-(1-nitroalkyl)-1,2,4-thiadiazole derivatives 1160
 - 3-ethoxycarbonyl-1,4-benzodiazepines synthesis 2197
 - 2[(ethoxycarbonyl)hydrazono]propanoic acid 1259
 - 4-(3-ethoxycarbonylthioureido)-3-substituted-furoxan intermediate 1160
 - 5-ethoxy-4-methyloxazole 867
 - ethyl acetoacetate 1456
 - 2-ethylbenzothiazoles 891
 - ethyl 2-(2-benzoylhydrazinyl)-2-oxoacetate – cyclocondensation of 1175
 - ethyl 4-bromopyrrole-2-carboxylate 335
 - ethyl 2-(2-chlorophenyl)hydrazine-carboxylate – condensation of 1192
 - ethyl diazoacetate 24
 - N*-ethylidiosopropylamine 892
 - ethyl-diisopropylcarbodiimide (EDC) 822
 - ethylene glycol 1027
 - ethylene oxide 312
 - 5-ethyl-4-ethoxycarbonyl-1,2,3-thiadiazole 1264
 - ethyl glyoxylate
 - with amines/ammonia 818
 - ethyl nosyloxy carbamate 23
 - ethyl pyrrole-2-carboxylate 304
 - S*-ethyl thioamides 1025
 - ethyl trifluoroacetate
 - three-component condensation of 1027
 - 2-ethynylbenzaldehydes
 - copper(I)-catalyzed domino four-component coupling–cyclization method 1578
 - o*-ethynylphenols reaction 597
 - π -excessive aromatic systems 2033
 - exocyclic carbonyl bond length 1055
 - exocyclic C–O bond
 - X-ray structural measurements 1054
 - exocyclic nitrogen atom 1058
 - exocyclic P–C bond cleavage by alkali metals 2076
 - 4-*exo*-digonal cyclization 2134
 - 3-*exo*-tet ring closure 27
 - expanded porphyrins
 - figure-of-eight structure 2254
 - extended Hückel theory (EHT) 1528, 1573
 - electron densities 1574
- f**
- fast atom bombardment (FAB) 2026
 - Fenton-type reaction 1492
 - ferrocenyllithium
 - direct C–C coupling of 1591
 - ferrocenylpyrazoles 707
 - fibrous histiocytoma tumor 1074
 - ficellomycin 13
 - field desorption (FD) techniques 2026
 - Fischer carbene complexes
 - coupling 604
 - Fischer–carbene complexes 2126
 - Fischer cyclization 394
 - Fischer indole synthesis 386, 387, 501–508
 - application of 389
 - cyclizations by C2–C3 bond formation 504
 - cyclizations by C3–C4 bond formation 504–506

- cyclizations by N–C2 bond formation 502–504
- cyclizations with N–C7a bond formation 506, 507
- by [4+2] cycloaddition 507
- with enol ethers and enol lactones 392
- under kinetically controlled conditions 388
- regioselectivity in 388
- Fischer indolization 389, 502
- Fischer synthesis 398
- five-membered heterocycles 3, 269
 - acylation 302–306
 - Barton–Zard synthesis 287, 288
 - computational chemistry 270
 - conjugate addition to α,β -unsaturated carbonyl compounds 309, 310
 - cyclizations of four-carbon precursors 278–281
 - cycloaddition reactions 322–328
 - and related approaches 289–291
 - fundamental reactivity patterns 271–273
 - general reactivity 270
 - halogenation 295–299
 - Hantzsch synthesis and related approaches 284
 - heteroatom *versus* benzene 271
 - IUPAC rules 269, 270
 - Knorr synthesis and related routes 281–283
 - ligand–receptor interactions 271
 - miscellaneous transition metal catalyzed methods 291–293
 - multi-component reactions 291
 - nitration 299
 - NMR data 270
 - Paal–Knorr pyrrole synthesis 275–278
 - photochemical reactions 330, 331
 - physicochemical data 270
 - protonation 294, 295
 - pyrrole derivatives 336–349
 - pyrrole ring synthesis 274, 275
 - pyrryl-C-X compounds, synthesis and reactions 331–333
 - reactions
 - with aldehydes, ketones, nitriles and iminium ions 309, 309
 - with bases 313–318
 - with carbenes and carbenoids 328–330
 - with electrophilic reagents 293
 - with nucleophiles 312, 313
 - with oxidants 310, 311
 - with radical reagents 318–320
 - with reducing agents 320–322
 - with sulfur-containing electrophiles 299–301
- reactivity and regioselectivity, in electrophilic substitution 293, 294
- relevant natural and/or useful compounds 273, 274
- syntheses involving glycine esters 284, 285
- transition metal catalyzed coupling reactions 333–336
- Trofimov synthesis 288
- Van Leusen method 285–287
- flash thermolysis 695
- flash vacuum pyrolysis 773, 928
- flavone 2276
 - structure 2275
- flavones 1674
- flavonoids 2275
- flavonol 2276
- flavyliums
 - synthesis 1638, 1639
- flavylium salts 1633
- flumazenil 2199
 - derivatives synthesis 2201
- fluorescein 2283
 - structure 2283
- fluorescence *in situ* hybridization (FISH) 2282
- fluorescent agents 2284
- fluorescent compounds 2285
- fluorescent coumarin
 - in laser devices 1669
- fluorescent dyes 2283
- fluorescent heterocycles
 - application 2283
- fluorescent organic nanoparticles (FONs1)
 - formation 628
- fluorescent paints
- dyes for 2284
- fluorinated 1,2,4-oxadiazoles 1024
- fluorinated 1,3,4-oxadiazoles 1024
- fluorinated pyrimidones 1745
- 3-fluoroalkylated benzo[b]furans
 - synthesis 603
- 5-fluoroalkylated 1H-1,2,3-triazoles 999
- 5-fluoroalkyl-1,2,4-oxadiazoles 1097
- fluorobenzenes
 - nucleophilic addition 1425
- N-fluorobenzenesulfonimide 318
- 6-fluoro-1,2-benzisothiazoles 769
- 1-fluoro-2-nitrobenzene
 - aryl halides 1007
- 2-fluoro-4-nitrobenzoic acid 2192
- 3-(2-fluorophenyl)-1H-indazole 682
- 2-fluoropyridines 1494
- fluoro(tributylstannyl)acetylene 667
- Fmoc-protected amino acid 2185

- FMO theory 666
 formamide, STO-3G energy 2146
 o-formamidoarylamine
 – cyclization of 884
 formylation of pyrrole 302
 4-formylbenzofuran 1162
 4-formylbenzoic acid 1101
 2-formyl glycals 674
 N-formylisoquinolinium imines 1612
 4-formyl-3-phenylsydnone 1069
 3-formylpropenoic acids 1695
 4-formylsydnone, reduction 1069
 four-membered oxygenated heterocycles 188
 free radical reactions 864
 Friedel-Crafts acylation 304, 841, 1590, 1640
 – of 3-alkyl-1-(phenylsulfonyl)pyrroles 305
 Friedel-Crafts acylations 381, 451, 2262
 Friedel-Crafts alkylations 38, 1109
 Friedel-Crafts alkylations of indole 438–449
 – epoxide and aziridine ring opening 447–449
 – indole as nucleophile in palladium-catalyzed allylic alkylations 449
 – Michael additions 439–443
 – reactions
 -- with carbonyl compounds 444, 445
 -- with imines and iminium ions, Mannich reaction 445–447
 -- with unactivated olefins 444
 Friedel-Crafts chlorination 1590
 Friedel-Crafts conditions 1013, 1568
 Friedel-Crafts-like transition state 32
 Friedel-Crafts reactions 701, 1545
 – pyrylium salts as electrophiles 1648
 frontier molecular orbital theory 1255
Fuligo septica 274
 fulminic acid (HCNO) 752
 fumagillin 57
 fuming nitric acid
 – nitration of 1589
 α -functionalized alkylfurazans 1166
 5-functionalized imidazole 855
 4-functionalized-quinoline derivatives
 – preparation of 1551
 2-furaldehyde 38
 furan 1
 – *ab initio* methods 540
 furan-2-carboxylate
 – asymmetric cyclopropanation 573
 furan-3-carboxylic acid synthesis 545
 furan derivatives 1703
 furan-2,3-diones 673
 furanocoumarin
 – synthesis of 1669
 furanophanes, transannular Diels-Alder reactions 570
 furans
 – additional reactions 581–583
 – additional syntheses 577–580
 – aminofurans 577
 – disubstituted furans 546–551
 – electrocyclic reactions 570–573
 – π -electron excess 540
 – enantioselective organocatalytic [4+3] cycloaddition 571
 – furan ring system, numbering 534
 – general reactivity 534–538
 – gold-catalyzed intramolecular cycloisomerization 572
 – microwave spectroscopy 538
 – monosubstituted furans 544–546
 – natural and useful compounds 540–542
 – nomenclature 534
 – oxyfurans 574–577
 – photochemical reactions 573, 574
 – reactions
 -- of C-metallated furans 568
 -- with electrophilic reagents 561–563
 -- with nucleophilic reagents 563
 -- with oxidizing reagents 563–567
 -- with radical reagents 569
 -- with reducing reagents 567, 568
 – reactivity 560–574
 – relevant physicochemical data 538–540
 – synthesis 542–560, 2363–2366
 – tetrasubstituted furans 557–560
 – trisubstituted furans 551–557
 – UV/Visible spectroscopic absorption maximum 539
 furazanobenzimidazoles 1169
 furazano[3,4-*b*]pyrazines 1169
 furazan ring cleavage 1152
 furazans 1167
 – electron impact mass spectra of 1137
 – *N*-ethyl salts of 1151
 – gas-phase thermolysis of 1154
 – heterocyclic ring of 1155
 – IR spectra of 1136
 – NMR chemical shifts 1135, 1136
 – oxidation of 1145, 1151
 – reduction of 1153
 furfurylamines
 – aza-Achmatowicz oxidation 566
 furocarbazole alkaloids 595
 furoclausine A synthesis 612
 furoxans 1144, 1155, 1158, 1161
 – NMR chemical shifts 1135

- nucleus 1154
- oxadiazole ring of 1134
- synthesis of 1147
- Fürstner synthesis 424
- 2-furylcarbene 554
- furylcyclopropane synthesis 559
- N'*-[3-furyl(phenyl)methylene]phenyl-hydrazide 1221
- 2-furylzirconocene complexes
 - dyotropic rearrangement 569
- trans*-fused diastereomer 536
- fused heterocyclic aromatic molecules 2310
- fused pyrimidones 1717
- [1,2-*a*]-fused pyrroles 319
- fused ring system 1410

- g**
- Gabriel synthesis 833
- (-)galanthamine framework 608
- Garner's aldehyde 886
 - polymer-bound version 2124
- gas-phase electron diffraction 1334
- Gassman synthesis 395
- Gattermann aldehyde synthesis 1831
- Gelsemium elegans* 164
- gem*-dialkyl effect 567
- gephyrotoxins
 - class 2003
- germetanes 252
 - preparations 252, 253
 - reactivity 253, 254
- γ -fagarine 1530
- gibepyrones
 - compounds of 1661
- ginkgolide B synthesis 574
- glacial acetic acid 951
 - thiocarbonyldiimidazole 953
- glaucoma 1253
- gliotoxin 1867
- glutamate excitatory amino acid receptors
 - AMPA subtype 2217
- glutamate receptors
 - implication 646
- glutamine synthetase tabtoxinine- β -lactam 2121
- glutathione S-transferase (GST) 1168
- glycidic amides, enantioselective synthesis 90
- glycidic esters, treatment 932
- glycosylidene-derived diaziridine 121
- glyoxal *o*-benzyloxime hydrazone 1003
- glyoximes, cyclization 1138
- glyoxylic acid with amines/ammonia 818
- gold-phosphole inhibitor 2105

- h**
- halide displacement reactions 780
- haloallenyl aldehyde
 - 1,2-halogen migration 556
- o*-haloanilines 420
- 2-haloazoles 843
- 7-halodinitrobenzofurazans 1137
- o*-haloenamines
 - Heck reaction 420
- 2-halogenated azoles 858, 861
- halogenated pyrroles 295–299
- halogenating agents 476
- N*-halogenation 700
- halogenation reactions 452, 453, 535, 2257–2262
 - acylation 2262
 - bromination 2259
 - chlorination 2258, 2259
 - cyanation 2262
 - fluorination 2258
 - iodination 2259, 2260
 - nitration 2260–2262
- halogen atoms 843
- halogen–lithium–tin interchange 854
- 2-halogeno 1,3,2-dithiaborolanes 956
- haloisoquinolines 1599
- α -haloketones
 - cyclocondensation of 826
 - dehalogenation of 830
- o*-halo-*N*-allylanilines
 - intramolecular Heck reactions 418
- 1-halo/nitro-2-nitrobenzenes 1012
- 2-halophosphinines
 - C–X bonds 2093
 - one-pot synthesis 2089
- 1-halophospholes 2075

- halopyridazines 1743
 3-haloquinolines
 – oxidation of 1560
 – synthesis of 1545
 5-halo-1,2,3-thiadiazole 1281
 o-halothioanilides 885
 o-halo-N-trifluoroacetylanilines 1549
 Hammick reaction 1507
 Hantzsch procedure 895
 – thiazoles preparation 831
 Hantzsch process 830
 Hantzsch synthesis 897
 – α -tosylketones 832
 – pyrrole synthesis 2362
 Hartree–Fock computational methods 1333
 H/D exchange 700
 Heck based cyclizations 506
 Heck coupling reactions 2123
 Heck couplings 1599
 – cross-coupling reaction 1487, 1763
 Heck reactions 457, 458, 837
 – of 2-chloro-3,6-dimethylpyrazine 1763
 Heck sequence 1563
 Heck-type couplings 859
 HeLa cells 540
Helminthosporium oryzae 1225
 Hemetsberger indole synthesis 429
 HepG2 human hepatic carcinoma 1168
 herbicide 1691
 heteroaryllithium reagents 1014
 heteroatom 1, 2
 heteroatomic nucleophiles 32
 heterobenzylic hydrogen atoms 1608
 heterobimetallic Ti–Ga–salen catalyst 97
 heterocalixarenes 1734
 heterocycle 1
 heterocycle[*a*]azeto[1,2-*d*][1,4]benzodiazepines synthesis 2211
 heterocycles 2293, 2357
 – feature 772
 – in liquid lasers 2285
 – role in 2358
 – synthesis 1642
 – use 2286
 heterocycles, ring contraction of 29, 30
 N-heterocyclic carbenes (NHCs) 560, 1035
 – class 2122
 heterocyclic chemistry 1
 heterocyclic compounds 1, 2
 – basic literature on 8, 9
 heterocyclic conducting polymers 2305–2314
 – electronic properties 2308
 – structure 2306
 heterocyclic derivatives 1, 2
 heterocyclic field
 – aminomethylated polystyrene resins 2333, 2334
 – chloromethylated polystyrenes 2330–2333
 – conventional vs. combinatorial organic chemistry 2326
 – crosslinked polystyrene-derived matrices 2329
 – functionalized polystyrene resins 2329, 2330, 2334–2339
 – heterocyclic synthesis on solid-phase 2357–2374
 – natural products 2322–2324
 – peptides, peptoids and peptidomimetics 2324
 – small synthetic organic molecules 2324–2327
 – solid phase and combinatorial chemistry in 2321, 2322
 – solid supports 2327–2343
 heterocyclic ring, reduction 478–480
 – catalytic hydrogenation 478, 479
 – metal hydride complexes 479, 480
 – metal-promoted reductions 479
 heterocyclic systems 1253, 2289
 – color and fluorescent agents 2275–2286
 – 1,3-dipolar cycloaddition reactions 2359
 – self-assembling materials and molecular containers 2286–2300
 – unnatural enzyme models 2300–2304, 2304–2314
 hetero-1,2-diazepines 1705
 hetero-Diels–Alder processes 1584
 – with electron-rich alkenes 1702
 – pyridine synthesis 1444
 N-heteroenesulfonylbenzenetriazoles 1016
 heteronucleophiles 476
 hexahydroazepine 1865
 hexahydro 1,3,5-triazin-2-thione 1824
 hexameric structure 2293, 2295
 hexamethyldisilathiane 1901
 hexamethyldisilazane (HMDS) 1026
 hiepan-4-one 1901
 high-conducting polymers
 – electrosynthesis 2306
 highest occupied molecular orbital (HOMO) 2005, 2107, 2282
 high intensity ultrasound (HIU) irradiation 2124
 high-throughput screening (HTS) 2321, 2322, 2324
 – feeding sources 2324

- histamine H₂-receptor antagonist 541
 histamine H₃ receptor antagonists 624
 H^+/K^+ ATPase 1316
 Hoffmann-rearrangement 503
 hole-transporting material (HTM) 627
 HOMO electron density 1528
 homopropargylamine 32
 Horner–Wadsworth–Emmons reaction 423, 2366
 Hoveyda–Grubbs catalyst 2037
 5-HT_{1A} receptors 645
 Hückel molecular orbital theory (HMO) 1993, 2024
 Hugershoff's method 897
 Huisgen rearrangement 1184
 human DNA topoisomerases 1127
 human immunodeficiency virus (HIV) 1075
 human phospho-diesterase 5 (hPDE5A) 1531
 human rhinovirus 3C protease (3CP) inhibitor 2004
 human rhinovirus (HRV) serotypes 2004
 Hünig's base 581
 Hurd–Mori reaction 1259, 1260, 1279
 hybrid DFT B3LYP method 1189
 hydrazide 1201
 1,2-hydrazinedicarbothioamide – oxidation method 1344
 hydrazines 390 – cyclocondensation 665
 hydrazino(3-arylsyndnon-4-yl)methanone oximes 1069
 hydrazones 659 – formation 392 – indolizidation 392 – lead tetraacetate cyclization of 1023
 hydrazones, transformation of 1280
 $N^2-(\alpha\text{-hydrazonotrifluoromethyl})\text{-}N^1\text{-}(trifluoroacetyl)\text{hydrazine}$ 1204
 hydride donors 2002
 hydroamination-based Fischer indole synthesis 393, 394
 hydroamination-based Grandberg indole synthesis 394
 2-hydrodestannylation sequence 862
 hydrogen-bonding interactions 2293
 hydrogen cyanide 1720
 hydrogen disulfide 941
 hydrogen sulfide 1706
 hydrolytic kinetic resolution (HKR) 95
 hydroperoxide, reduction 566
 5-hydroperoxycarbonylphthalimide 66
 2-hydroperoxy-hexafluoropropan-2-ol 69
 3-hydroperoxypyrazolines 927
 hydroquinine-derived catalyst 22
 hydroquinone – oxidation 427
 hydroximoyl chlorides – Huisgen's base-induced dehydrohalogenation of 1092
 hydroxyalkyldioxolanes 931
 2-(hydroxyamino)alkan-1-one oximes – treatment of 903
 o-hydroxyarylketone – chromone, formation of 1675
 4-(o-hydroxyaryl)-1,2,3-thiadiazoles 1277
 3-hydroxy-1,4-benzodiazepines synthesis 2184
 o-hydroxybenzophenone oxime – Beckmann rearrangement of 883
 1-hydroxybenzotriazole – in peptide coupling reactions 1015
 3-hydroxy-2-carboxysyndnone dianion 1051
 hydroxy derivatives, tautomerism 1077
 1-hydroxy-2,3-diphenylpyrrole 338
 3-hydroxy-6(1H)-pyrazinone 1689
 β-hydroxyhydroxamate – cyclization 2127
 N-hydroxy-2-(hydroxyimino)-2-arylacetimidamide 1140
 3-hydroxyindoles – synthesis 406
 N-hydroxyindoles – structure 498
 hydroxyindolomorphinans 428
 hydroxyisoquinolines 1608
 3-hydroxy-isoxazole 738
 hydroxylamine 1084, 1089 – nucleophilic attack of 1152
 hydroxylamine reaction – with three-carbon atom components 739
 hydroxylamine-O-sulfonic acid (HSA) 1308 – plasma proteins 1308, 2119
 2-hydroxylamino-4,5-dihydroimidazolium-O-sulfonate 1301
 2-(6-hydroxy-2-methoxy-3,4-methylenedioxyphenyl) benzofuran synthesis 614
 3-hydroxymethyl-5-arylisoxazole – polymer-supported synthesis 745
 hydroxymethylation 1604
 N-hydroxymethyl moiety 889
 5-hydroxy-2-methyl-6-phenyl-7*H*-[1,3,4]oxadiazolo[3,2-*a*]pyrimidin-7-one 1194
 2-(hydroxymethyl)pyrroles 331
 3-(hydroxymethyl)pyrroles 331
 7-hydroxy-5-methyl-1,2,4-triazolo[1,5-*a*]pyrimidine 1691

β-hydroxyoximes 762
 hydroxyperoxy zwitterion 1061
 5-hydroxy-3-phenyl-1,2,4-oxadiazole
 – keto forms 1076
 3-hydroxy-5-phenyl-1,2,4-thiadiazole 1313
 hydroxypyrazines 1747
 6-hydroxypyridazin-3(2H)-ones 1695
 3-hydroxypyridines 1496
 – electrophilic substitutions 1497
 – pK_as of 1496
 hydroxypyrimidines 1689
 6-hydroxypyrimidin-4(3H)-ones 1719
 3-hydroxyquinoline-2-carboxylates 1539
 4-hydroxyquinolinone esters
 – preparation of 1555
 4-hydroxy-2-quinolinones
 – microwave synthesis of 1535
 4-hydroxystilbenes
 – oxidative dimerization 609
trans-4-hydroxy-5-substituted 2-cyclopentenones 568
 4-hydroxy-3-substituted 2-pyranones 1667
 3-hydroxysulfinyl chloride 967
 3-hydroxy-1,2,4-thiadiazoles 1288
 – with electrophiles 1326
 5-hydroxythiazoles
 – hydrolysis of 846
 hydroxy-(tosyloxy)iodobenzene (HTIB) 833
 5-hydroxytryptamine 1127
 hyperconjugation effect 2117
 hypervalent iodine reagent 575

i

imidazole-4,5-dicarboxylic acid 886
 imidazole N-oxides 903
 imidazoles 841, 842, 845, 865
 – derivatives 860
 – 1,2-dicarbonyl compounds 816
 – direct alkylation of 846
 – nitration of 838
 – nomenclature and numbering of 811
 – photosensitized oxidation 842
 – preparation methods of 816
 – preparation of 816
 – quaternizing alkylations of 835
 – ring system 2369
 – self-condensation, preparation 822
 – synthesis of 819, 2369–2372
 – vinylation of 836
 imidazolide ions
 – resonance structures of 815
 imidazolidine
 – synthesis of 876
 imidazoline 877

imidazolino[1,4]benzodiazepines
 – synthesis 2206
 imidazolium cations 839
 imidazolium ions
 – resonance structures of 815
N-imidazolium-*N*-methylamides 894
 imidazolsugars
 – synthesis of 848
 imidazol-4-yl-zinc chloride 855
 imidazo[1,2-*b*]thiazolines 845
 imidoylbenzotriazoles 1027
N-(imidoyl)benzotriazoles 1014
 imidoyl chloride 877
 imidoyl phosphate formation 2200
 imine
 – hydrazones 1003
 – *in situ* formation of 822
 2-Imino-1,3-dioxoles 934
 2-imino-1,3-oxathioles
 – preparation of 975
 5-imino-3-oxo-1,2,4-thiadiazolidines 1298
 iminophosphoranes 829, 897, 1716
 iminophosphoranes 655
 5-imino-1,2,4-thiadiazole-3-ones 1298
 3-imino-1,2,4-thiadiazoline 1322
 imipramine 1867
 o-immobilized ketoester
 – with diverse aldehydes 1460
 immobilized metal epoxidation catalysts 83
 2*H*-indazole-2-oxides 680
 1*H*-indazoles 687, 696
 – preparation 682
 indazoles synthesis 678–696
 – one C3–C3a bond formation 687, 688
 – one N1–C7a bond formation 683–687
 – one N2–C3 bond formation 680–683
 – one N–N bond formation 678–680
 – ring synthesis from heterocycles 695, 696
 – synthetic methods 691–695
 – two bonds formation 688–691
 indenoquinoline 1554
 indigo structures 2277
 indium chloride 954
 indium tribromide 32
 indium trichloride 23
 1*H*-indole. *see* indole
 indole-2-carboxylic
 – decarboxylation 501
 indole carboxylic acids 500, 501
 indole reactivity
 – oxidation reactions 475–478
 – pericyclic reactions involving heterocyclic ring 480–489

- photochemical reactions 489–491
- radical reactions 470–474
- reactions with bases 453–457
- reactions with carbenes and carbeneoids 491
- reactions with electrophiles 436–453
- reduction of heterocyclic ring 478–480
- transition metal catalyzed reactions 457–470
- indole ring synthesis, by pyrroles annelation
 - from 3-alkynylpyrrole-2-carboxaldehydes 435, 436
 - [4+2] cycloadditions 435
 - electrocyclizations 435
 - palladium-catalyzed cyclizations 433, 434
 - synthesis by electrophilic cyclization 431–433
- indole ring synthesis, from benzene ring
 - cyclization, N–C2 bond formation 398–415
 - cyclizations with N–C7a bond formation 427–431
 - by formation of C3–C3a bond 415–421
 - by formation of C2–C3 bond 421–427
 - involving sigmatropic rearrangement 385–398
- indoles 377
 - addendum 501–513
 - alkaloids 384
 - N-alkylation 453
 - alkylindoles 491–494
 - o-alkynyl-N,N-dialkylanilines, cycloisomerization 502
 - N-amination 500
 - aminoindoles 500
 - catalytic asymmetric Michael reaction 441
 - CDCl₃, ¹H and ¹³C NMR chemical shifts 380
 - C-metallation 454
 - containing stilbenes 490
 - coupling reaction 463
 - 1,3-dipolar cycloadditions 485
 - direct acylation 454
 - discovery and structure 377
 - electrophilic substitution reactions 381
 - five-membered ring construction, strategies for 386
 - formation 419, 1651
 - Friedel–Crafts alkylation 442, 444, 508
 - frontier orbitals, graphical representation 381
 - general reactivity 379–382
 - H-1 and H-2, chemical shifts for 380
 - Heck reaction 421
 - ¹H NMR spectra 379
 - indole carboxylic acids 500, 501
 - indole derivatives chemistry 491–501
 - indole reactivity 436–491
 - indole ring synthesis by pyrroles annelation 431–436
 - indole ring synthesis from benzene ring 385–431
 - indole synthesis 384–436
 - intramolecular Pd(II)-catalyzed oxidative cyclizations 464
 - introduction 377
 - N-metallation 453, 454
 - natural products 383
 - one-step *tert*-prenylation 511
 - oxiderivatives 494–499
 - Pd-catalyzed cascade synthesis 506
 - physicochemical data 379
 - preparation 446, 502
 - properties 379–382
 - regioselectivity in 380, 387
 - relevant natural/useful compounds 383, 384
 - structural parameters 379
 - synthesis 384–436, 1650
 - synthesis by cycloisomerization of propargylanilines 502
 - system isomers and nomenclature 378
 - tautomers and isomers 378
 - indolets, NH-containing 464
 - indolinium cyanines Basic Yellow 21
 - structures 2279
 - 3-H-indolium cation 438
 - indolizines 3, 2003–2020
 - Birch reduction 2018
 - derivatives 2020
 - general structure and reactivity 2003
 - ¹H and ¹³C NMR chemical shifts 2006
 - Heck arylation 2019
 - intramolecular condensation 2006, 2007
 - nitration 2012
 - NMR spectra 2005
 - organometallic processes 2009
 - reactivity 2011–2020
 - rearrangement of acetylenic derivatives 2009–2011
 - relevant natural/useful compounds 2003–2005
 - relevant physicochemical data, computational chemistry, and NMR data 2005
 - synthesis by [3+2] approach, 1,3-dipolar cycloaddition 2007–2009
 - indolizin-1-ones synthesis 2010

- 2-indolylborates 455
 indolyl Grignard reagent 844
 indolyl palladium complex 466
 indolyl rhodium complex 470
 indomethacine analogs
 – solid-supported synthesis of 391
 infrared (IR) spectra 734
 ingenol
 – ABC-ring 571
in situ generated 1-(*o*-bromophenyl)-2-ethylamine 430
in situ generated Rh carbенoid 423
 intensity of electric current *versus* electric potential (I-V) 2314
 intermediate oxime
 – cyclization-dehydration 737
 intramolecular aza-Wittig reaction 2204
 intramolecular aziridinations 19
 – of carbamates 20
 – reaction conditions for 20
 intramolecular aziridinations, reaction conditions for 19
 intramolecular Buchwald–Hartwig amination 430
 intramolecular cyclization of 1,6-hexanediols 1899
 intramolecular Diels-Alder reactions 582
 intramolecular dioixirane-mediated hydroxylation 139
 intramolecular dipolar cycloaddition 2202
 intramolecular Fujiwara-Moritani/oxidative Heck reaction 602
 intramolecular Heck reaction 418, 433
 intramolecular Michael/hetero Michael addition 561
N-inversion energy 11
 $\alpha\text{-}\lambda^3$ -iodanil ketone
 – formation of 833
 iodinating reagents
 – bis(pyridine)iodonium(I) tetrafluoroborate ($\text{IPy}_2\text{BF}_4^-$) 410
 iodine-mediated electrophilic cyclization
 – of 2-alkynyl-1-azidomethyl benzenes 1579
 iodoamides
 – copper-catalyzed cyclizations 2191
 o -idoanilines
 – direct annulation 420
 3-*ido*-6-arylpyridazines 1756
 o -iodobenzaldehydes
 – *tert*-butylimines of 1581
 iodo benzene
 – novel palladium-catalyzed carbonylation of 885
 iodo benzene diacetate 15, 24, 1023
 iodo cyclization 38
 5-*ido*-1,4-disubstituted-1,2,3-triazole
 – synthesis of 994
 iodomethylenetriphenylphosphorane 47
 iodonium salt 975
 o -iodophenols
 – nucleophilic addition of 602
 – palladium-catalyzed carbonylation 1675
 2-*ido*-1-(phenylsulfonyl)pyrrole 333
 iodopyrimidines 1745
 4-iodopyrrole-2-carbonitrile 318
 4-iodopyrlyium salt formation 1649
 5-iodoquinoline
 – with bromoenoate 1563
 iodosobenzene 19
 iodo-substituted diaminopyrazine 1763
N-iodosuccinimide (NIS) addition 1665
 iodosylbenzene 79
 5-iodouridine
 – palladiumcatalyzed coupling of 862
 ionic assembly 2287
 ionic interactions
 – potential enhancement 601
 ionic liquid 603
 ionizing radiation 1137
 iridium-catalyzed asymmetric hydrogenation 1612
 IR spectroscopy 774, 1054, 1055
 isatin, reduction 377
 isocyanates
 – use of 1108
 isocyanatophosphoryl chloride 2014
 isocyanides 824, 1410
 – aldol-type addition of 878
 1,2,5-isomer 1255
 isomeric 2-oxide system 1052
 isomeric 1,2,3-triazoles 993
 isonitrile derivatives 878
 isoporphycene 2236
 2,3-*O*-isopropylidine-*D*-glyceraldehyde
 – thiazole-based one-carbon homologation of 866
 2-isopropylthiazole 869
 isoquinoline 3, 1572, 1573, 1589, 1590, 1594
 – addition to nitrogen 1588
 – aromatic nucleophilic substitution 1572
 – Bischler–Napieralski synthesis, Pictet–Gams modification of 1576–1578
 – C-metallated isoquinolines
 -- boron derivatives 1597, 1598
 -- lithium derivatives 1596
 -- metal-catalyzed reactions 1599–1601
 -- tin derivatives 1598, 1599

- zinc derivatives 1596, 1597
- condensation reaction-based methods 1580, 1581
- direct metallation 1595, 1596
- electrocyclic and photochemical reactions 1604–1606
- electrocyclic ring closing methods 1584, 1585
- electrophilic cyclization-based methods 1578, 1579
- hygroscopic solid 1572
- metal-catalyzed ring closing methods 1581–1584
- natural compounds 1574, 1575
- NMR data 1573
- nucleophilic cyclization-based methods 1580
- nucleophilic substitution with displacement of halide 1594, 1595
- nucleophilic substitution with hydride transfer 1591–1593
- photochemical methods 1587
- Pomeranz–Fristsch synthesis 1576
- reactions with bases 1595
- reactions with electrophilic reagents 1588
- reactions with nucleophilic reagents 1591
- reactions with oxidizing reagents 1590–1591
- reactions with radical reagents 1602–1604
- reactions with reducing reagents 1601, 1602
- reactivity 1571, 1588
- ring contraction-based methods 1585–1587
- ring expansion-based methods 1585–1587
- structural isomer of 1571
- substitution at carbon 1589, 1590
- synthetic methods 1575
- tautomerism 1574
- isoquinoline alkaloids 1574
- isoquinoline carboxylate 1577
- isoquinoline-3-carboxylate 1581
- isoquinoline derivatives
 - alkylisoquinolines 1608, 1609
 - aminoisoquinolines 1608
 - isoquinoline carboxylic acids 1609
 - isoquinoline *N*-oxides 1613, 1614
 - oxyisoquinolines 1606, 1607
 - quaternary isoquinolinium salts 1609–1613
- isoquinoline magnesium derivatives 1595
- isoquinoline-*N*-borane 1610
- isoquinoline *N*-oxides 1590, 1613, 1614
- photolysis of 1606
- isoquinoline reacts
- with potassium amide 1592
- isoquinoline ring 1595
- isoquinolines 1581
- isoquinoline skeleton
- synthetic methods 1575
- isoquinoline syntheses
 - Larock's group 1581
- isoquinoline synthesis 1643
- isoquinolinium cation 1590
- isoquinolinium methylides 1605
- isoquinolinium salts 1571
- isoquinolin-1-ol 1574
- isoquinolin-3-ol 1574, 1606
- isoquinolin-1-ones
 - classical reactions of 1607
- 4-isoquinolylzinc bromide 1597
- 1-isoquinolylzinc salt 1596
- isosydnone 1210
- isothiazole 728, 733
 - ^{13}C NMR chemical shifts 733
 - ^1H NMR chemical shifts 728
 - physical properties 733
- isothiazole 1,1-dioxides. *see* sultams
- isothiazole-fused 3-sulfolenes 793
- isothiazoles 753–760
 - and benzisoxazoles, reactivity 772–787, 787–797
 - general reactivity 729–734
 - natural/useful compounds 734–736
 - nomenclature 728, 729
 - photochemical reactions 787
 - ring transformations of heterocycles 758–760
 - ring transformations of heterocycles leading to isothiazoles 758–760
 - synthesis from acyclic compounds 753–758
 - synthesis, from acyclic compounds 753–758
- isothiazolium salts 790, 791
- oxidation 794
- isothiazol-3-ones, catalytic hydrogenation 793
- isoxazoles 49, 727, 736–753
 - π -bond orders 730
 - π -electron density distributions 729
 - electrophilic substitution 730
 - ^1H NMR chemical shifts 731
 - N–O bond 730
 - one-pot synthesis 742
 - oxidation reactions 784
 - proton resonances 731

– reductive ring cleavage 784
 – ring-opening reactions 777
 – [3+1+1] routes 751–753
 – [3+2] routes 737–747
 – [5+0] routes 748–751
 – solid-phase synthesis 737
 isoxazolidin-5-ones 1721, 1722
 isoxazoline-3-thiones 942
 isoxazoline transposition 1161
 isoxazolium salts, deprotonation 779

j

Jacobsen catalyst 73
 Jacobsen-type catalyst 95
 Jacobson–Hunter method 885
 Jacobson method 885
 janoxepin 1868
 Japp–Klingemann reaction 392, 393
 jatrorrhizine 2021

k

Kaiser resins 2352
 Katritzky synthesis 433
 Katsuki catalyst 17
 ketazolam synthesis 2209
 keteneiminium salts 47
 ketene silyl acetals 1556
 ketenimine 1584
 1,5-ketoacid derivatives 1662
 α -ketoaldehydes 816
 keto amide, cyclodehydration of 827
 β -ketoamides 821
 ketoconazole synthesis 938
 5-ketoester 1662
 2-ketomethylquinolines 1567
 ketone enolates
 – Pd-catalyzed arylation 401
 ketone *N*-acylhydrazones
 – electrolytic oxidation of 1179
 ketone precursors for dioxirane oxidations 62
 keto-1,2,4-oxadiazoles 1128
 – allergic diseases 1128
 – asthma 1128
 ketorolac 274
 β -keto sulfones 1014
 khellin, structures 1674
 Kinugasa reaction 2130
 Knoevenagel adducts 23
 Knoevenagel condensation 1655
 Knorr synthesis 1534

l

labile metal–ligand bonds formation 2288
 lachrymatory, uses 833

Lactam 1135
 β -lactamase 2157
 – hydrolytic enzymes 2144, 2145
 – inhibitors 861
 β -lactams 3
 – analysis by X-ray diffraction 2119
 – antimicrobials 2145
 – 2-azetidinone nucleus synthesis 2121–2134
 – 2-azetidinone ring reactivity 2134–2144
 – benzylidene moiety 2142
 – biologically relevant monocyclic β -lactams 2120, 2121
 – chemistry 2117
 – enzyme-catalyzed hydrolysis 2154
 – ^1H NMR spectroscopy 2120
 – *trans*- β -lactams synthesis 2122
 – monocyclic derivatives 2117
 – nonclassical antibiotics, discovery of 2117
 – penicillins and cephalosporins 2144–2161
 – physicochemical data 2117–2120
 – synthesis 2358, 2359
 Langmuir–Blodgett films 2308, 2314
 Lansbury’s reagent 1489
 lanthanide triflates 23
 Larock indole synthesis 413
 Larock’s heteroannulation 414
 Larock’s indolization 415
 Lawesson’s reagent 48, 940
 L-cysteine methyl ester 888
 lead optimization programs 2323
 – natural products used in 2323
 lead tetraacetate (LTA) 1198
 Leimgruber–Batcho synthesis 402
 lesopitron 645
 leucopterin 2276
 Lewis acid (LA) 35, 100, 386, 402, 440, 448, 452, 841, 849, 872, 900, 956, 1078, 1413, 1657, 1833, 2135, 2302
 – catalyzed alkylation 536
 – catalyzed halocyclization 1546
 – catalyzed methods 25, 1092, 1462
 LiAlH₄ reduction 1115
 ligand DPEphos effects 606
 ligand–receptor interactions 271
Ligularia tongolensis
 – genetic study 541
 Li–halogen exchange reactions 1562
 linkers 2350, 2351
 lipoic acid, sulfonamide derivative 946
 lipophilic alkenes 82
 lipo-soluble substances. *see* benzodiazepine
 liquid crystals (LCs) 1056

- lithiated allene reaction 1464
 lithio(alkyl)triazines 1828
N-(2-lithioallyl)anilines
 – carbometallation 417
 2-lithioimidazoles 847
 lithioisoquinolines
 – metal–halogen exchange 1596
N-lithioketimines 1456
 2-lithio-*N*-methylimidazole 847
 4-lithio-3-phenylsydnone 1067
 4-lithio-5-phenyl-1,2,3-thiadiazole 1277
 2-lithiothiazoles 850
 – used as nucleophiles 850
 3-lithio-1-TIPS-pyrrole 318
 lithium aluminum hydride 105, 1373, 1602
 lithium azoles 847–850
 lithium bis(trimethylsilyl) amide
 (LHMDS) 1465
 lithium–bromine exchange 859
 lithium *t*-butoxide 98
 lithium dialkylamides 1580
 lithium (trimethylsilyl)diazomethane 1266
 lithium diisopropylamide (LDA) 50, 99, 100,
 1005, 1477, 1754
 lithium–halogen exchange 86, 1483
 5-lithiumimidazoles 848
 lithium perchlorate 33, 95
 lithium telluride 106
 lithium tetrahydroaluminate 1612
 lithium 2,2,6,6-tetramethylpiperidine
 (LTMP) 37, 107, 691, 1477, 1562,
 1613, 1752
 lithium tetramethylpiperidine 1005
 lithium trimethylsilyldiazomethane 1264
 liver alcohol dehydrogenase 649
 lobatrienetriol 1868
 lowest unoccupied molecular orbital
 (LUMO) 2005, 2282
 luteolin, structures 1674
- m**
- MacDonald-type condensation 2244
 macrocycles 2234, 2236
 – synthesis 2088
 macrocyclic pyrazoles 710
 macroreticular polystyrene resins
 – bromine–lithium exchange 2338
 Madelung indole synthesis 422
 madurastatin A1 13
 magnesium azoles 850–852
 magnesium bis(monoperoxyphthalate)
 hexahydrate 66
 magnesium monoperoxyphthalate
 (MMPP) 564
- male erectile dysfunction (MED) 651
 maleimide derivatives 760
 manganese–picolinamide–salicylidene
 complex 75
 manganese to chromium 72
 Mannich additions 1652
 Mannich bases 2015
 Mannich reactions 308, 445–447, 888
 Marckwald synthesis 818, 894
 Märkl relying method 2086
 Märkl synthesis 2108
 Markovnikov adducts 870
Martinella iquitosensis 1531
 martinelline, synthesis of 1555
 Martin's sulfrane 872
 massanalyzed ion kinetic energy (MIKE)
 spectroscopy 1138
 mass spectrum of 2,7-di-*tert*-
 butylthiepine 1873
 matrix metalloproteinases (MMPs) 2345
 – inhibitors 110, 2347
 mauveine synthesis 2279
 McBride synthesis 2100
 McCormack reaction 2102
 – of conjugated dienes 2074
 medazepam synthesis 2195
 Meerwein's reagent 1284, 1319
 mefloquine 1533
 Meisenheimer complex 688, 1153,
 1158, 1572
 melamine–barbituric acid 2296
 melamines 1818, 1820
 Meldrum's acids 340, 738
 MeMgBr utilization 598
 MeOPEG-supported azide 1416
 5-mercaptop-1,2,4-thiadiazole
 – IR spectrum of 1289
 2-mercaptop-1,3,4-thiadiazoles 1381
 Merck researchers 1409
 Merrifield resin 827, 1349, 2331, 2334
 – oxidation 2334
 Merrifield's resin 77
 Merrifield's seminal polypeptide
 synthesis 2327
 mesitonitrile oxide 1165
O-(mesitylenesulfonyl) hydroxylamine 1308
 mesitylenesulfonylhydroxylamine
 (MSH) 892
 mesoionic 1,3-dithiol-4-ones 1313
 – coupling reactions 962–963
 – reactions with electrophiles 961
 – reactions with nucleophiles 961, 962
 – reductions 962
 – thermal and photochemical reactions 960

- mesoionic 5-(methoxycarbonyl)amino-3-methyl-1,2,3-thiadiazole 1257
mesoionic 2-methylene-1,3,4-thiadiazole 1350
mesoionic 1,3,4-oxadiazoles 1190
mesoionic 1,3-oxathiolium-4-olates 978
mesoionic 3-phenyl-1,2,3-thiadiazoles 1285
mesoionic sydnone 1049
meso-ionic 1,2,4-thiadiazoles 1291
mesotetraalkylporphyrinogens 307
mesylation 92
o-mesylation 27
metalation of diazines 1754
metal-based catalytic systems 407
metal-catalyzed approaches
– development 593
metal-catalyzed reactions 385
– cross-coupling reactions 382
– types of 1482
– Heck reactions 403
– Stille coupling 403
metal-halogen exchange 1754
– methodology 543
metal hydrides
– application 2138
metal ions 1733
N-metallated pyrroles 313
metallation reactions 1065
– pyrroles at C3 273
metallo- β -lactamase 2158
metalloester enolate-imine condensation
route
– asymmetric version 2125
metallo-octaalkyl porphyrin
– diformylation 2255
metalloporphyrins 2254
metallo-vinyl porphyrins 2256
metathesis catalysts
– synthesis of 891
methanesulfonylbenzotriazole 1012
methanol, photochemical irradiation 1024
methoxyacryloylisothiocyanate 1718
p-methoxybenzylamine, condensation 1412
N-methoxycarbonylindoles 413
2-methoxy-2*H*-azepine 1875
1-(methoxymethyl)-1*H*-1,2,4-triazole 1030
3-methoxy-6-methylpyridazine 1733
2-(methoxymethyl)pyrrole derivative 310
N-methoxypyridazinium salts 676
5-methoxytriazoline
– thermal decomposition *in vacuo* of 1031
7-methoxytryptophan 414
methylaluminium bis(4-bromo-2,6-di-*t*-butylphenoxyde) (MABR) 101
5-methylamino-4-nitroisoxazole, alkaline treatment 779
2-methylanilides, cyclocondensation 422
5-methyl/5-aryl-2-thioxo-2,3-dihydro-1,3,4-oxadiazoles, methylation 1215
2-methylaspartate 52
1-methylazafulvenium ions 331
3-methyl-1,2-benzisoxazole
– photolysis 775
– synthesis 763
methyl 2,3-butadienoate 348
methylcyclohexadiene oxide 18
N-methyl-*D*-aspartate (NMDA) receptors 649
1-methyl-2,3-dinitropyrrrole 312
2-methyl-1,3-dioxolane
– preparation of 931
2-methyl-3,5-diphenyl-1,2,4-thiadiazolium chlorosulfate 1314
methyl 2,5-di-*tert*-butyl-3*H*-azepine-1-carboxylate 1874
methylene-activated compounds 1698
methyleneaziridines 50
methylene blue (MB) 566
methylene chloride 23, 57
methylene cyclopropane 969
methylenedecalone 101
 α -methylene group, carbonyl compounds 954
3-methyleneindolines 417
3-methylene quinolones 1550
3-methylenindolines 419
N-[(1S)-1-(methyl ethyl)-2-oxoethyl](*tert*-butoxy)carboxamide (*N*-Boc-L-valinal) 1226
N-methylformanilides 1554
3-methylfurazans 1136
 α -methylglutamate 52
methyl group, deprotonation 812
2-methyl-2*H*-1,2,3-triazole, nitration 1008
1-methyl-1*H*-1,2,4-triazoles 1031
N-methylimidazol-2-yl-zinc iodide 855
4-methyl-5-imino-2-thienoyl- Δ^2 -1,3,4-thiadiazolines 1358
1-methylisoquinoline 1592
N-methylisoquinolinium iodide 1605
N-methylisoquinolinium salts 1611
S-methyl isothioamide hydroiodide 1019
methylisoxazoles
– ^{13}C NMR chemical shifts 733
– ^1H NMR spectra 732
– physical properties 733
methylolithium 1901
N-methylmaleimide 323
methyl 2-[3-(4-methylphenyl)-1,2,4-oxadiazol-5-yl]benzoate 1079

- molecular dimensions 1079
- methyl(methylthio)oxadiazolium
 - tetrafluoroborates 1216
- N-methylmorpholine N-oxide (NMO) 71, 1022
- S-methyl-N-acylisothioureas 1025
- 3-methyl-7-nitrobenzo[c]isoxazole 1162
- 2-methyl-4-nitro-2H-1,2,3-triazole 1008
- methyl olenonate, oximes 1411
- o*-methylloxime 1539
- methyl 3-oxo-6-heptynoate 859
- 4-methylpent-3-en-2-ol 79
- N-methyl-N-phenyl amide 48
- 3-methyl-4-phenylfurazan 1151
- 2-methyl-6-phenylimidazo[2,1-*b*]oxadiazole 1206
- 3-methyl-5-phenylisothiazole lithiation 797
- 3-methyl-5-phenyloxazole 727
- 2-(methyl, phenyl, or styryl)chromones 674
- 3-methyl-5-phenyl-1,2,4-oxadiazole
 - methyl group of 1121, 1122
- 5-methyl-3-phenyl-1,2,4-oxadiazole 1121
- 1-methyl-2-phenyl-6-pyridazinedione 1736
- 3-methyl-4-phenyl sydnone, nitration 1066
- 4-methylpolystyrene chlorination 2332
- 5-(2-methylpropanenitrile)- Δ^4 -1,2,4-oxadiazolines 1105
- methylpyridines, nomenclature 1432
- 1-methylpyrrole 322
- N-methylpyrrole 1748
- methyl pyrrole-2-carboxylate 303
- methyl 3-pyrroline-1-carboxylate 348
- methylquinolines, aerobic oxidation 1567
- N-methylquinolinium salts 1554
- trans*- β -methylstyrene 72
- methyl-substituted oxepines 1867
- 2-methylsulfanyl-1,3-dithiolium salts
 - with Grignard reagents 962
- 2-methylsulfonyl-1,3,4-oxadiazoles
 - nucleophilic substitution of 1222
 - 2-methylsulfonyl-5-phenyl-1,3,4-oxadiazole
 - nucleophilic substitution of 1221
 - 2-methylsulfonyl-5-pyrazolyl-1,3,4-oxadiazole 1222
- 3-methylsydnone 1055
- methyl tetramate 341
- 1-methyl-tetrasubstituted imidazoles 821
- 3-methyl-1,2,4-thiadiazole 1323
- 5-methyl-1,3,4-thiadiazole-2-thiols
 - trihalomethylsulfenyl derivatives of 1339
- N-methyl-1,2,4-thiadiazolium salt 1290
- 2-methylthiazol-4-ylmagnesium bromide
 - preparation of 851
- 2-(methylthio)-5-oxazolylmagnesium bromide 851
- 1-methyl-1,2,4-triazole 1033
- methyltrioxorhenium (MTO) 81
- (M-60)⁺ fragment, acetylenic structure 1138
- Michael acceptor 35, 443
- Michael additions 439–443, 508, 695, 699, 1546, 1652, 1740
- ketone, enolate 1663
- Michael fashion 819
- Michael olefins 837
- Micrococcus luteus* 12
- micro/macroporous polystyrene resins
 - Friedel-Crafts acylation 2336
- Micromonospora chersina* 57
- microporous polystyrene-derived resins
 - direct lithiation reaction 2338
- microreactors, uses 1084
- microwave-assisted one-pot cyclization-Suzuki coupling approach 618
- microwave assisted organic synthesis (MAOS) 816
- α -hydroxyketones 817
- microwave induced Claisen rearrangement 620
- microwave irradiation 993, 1715
- microwave-mediated solvent-free Rap-Stoermer reaction 618
- microwave methodology 1185
- microwave-promoted synthesis
 - of 1,4-benzodiazepine-2,5-diones 2189
- microwave spectroscopy 1134
- midazolam, multistep synthesis 2201
- migration–nucleophilic attack–cyclization (MNAC) 1189
- Minisci reaction 1492, 1602
- 3-minopyrazine-2-carboxylic acid 1737
- miraziridine A 13
- Miscini reaction
 - with RHNCO radicals 1492
- mitomycin C 12, 13
- mitomycins 1992
- Mitsunobu conditions 1404, 2345
- Mitsunobu reaction 883, 1607
- Mitsunobu reagent 27
- MNDO calculations
 - *ab initio* methods 1053
- Mn-salen catalysts 73
- modern drug discovery
 - flow chart outlining 2322
- modified salens and salen analogs 75
- molecular orbital calculations 1131
- Møller-Plesset (MP2) levels 1573

- molsidomine 1072
 molybdenum alkylidene-catalyzed
 ring-closing metathesis 619
 molybdenum hexacarbonyl 106
 monocyclic azepine derivatives 1867
 monocyclic dioxolanes 928
 monocyclic furazans 1137
 monocyclic furoxans
 – rearrangement of 1159
 monocyclic 1,2,4-thiadiazole scaffold 1316
 monocyclic 1,2,4-triazole-containing
 structures 1033
 monocyclic 1,2,3-triazole system 989
 monofunctional resin cleavage
 procedures 2352
 monohydroxyquinolizinium bromides.
 – pK_a values 2045
 monosubstituted alkynes
 – addition of azides 992
 – co-cyclization of 1439
 monosubstituted furazans 1135
 monosubstituted furoxans
 – glyoximes 1155
 4-monosubstituted 1,2,3-thiadiazoles
 – ring cleavage of 1276
 montmorillonite KSF
 – use of 887
 Moore's law 2313
 Morita–Baylis–Hillman acetate 562
 Morita–Baylis–Hillman reaction 581
 morphine 164
N-morpholino-*N*-
 nitrosoaminoacetonitrile 1072
 Mukaiyama's dehydration
 – of primary nitro compounds 1092
 multicomponent reactions (MCRs) 822, 878,
 2129
 – advantages 2129
 multidirectional cleavage strategies
 2352–2357
 – direct cleavage by electrophiles 2353
 – direct cleavage by nucleophilic
 substitution 2352, 2353
 – safety-catch linkers 2354–2357
 multi-step combinatorial synthesis 2326
 muscaflavin 1867
Mycobacterium tuberculosis 57, 1194
 myricetin 1675
 – structures of 1674
- n**
- Nafion NR50 1178
 naphthoxadiazole 1057
 – irradiation of 1059
- naphthalacetone derivative 44
 Natsume synthesis 432
 naturally occurring 13
 natural octapeptide celogentin 477
 natural pigments 2275
 – limitations 2278
 N–C–N bond angle 118
 Neber rearrangement 42
 Negishi conditions 1601
 Negishi coupling conditions 1838
 Negishi couplings 1600
 Negishi cross-coupling 1006
 Negishi crosscoupling reactions 789
 Negishi reaction 1761
 Nenitzescu indole synthesis 427–429
 Nenitzescu reaction 428
 N–H bond 5, 6
 NH-indoles
 – arylation 467
 NH-pyrazoles
 – tautomerism 642
 N7–H tautomer 1303
 nickel catalysis
 – aryl and alkylGrignard reagents 864
 nickel-catalyzed zinc-based Colon
 reaction 1599
 nicotinamide adenine dinucleotide
 (NAD^+) 1431
 nicotinamide adenine dinucleotide phosphate
 (NADP^+) 1431
 nicotine 1432
 nitration 449–451, 700
 N-nitration 700
 nitrene
 – cyclizations of 405
 – generation reaction 406
 – insertion, synthesis by 429
 nitrene precursors 12
 nitric oxide donor 1072
 nitric oxide synthase (NOS) isoforms 650
 – interaction 650
 nitrile imines 1063
 nitrile oxides 1108, 1148, 1158
 – cycloaddition 745, 1095
 – dipolar cycloaddition 2207
 – 1,3-dipolar cycloaddition 743, 746, 764
 – formation of 1094, 1156
 – intramolecular 1,3-dipolar
 cycloaddition 744
 – stability 742
 – ultrasound cycloaddition of 1092
 nitriles
 – microwave irradiation of 1088
 o-nitroacylaminoarenes

- *in situ* reduction 884
 - α -nitroalkanoic acids
 - alkyl esters of 1148
 - nitroalkenes, cyclocondensation 2363
 - nitroalkenes/vicinal acetoxy nitro derivatives 999
 - nitroamino derivative 1502
 - σ -(2-nitroaryl)alkyl ketones 399
 - nitrobenzofurazans 1168
 - σ -nitrobenzyl bromide 423
 - nitrobenzyl linker 2356
 - σ -nitrochalcones 1542
 - σ -nitrochlorobenzene 884
 - σ -nitrocinnamaldehydes
 - Baker's yeast reduction of 1542
 - Baylis–Hillman adducts 1542
 - nitrogen atom oxidation 1588
 - nitrogen chemical shift 1435
 - nitrogen transfer
 - to amines 132
 - to carbon 132
 - common oxaziridines used 131
 - α -nitrohydrazones
 - addition of amines 1022
 - 2-nitroindoles 450
 - Gribble's syntheses 455
 - 1-nitroisoquinoline 1592, 1593
 - nitroisoxazole reaction 780
 - α -nitroketone 1092
 - σ -nitroktones 401, 402
 - α -nitro-ketoximes 1147
 - α -nitro ketoxime tautomer
 - thermal isomerization 1146
 - nitrones
 - 1,3-dipolar cycloaddition 1107, 2132
 - p -nitrophenylazirine 55
 - 2-(4-Nitrophenyl)-5-phenyl-1,3,4-oxadiazole 1225
 - σ -nitrophenylpyruvate 398
 - 3-nitropyridine 1732
 - N-nitropyridinium ion 1472
 - σ -nitro- β -pyrrolidinostyrene 402
 - nitrosoamidines 2199
 - 4-nitro-5-aminopyrazoles 644
 - 5-nitrosoamino-1,2,4-thiadiazoles 1325
 - 1,2-nitrosoarenes 1133
 - nitrosobenzene derivative 398
 - nitrososyndnonimines 1073
 - σ -nitrostannylbenzene
 - Stille cross-coupling 401
 - σ -nitrostyrenes
 - *N*-heteroannulation 403
 - reductive cyclizations 402
 - 4-nitro-6-trifluoromethansulfonylbenzofuroxan 1164
 - NMR spectroscopy 2071, 2243
 - N-nucleophilicity 1571
 - NOCCC reactions 750, 751
 - non-conventional chiral mesoionic liquid crystals 1056
 - non-covalent forces
 - types of 2287
 - non-cyclic derivatives 2
 - non-natural morphine 2303
 - non-steroidal anti-inflammatory drugs
 - Indomethacin, Sumatryptan and Etodolac 384
 - (5-Nonyl-1,3,4-oxadiazol-2-yl)benzothiazine dioxide 1184
 - norchelerythrine, synthesis 1579
 - Nordlander synthesis 416
 - novel arsonium ylides 26
 - novel polymeric supports 2341–2343
 - N -protonated isoquinoline 1589
 - N –S bond 1314
 - nucleophilic agents 2355
 - nucleophilic catalyst 837
 - nucleophilic reactions 886, 2262–2268
 - π -cation radicals reactions 2262, 2263
 - reactions with 5,15-disubstituted porphyrins 2265, 2266
 - reactions with H₂TPP 2266–2268
 - reactions with porphine 2268
 - substitution reactions. reactions with H₂(OEP) 2263–2265
 - nucleophilic replacement reactions 780
 - at C4 in sydnone 1065
- o**
- OCCCN reactions 749, 750
 - octaethyl porphyrins (OEPs) 2231
 - octaethyl tetra phenyl porphyrins (OETPPs) 2231
 - octaethylxanthoporphyrinogen 2261
 - octaphyrins 2252
 - octapyrrolic macrocycles. *see* octaphyrins
 - olefinic epoxides 101
 - olefin-metathesis approach 618–620
 - olefins 68
 - olitipraz 946
 - one pot process 394, 420
 - one-pot reactions 1636
 - on-water methodology 617
 - optical bleachers 2284
 - optical microscopy 1056
 - organic electroluminescence (OEL) 626

- organic light emitting devices (OLEDs) 627, 1230, 2304, 2308
- organocupper reagents 549, 2010
- organohalides
 - palladium-catalyzed cross-coupling reactions of 1482
- organoindium reagents 2135
- organolithium reagents 2261
- nucleophilic attack 2263
- organometallic alkylations of cyanuric acid 1832
- organometallic processes 2009
- organometallic reagents 460
 - use of 1540
- organopalladium chemistry 1755
- organopalladium compound 467
 - use 2056
- organotin(IV) compounds
 - IR spectra of 1338
- orthoesters 1411
- Ortoleva–King reaction 2043
- 1,2,4-oxadiazole 1109
 - aldol condensation with benzaldehyde 1122
 - heteroaromatic compound 1129
 - 1,3,4 oxadiazole 1170, 1172
 - aromatic and thermally stable molecule 1170
 - cyclization of acylhydrazones, semicarbazones, and thiosemicarbazides 1177–1183
 - diacylhydrazines, cyclization 1175–1177
 - furoxan moiety, drugs 1171
 - heterocyclic ring 1214–1221
 - mass spectrometry 1175
 - mesoionic 1,3,4-oxadiazoles, preparation of 1190, 1191
 - metal complexes 1229–1231
 - methanol use 1120
 - NMR spectroscopy 1174
 - 1,3,4-oxadiazolium cations, synthesis of 1190, 1191
 - oxidative and reductive processes 1211–1214
 - reactions of substituents 1223–1229
 - reactions with nucleophiles 1221–1223
 - reactivity 1203
 - ring cleavage reactions 1203–1211
 - ring transformations 1183–1189
 - structural aspects 1173
 - synthesis of 1175
 - Δ^2 -1,3,4-oxadiazoline 1196–1203
 - oxadiazolinones, oxadiazolinethiones, and oxadiazolimines 1191–1196
 - 2,3,4,5-tetrahydro-1,3,4-oxadiazoles 1196–1203
 - theoretical aspects 1172–1173
 - UV/IR spectroscopy 1174–1175
 - X-ray diffraction 1173, 1174
 - 1*H*-[1,2,4]-oxadiazole[4,3-*a*] quinoxalin-1-one (ODQ) 1075
 - 1,2,3-oxadiazole derivatives 1072
 - 1,3,4-oxadiazole derivatives 1229
 - 1,3,4-oxadiazole-functionalized terbium (III) β -diketonate
 - synthesis of 1230
 - 1,2,4-oxadiazole moieties 1086
 - 1,2,3-oxadiazole 3-oxides 1051
 - oxadiazole ring
 - nucleophilic attack 1156
 - 1,2,4-oxadiazole ring 1075, 1076, 1127
 - protons 1081
 - 1,2,5-oxadiazole ring 1129
 - 1,3,4-oxadiazole ring 1209, 1219, 1225
 - 1,2,4-oxadiazole rings
 - rearrangement reactions of 1117
 - *p*-tolyl ring 1080
 - oxadiazoles
 - photoreactivity of 1099
 - types of 1047
 - 1,2,3-oxadiazoles 1048
 - benzo-1,2,3-oxadiazoles 1059
 - DFT analysis 1048
 - 4,5-dihydro-1,2,3-oxadiazoles 1059
 - 1,3-dipolar cycloaddition reactions 1070, 1071
 - electrophilic substitution at C4 1065–1067
 - nucleophilic substitution at C4 1065
 - reactivity of 1058
 - ring cleavage 1060–1065
 - ring system 1049
 - substituents, reactions 1067–1070
 - 4'-substituted-3'-nitrophenylsydrones 1074
 - sydncarb 1073
 - sydrones 1059, 1060
 - sydnonimines 1049, 1050, 1057, 1058
 - sydnonimines molsidomine 1072
 - synthesis 1057
 - 1,2,4-oxadiazoles 1074, 1075, 1083, 1084, 1088, 1089, 1090, 1092, 1094, 1095, 1109, 1118, 1127
 - amidoxime route
 - *N*-acylamidoximes, cyclization of 1089–1091

- *O*-acylamidoximes, cyclization of 1084–1089
- catalytic hydrogenation of 1113
- ^{13}C NMR shifts 1082
- cycloaddition route 1092–1095
- ester and amide isostere 1075
- fragmentation pattern of 1082
- human immunodeficiency virus (HIV) 1075
- IR analysis 1082
- mass spectrometry 1082, 1083
- in medicine 1127, 1128
- NMR spectroscopy 1081, 1082
- N-[3-phenyl-1,2,4-oxadiazol-5-yl-methyl] phthalimide 1074
- nucleophilic displacements on 1113
- phenyl moiety of 1213
- reactions with electrophiles 1109–1111
- reactions with nucleophiles 1111–1113
- reactivity of substituents 1121–1126
- reductions and oxidations of 1113–1117
- structure of 1076, 1077
- synthesis of 1095–1099
- dihydro-1,2,4-oxadiazoles 1099–1102
- 2,3-dihydro-1,2,4-oxadiazoles 1104–1107
- 2,5-dihydro-1,2,4-oxadiazoles 1102–1104
- 1,2,4-oxadiazole-N-oxides 1108, 1109
- 1,2,4-oxadiazolidines 1107, 1108
- synthetic routes 1083
- theoretical studies 1077–1079
- thermal and photochemical ring cleavage 1117–1121
- UV irradiation of 1119
- UV/IR spectroscopy 1081–1082
- X-ray data of 1079
- X-ray diffraction 1079–1081
- yttrium triflate, as catalyst 1094
- 1,2,5-oxadiazoles 1129, 1150
- aryl furazans 1165–1167
- benzofurazans 1143, 1144
- benzofuroxans 1154
- benzofuroxans, cycloaddition reactions 1164, 1165
- benzofuroxans, heterocyclic ring rearrangements of 1158
- benzofuroxans, rearrangements 1162–1164
- benzofuran system 1149, 1150
- 1,2-dioximes, oxidation of 1145
- dipole moments 1132
- electrophiles and oxidizing agents 1150–1152, 1154, 1155
- furazans, furoxans, and benzo-related compounds in medicine 1167–1170
- furoxans 1144, 1154, 1165–1167
- furoxans, heterocyclic ring rearrangements of 1158
- furoxans, rearrangements 1159–1161
- heteroaromatic compound 1129
- heterocyclic ring 1150
- Meisenheimer complex formation 1158
- nitrile oxides, dimerization of 1147–1149
- α -nitro ketoximes, dehydration of 1145–1147
- nucleophiles and reducing agents 1152–1154, 1155–1157
- ring systems of 1047
- structural aspects 1129–1131, 1134
- mass spectrometry 1137, 1138
- NMR spectroscopy 1135, 1136
- UV/IR spectroscopy 1136, 1137
- X-ray diffraction 1134, 1135
- synthetic routes 1145
- furazans 1138–1143
- theoretical studies 1131–1134
- thermal and photochemical ring cleavage 1154, 1157, 1158
- 1,2,3-oxadiazole system 1047, 1051, 1170, 1172, 1177, 1185, 1211, 1214, 1226, 1254
- Diels–Alder (DA)/1,3-dipolar cycloaddition (1,3-DC) 1218
- electron impact mass spectra of 1175
- IR absorption spectra 1174
- proton NMR data, ring hydrogens 1174
- ring-opening reactions of 1203
- synthesis of 1181
- X-ray structures of 1173
- 1,3,4-oxadiazole system 1203
- electronic spectrum of 1174
- 1,2,4-oxadiazole systems 1083
- nucleophilic attack 1111
- 1,3,4-oxadiazole systems
- iridium(III) complexes 1231
- 1,3,4-oxadiazole-2-thione derivatives
- Mannich reaction of 1216
- 1,2,4-oxadiazolidine 3,5-dione 1111
- 1,2,3-oxadiazolidine ring system
- derivatives of 1053
- 1,2,4-oxadiazolidines 1107
- 1,2,4-oxadiazolidinones 1108
- 1,2,4-oxadiazoline
- acetylation of 1111
- 1,2,3-oxadiazolines 1050
- *ab initio* and DFT calculations 1051
- mass spectra 1056
- NMR spectra 1055, 1056
- structural parameters 1054
- theoretical aspects 1053, 1054

- thermotropic liquid crystals (LCs) 1056
- UV and IR spectroscopy 1055
- X ray crystallography and spectroscopic data 1052
- X-ray diffraction 1055
- 1,3,4-oxadiazolin-5-ones 1191
- 1,3,4-oxadiazolium cations 1170, 1191
- 1,2,4-oxadiazonium salts 1110
- 1,3,4-oxadiazonium salts 1210
- 1,2,4-oxadiazolo[4,5-*a*]indolines 1116
- 1,2,4-oxadiazol-5-one moiety 1128
- oxadiazolones 1205
- 1,2,4-oxadiazol-5-ones 1121
- 1,3,4-oxadiazol-2-ones 1205
- oxadiazolopyrimidinium salts 1110
- 1,2,4-oxadiazol-5-yl carboxylic acids 1086
- 2-(oxadiazolyl)imidazo[1,2-*a*]pyrimidines 1176
- oxa-Pictet-Spengler procedure 545
- 1,4-oxathiane 977
- 1,4,2-oxathiazine 978
- oxathiolane
- treatment of *N*-alkylcystinol 968
- 1,3-oxathiolane derivative 975
- 1,3-oxathiolane 2,2-dioxide
- diazosulfone 973
- 1,2-oxathiolane-2,2-dioxides 970
- 1,3-oxathiolane-5-ones 979
- 1,2-oxathiolane 2-oxides 970, 971
- SO, thermal extrusion of 970
- 1,2-oxathiolane-2-oxides 968
- 1,2-oxathiolanes 966
- ^1H NMR data 967
- NMR spectroscopy 967
- nucleophilic attack 971
- thermal/photochemical reactions 970, 971
- X-ray diffraction 967
- 1,3-oxathiolanes 971, 980
- hydrolysis of 979
- NMR spectroscopy 972, 973
- oxidation of 978
- preparation of 975
- radical, electrochemical reactions 979
- reactions with electrophiles 978, 979
- reactions with nucleophiles 979
- ring expansion 979, 980
- ring synthesis of 973–976
- thermal reactions 978
- X-ray diffraction 972
- 1,2-oxathiolanes derivatives.
- ^1H NMR data for 967
- 1,3-oxathiolane systems
- ^1H NMR data for 972
- 1,3-oxathiolane-2-thione 974
- 1,2-oxathiolan-5-one 2,2-dioxide derivative 970
- 1,3-oxathiolan-2-ones
- CO₂, pyrolytic extrusion of 978
- 1,2-oxathioles 966
- heterocycles, ring transformations 970
- NMR spectroscopy 967
- nucleophilic attack 971
- ring synthesis of 967–969
- thermal/photochemical reactions 970, 971
- X-ray diffraction 967
- 1,3-oxathioles 971
- cycloaddition reactions 978
- heterocycles, ring transformations of 976, 977
- heterocyclic ring of 977
- NMR spectroscopy 972, 973
- reactions with electrophiles 977
- reactions with nucleophiles 978
- ring synthesis of 973–976
- X-ray diffraction 972
- 1,3-oxathiolium 4-oxide compound
- ^{13}C NMR data for 972, 973
- 1,2-oxathiolium salts 966
- 1,3-oxathiolium salts 971
- with NaN₃ 978
- preparation of 973
- 1,2-oxathiolone derivative
- geometry of 967
- oxazaphosphole 50
- 1,3-oxazin-6-ones 1446, 1722
- Hetero-Diels-Alder reaction of 1446
- oxaziridines 1108
- nitrogen transfer reactions 131, 132
- oxygen transfer reactions 133
- properties 129
- reactivity 131
- rearrangements 133–135
- synthesis 129–131
- oxazole. *see also* 1,3-oxazoles
- mercuration of 839
- ring bromination of 838
- synthesis of 902
- oxazole nitrogen 849
- oxazole ring 842
- oxazoles 824, 865
- aza-Wittig rearrangement 829
- preparation of 826
- 1,3-oxazoles 809
- nomenclature and numbering of 811
- oxazoles, preparation
- β -(acyloxy)vinyl azides 827
- using van Leusen-TosMIC route 828

- oxazolidine ring 889
 oxazolidines 888
 oxazolidinones 38, 901
 oxazolidin-5-ones 1175
 1,3,4-oxazolidinyl carbocation 1179
 oxazoline *N*-oxides 1105, 1107
 oxazoline–thiazoline conversion 879
 oxazolo[3,2-*d*][1,4]benzodiazepines
 – synthesis 2205, 2206
 oxazolone
 – with *iso*-pentyl nitrite 1003
 5-oxazolyl cuprates 855
 oxazolylmagnesiums
 – use of 851
 oxazol-2-yl-zinc 855
 oxepanes 1868
 – synthesis 1898
 oxepine–arene oxide equilibrium 1877
 oxepines 1867, 1870, 1871
 – partially reduced, reactivity 1953
 -- dihydrooxepines 1953–1955
 -- tetrahydrooxepines 1955–1957
 – reactivity 1943, 1944
 -- and benzofused derivatives 1944–1952
 oxetanes 188, 208
 – acyl halide–aldehyde
 cyclocondensations 198–200
 – bond lengths and angles 188
 – carbonylative ring expansion reactions
 201, 202
 – catalyzed [2+2] cyclizations 193, 194
 – C–H insertions 200, 201
 – [2+2] cycloaddition of ketene and carbonyl
 compounds 197, 198
 – electrophilic cyclizations 196
 – β-hydroxy acid cyclizations 202
 – infrared spectroscopy 189
 – isomerization of oxiranyl hydroxyls 195,
 196
 – β-lactones, reactivity of 202–208
 – natural/bioactive compounds 189, 190
 – NMR spectroscopy 189
 – nucleophilic attacks 208–214
 – oxirane ring expansions 196
 – oxirane ring opening by carbanionic
 attacks 195
 – [2+2] Paterno–Büchi cyclizations 191–193
 – physicochemical data 188, 189
 – reactivity 202–214
 – ring contraction of butanolides 194, 195
 – synthesis 191–202
 – Williamson reactions 195
 2-octanone 188
N-oxidation 1734
 oxidation reactions 475–478
 oxidative acetoxylation 1546
 oxidative coupling reaction 311
 oxidative cyclization 607–609
 5-oxide tautomers 1132
 3-oxidopyrylium betaine
 – [5+2] dipolar cycloaddition 1652
 – intramolecular dipolar cycloaddition 1652
 oxime ethers
 – [3,3]-sigmatropic rearrangement 620
 oxime tosylates 756
 oximino derivatives 1453
 oxindole 495
 – reactivity 498
 – synthesis by cyclization reactions
 496–498
 – synthesis from indoles 495
 – synthesis from isatins 495, 496
 – zinc-dust pyrolysis 377
 oxiranes 55, 56, 875
 – epoxidation of carbonyl compounds 86–90
 – epoxidation of electron-deficient
 alkenes 83–86
 – metal-catalyzed epoxidation of alkenes
 69–83
 – nucleophilic ring opening 92–98
 – oxiranyl anions 107–109
 – properties 56, 57
 – radical chemistry 104
 – reactivity 92
 – rearrangements 98–104
 – reduction and deoxygenation 104–107
 – ring-closing reactions 90–92
 – synthesis 58–90
 – using dioxiranes 59–64
 – using other oxidants without metal
 catalysts 64–69
 oxiranyl anions 107–109
 – carbonoid behavior of 109
 – reaction with electrophiles 108
 4-oxoalkanoic acids 1693, 1694
 α-oxoamides 2130
 5-oxo compound 1111
 5-(4-oxo-2,5-diphenyl-1,2,5-oxadiazolidine-
 3-yl)-2,4(1H,3H)-pyrimidinedione
 – synthesis of 1131
 2-oxoesters
 – glyoxalate 445
 α-oxoketene dithioacetals 661
 α-oxoketene *N,S*-acetals
 – cyclocondensation 660
 oxone 33
 4-oxo-thiazolidine 1069
 α-oxothioester

- diazomethane 975
- β -oxo thionoesters 738
- oxybenzoporphyrin synthesis 2243
- oxygen transfer
 - to carbon. 134
 - common oxaziridines used for 133
 - reactions 133
 - to sulfur 134

- p**
- Paal–Knorr condensation
 - of polymer-supported 1,4-diketones 2363
- Paal–Knorr synthesis 542
- palladacycle, formation 505
- palladium acetate 1763
- palladium-catalyzed alkylation reactions of
 - chloropyrazines 1762
- palladium-catalyzed carbonylation
 - synthesis of chromone 1676
- palladium-catalyzed C–H arylation reaction 1033
- palladium-catalyzed C–N coupling reactions 1565
- palladium-catalyzed cross-coupling reactions 786, 2049
- palladium-catalyzed cyclizations 426–427, 433, 434
 - isomerization procedure 551
- palladium-catalyzed–H bond arylation of azoles 857
- palladium-catalyzed hydrogenation/ heterocyclization 1544
- palladium-catalyzed intramolecular amidation 2192
- palladium-catalyzed multicomponent sequential coupling strategy 598
- palladium-catalyzed Negishi coupling 1597
- palladium-catalyzed oxidative alkenylation 334
- palladium-catalyzed reaction
 - of propargyl acetates 933
- palladium-catalyzed Sonogashira reaction 612
- palladium-catalyzed Stille reaction 1598
- palladium-catalyzed Suzuki–Miyaura reactions 1597
- palladium(0)-catalyzed termolecular queuing processes 1550
- palladium complex 346
- palladium(II)-catalyzed oxidative carbocyclizations 602
- palladium-mediated sequential cross-coupling Sonogashira reaction–Wacker-type heteroannulation 558
- palladium-promoted homocoupling processes 2051
- Pandanus acanthifolium* 110
- (*R*)-pantolactone derived ester 25
- papaverine 1575
- Pariser–Parr–Pople (PPP) approximation method 540, 2024
- Parish conditions 82
- Paterno–Büchi reaction 537
 - [2+2] cycloaddition 573
- PBD-DNA adduct formation 2212
- Pd(0) catalyst 457
- Pd-catalyzed allylic alkylations
 - indole as nucleophile in 508, 509
- Pd-catalyzed carbonylation 1764
- Pd-catalyzed cyclization 420
- Pd(0)-catalyzed domino reaction
 - mechanism for 409
- Pd-catalyzed intramolecular arylation 602
- Pd-catalyzed process 877
- Pd-catalyzed reactions 382, 385, 1761, 2017
- Pd-catalyzed Suzuki–Heck sequence 506
- Pd-catalyzed tandem process 415
- Pd/CuI-catalyzed tandem Ullman/Sonogashira couplings 605
- trans*-[PdCl₂]-1,2,4-oxadiazole complexes
 - isolation of 1095
- Pd(II)-catalyzed cycloisomerization 553
- Pd^{II}-mediated carboxylative annulation 601
- Pechmann synthesis 1255
- PEDOT 2307
- PEG-bound bromothiophene 2368
- penicillin 2144–2161
 - chemical relationship 2158
 - classical syntheses 2148–2150
 - conversion 2158–2161
 - industrial production 2150–2153
 - introduction 2144–2146
 - physicochemical data 2146–2148
 - reactivity 2153–2158
- penicillin-binding proteins (PBPs) 2144, 2156
- catalytic cycle 2157
- penicillin G 2160
- use 2145
- penicillin V 2147
- penicillin V ester, ring enlargement 2159
- pentacyclic cations synthesis
 - representative examples 2058–2061
- N*-pentafluorophenyl triazolium tetrafluoroborate salts 1034
- pentameric/hexameric helicates, preparation 2291
- pentane-1,5-dione

- condensation 1633
- pentapyrrolic 22π system 2249
- peptidic hormones 2214
- peracetic acid 66
- perchlorinated pyridazines 1737
- perfluorinated metallophthalocyanine, n-type semiconductor 2311
- perfluoroalkylether-1,3,5-triazines 1833
- perfluoroalkyl iodides 314, 319
- 5-perfluoroalkyl-1,2,4-oxadiazoles
 - hydrazinolysis of 1023
- 2-(perfluoroalkyl)pyrroles 319
- perfluoroalkylquaterthiophenes 2310
- perfluoroalkyl radicals 319
- perfluoro-(isopropyl)-1,3,5-triazines
 - 1832
- perhydroazepine 1865
- pericyclic reactions 512, 513
- perilllosin 1868
- periodates 70
- peroxisome proliferator-activated receptor- γ (PPAR- γ) 541
- Petasis-Ugi multicomponent condensation strategy 2129
- phase-transfer catalyst 2298
- phase-transfer Gomberg-Bachmann synthesis 544
- phenacyl benzoate
 - with H_2S 974
- phenacyldithiocarbamates 973
- 1-phenacylisouquinolines 1574
- phenanthridine, synthesis 1557
- phenolic-type reactions 2047
- α -(phenoxy)alkyl ketones
 - dehydrative cyclization 596
- phenylacetic acid derivative
 - Friedel-Crafts acylation 2220
- phenylacetonitrile 1594
- phenylalkoxyoxadiazoles
 - alkyl iodide 1223
- 2-phenylamino-5-(4-fluorophenyl)-1,3,4-thiadiazole 1342
- N-phenyl- α -phosphinylhydrazone 657
- phenyl azide 994
- N-phenylbenzaldimine 24, 25
- 3-phenyl-1,2-benzisoxazole
 - flash vacuum pyrolysis (FVP) 773
- N-phenyl-benzyl imine 847
- phenyl chloroformate 1826
- 2-phenylchromones. *see* flavones
- α -phenylenediamine 53
- β -phenylethylamines 1575
- β -phenylethyl vinyl azide 46
- phenylfuranans 1135, 1150
- 6-phenyl-3(2H)-pyridazinones 1756
- phenylhydrazine 1368
- phenylhydrazones
 - (*Z*)-isomers of 1159
- N-phenylimidazoles 857
- phenyliminodioxolane 935
- 3-(phenylimino)-1,2,4-thiadiazolidin-5-ones 1299
- phenyl isocyanate
 - imidazole-1-carboxamides, addition 841
- 5-phenyl isomer 1076
- phenyl isothiocyanate 41, 1365
- 5-phenyloxazole 942
- phenyl ketone phenylhydrazones
 - lead tetraacetate oxidation 684
- phenylmagnesium chloride 405
- N-phenylmaleimide 1071
 - intramolecular dipole formation-intermolecular cycloaddition 2208
- 5-phenyl-4-methyl-1,3,4-thiadiazolium-2-olate 1368
- 2-phenyl monosulfoxide derivative 965
- 2-phenyl-1,3,4-oxadiazole 1209
- 3-phenyl-1,2,4-oxadiazole
 - INDO studies 1078
- N-[3-phenyl-1,2,4-oxadiazol-5-yl-methyl] phthalimide 1074
- 1-phenylphosphinane, description 2071
- phenyl radicals 865
- N-phenylsulfonylindole 455
- 1-(phenylsulfonyl)pyrrole 304
- 3-phenylsydnone 1065
 - oxidation of 1060
- 3-phenylsydnone-4-carboxylic acids 1067
- 3-phenylsydnone 1065
- 5-phenyltetrazole 1422
- phenylthallium bis-trifluoroacetate 1605
- 3-phenyl-1,3,4-thiadiazolidine-2-thiones 1366
- N-(5-phenyl-1,3,4-thiadiazol-2-yl) benzamide 1341
- 4-phenyl-1,2,4-triazole-3,5-dione 1033
- N-phenyltrifluoroacetohydronoyl bromide 1359
- phenyltrimethylammonium bromide (PTAB) 18
- 3-phenyl-/3-(*p*-tolyl)-10b*H*-1,3,4-thiadiazolo[2,3-*a*]isoquinoline-2(*3H*)-thiones 1365
- Phillip's method 882
- pH-independent reaction 2155
- phosgene 1822
- phosphabenzene dimeric complex 2095
- phosphacene 1584

- phosphetanes 244
 phosphine oxides 45
 phosphinines 2084–2097
 – history and nomenclature 2084, 2085
 – reactivity 2089–2097
 – spectral, structural and theoretical studies 2085
 – synthesis 2086–2089
 λ^5 -phosphinines 2085
 phosphinine synthesis 1643
 phosphodiesterase type 5 (PDE5) 651
 phosphodiesterase type 3 enzymes (PDE3) 647
 phosphole system 2071–2084
 – history and nomenclature 2071, 2072
 – isomers 2072
 – phospholide ions 2075, 2076
 – reactivity 2076–2084
 – spectral, structural and theoretical studies 2072, 2073
 – synthesis 2073–2075
 phosphomolybdic acid (PMA) 34
 phosphonate 1123
 phosphonium salts 423
 phosphonium ylides 944
 phosphorus–carbon heterocycles, uses 2103
 phosphorus heterocycles
 – addendum 2105–2108
 – applications 2103–2105
 – five-membered rings 2102, 2103
 – four-membered rings 2100–2102
 – introduction 2071
 – phosphinines 2084–2097
 – phospholes 2071–2084
 – three-membered rings 2097–2099
 photoaffinity label (PAL) 128
 photochemical free-radical alkylation 1605
 photochemical reactions 489–491
 photodynamic therapy (PDT) 2238, 2247
 photoinduced rearrangements
 – of O–N bond 1099
 photolytic decomposition of vinyl azides 47
 phthalimide aziridinations, reaction
 conditions for 20
 phthalocyanines 2280
 – industrial applicability 2281
 – structure 2281
 Pictet–Gams modification 1577
 Pictet–Spengler reactions, asymmetric organocatalyzed 508
 Pictet–Spengler syntheses 1576
 pilocarpine analogues, synthesis 851
 PINDOX 98
 piperidine 2
 piperidin-2-one 2
trans,trans-1-piperidinyl-4-(2-pyridyl)butadiene 2040
 piperylene 1220
 platelet derived growth factor (PDGF) 2321
 plieninger indole synthesis 404
 ^{31}P NMR spectroscopy 2090
 polar solvents 928
 Polonovsky rearrangement 2184, 2196
 polyacrylamide resins 2339, 2340
 poly(2,3-benzofuran) (PBF) 625
 poly(2,2'-bithiazole-5,5'-diyl)s 2307
 polychloropyrimidines 1743
 polycyclic adduct 482
 polycyclic aromatic nitrogen cation systems 2021
 polycyclic ring system synthesis 569
 polycyclic systems 550
 polyethers 1899
 poly(ethylene glycol) (PEG) 1028, 1101, 1417
 – chains 2340
 – with sodium methoxide 1101
 poly(ethylene glycol)-supported azide
 – 1,3-dipolar cycloaddition of 998
 polyethylene polyoxypropylene (POEPOP) 2342
 2-(polyhydroxyalkyl)pyrroles 311
 polyisoxazole systems 747
 polymer-bound α -silylimines 2360
 polymer-bound halothiophenes 2367
 polymer-bound resin 2363
 polymer-bound substrates 2328
 polymer-bound triphenylphosphine 423
 polymeric systems 2305
 polymer-supported Mukaiyama-type reagent 2124
 polymer-supported triphenylphosphine
 – use of 876
 polyoxometallates (POMs) 79
 polyoxyethylene polystyrene (POEPS) 2342
Polyozelus multiflex 595
 polyphosphoric acid (PPA) 1176
 poly(pyrrole)s 2308
 poly(selenophene)s 2308
 polysiloxane 1057
 polystyrene-derived resins
 – application 2329
 polystyrene–polyethylether (PS-PEG) resin-supported palladium-phosphine complex 612
 polystyrene resin
 – Friedel–Crafts alkylation 2336
 polystyrene resin-bound azide 996
 polystyrene resins

- nitration 2336
- polystyrene-SO₂-CH₂-NC resin 827
- polystyrene-sulfonyl hydrazide resins 1004
- polysubstituted imidazolidinones 899
- poly(thiazole)s 2307
- poly(thiophene)s 2306, 2307
 - organometallic synthesis 2307
- porphine 2231, 2268
- porphyrin 1510
- porphyrin framework
 - carbon rings in 2234
 - core-modified porphyrins 2233–2235
 - electrophilic reactions 2255–2262
 - expanded porphyrins 2235, 2236
 - five- and six-membered cyclic sub-units 2235
 - general introduction 2231, 2232
 - isomers 2232
 - nitro derivatives 2260
 - nucleophilic reactions 2262–2268
 - pyrrole inverted systems 2233
 - reactivity 2254–2268
 - six-membered ring 2234
 - structures 2276
 - syntheses and reactions 2231
 - synthetic chemistry 2236–2254
 - tetrapyrrolic systems 2232, 2233
 - trimer, Diels–Alder acceleration 2303
- potassium carbonate 45
- potassium dodecatungstocobaltate 95
- potassium hydrosulfide 904
- potassium hydroxide
 - hydroxylation of 1593
- potassium permanganate 82
- potassium 2-
 - phenylhydrazinecarbodithioate 1350
- potassium thiocyanate 1361
- potential energy surface (PES) 1133
- poton affinities 1078
- Povarov reaction 1552
- prolyl endopeptidase (PEP) 595
- α -propargyl α -keto ester
 - palladium-catalyzed cyclization 554
- propargyl alcohols
 - palladium-catalyzed
 - cyclocarbonylation 575
- propargyl amides 877
- propargylic alcohols
 - hydroamination 416
 - ruthenium/platinum-catalyzed sequential reaction 557
- propargyl vinyl ether
 - gold-catalyzed reactions 558
- propionic acids 1670
- propylenediamine 119, 121
- propyne conversion, regioselectivity 1440
- N-protected (α -aminoacyl)
 - benzotriazoles 1087
- N-protected-2,3-bis(dibromomethyl) indoles 487
- N-protected-2-indolylstannane, coupling 463
- N-protected hydroxylamine tosylates 22
- N-protected quinolin-4-ones 1567
- N-protected 1,2,3-triazoles, lithiation 1005
- proton sponge 1158
- proton-transfer transition state 45
- (+)-pseudoephedrine-derived aziridine 38
- Pseudomonas putida* 1751
- pterin family 2277
- pterin pigments
 - 7-methylxanthopterin 2276
- 1-(toluenesulfonyl)-4-(tributylstannylyl)pyrrole-2-carboxaldehyde 335
- Pummerer rearrangement 2352, 2356
- Pummerer-type reaction 553
- 4*H*-pyran
 - synthesis by a Ni-catalyzed formal [4+2] cycloaddition 1659
- 2*H*-pyran derivatives
 - characteristic property 1655
 - Claisen rearrangement 1659
 - strategies for synthesis 1657
 - synthesis by Knoevenagel condensation 1656
 - synthesis by metal-catalyzed cycloisomerization of diyneols 1657
 - synthesis by metal-catalyzed isomerization 1656
 - synthesis by Pd-catalyzed 6-*endo*-dig cyclization of enynols 1657
- pyranoflavylum synthesis 1653
- pyranone
 - α -formylation of 1668
 - formation of 1663
 - Grignard reagent 1666
 - O-enolate cyclization 1664
- 2-pyranone
 - transformation of 1667
- 2*H*-pyran-2-one 1663
- 2*H*-pyran -2-one 1663
- 2*H*-pyran-2-one 1663
 - retrosynthetic analysis for 1662
 - structure of 1661
- 2*H*-pyran -2-one
 - synthesis of 1664
- 2*H*-pyran-2-one
 - resonance structures for 1661
- 4-pyranone

- from diketone 1672
- α -pyranone
- allenyl ketone to 1663
- via carbonylation–cyclization 1664
- 2-pyranones
 - synthesis of 1664
 - transformation of 1666
- 2*H*-pyran-2-ones. *see* α -pyrones
- synthesis of 1663
- 4-pyranones
 - nucleophilic attacks on 1673
- 4*H*-pyran-4-ones. *see* γ -pyrones
- mesomeric structures for 1671
- pyranoquinoline alkaloids 1532
- 4*H*-pyrans
 - bicyclic 1660
 - Claisen rearrangement 1659
 - synthesis of 1658, 1659, 1660
- 2*H*-pyran structures 1655
 - ring synthesis 1655–1657
- 4*H*-pyran structures 1655
 - ring synthesis 1657–1660
- pyrazine 1683
- pyrazine (1,4-diazine) 1731
- pyrazines (1,4-diazines) 1737, 1746, 1755
- pyrazoles
 - ^{13}C NMR spectra 641
 - geometry 640
 - ^1H NMR spectra 641
 - identification of isomers 638
 - medicinal chemistry aspects 635
 - ^{15}N NMR spectra 641
 - properties 638
 - space filling models 640
 - structures 639
 - use 637
- 1*H*-pyrazoles
 - preparation 668
- pyrazoles synthesis 651–678
 - one C–C bond formation 654, 655
 - one N–C bond formation 653, 654
 - one N–N bond formation 652, 653
 - from other heterocycles 671–678
 - two bonds formation 655–671
- pyrazoline cycloadduct 1165
- Δ_2 -pyrazolines
 - NMR data on 642
- pyrazolium 705
- pyrazoloacridine (PZA) 649
- pyrazolo[1,5-*a*]pyrrolo[2,1-*c*][1,4]benzodiazepines synthesis 2203
- pyrazolo derivatives 1165
- pyrazolopyridines
 - synthesis of 1459
- pyridazine 1666, 1683
- pyridazine, N–N bond 1684
- pyridazines 1733
- pyridazines (1,2-diazines) 1731, 1735, 1742, 1747
- pyridazine thiocarboxamides 1753
- pyridazin-3(2*H*)-one 1694
- pyridazinones 1704
- pyridine 2, 1431, 1558
 - aldehydes, ketones, carboxylic acids and derivatives 1506–1507
 - alkyl derivatives 1504–1506
 - amino derivatives
 - diazotization of 1503, 1504
 - electrophilic substitution reactions 1502, 1503
 - reactions with acids 1500, 1501
 - reactions with acylating agents 1501, 1502
 - reactions with alkylating agents 1501
 - reactions with electrophilic reagents 1499, 1500
 - benzene derivative 1436
 - *tert*-butyl acrylate of 1488
 - electron-deficient heterocycles 1436
 - electron-deficient nature of 1437
 - electrophilic substitution reactions (S_{EAr}) 1471, 1472
 - Heck reaction 1486–1489
 - with hydroxide ions 1475
 - with phenyllithium 1477
 - IR spectrum 1435
 - metal-catalyzed cross-coupling reactions 1481–1483
 - natural compounds 1433
 - nitrobenzene charge distributions 1436
 - nitrogen chemical shift of 1434
 - ^{15}N NMR signal for 1434
 - nucleophilic aromatic substitutions 1476
 - photochemical irradiation 1495
 - photochemical reactions 1495
 - proton coupling constants 1435
 - reactions at ring carbon atom 1492–1494
 - reactions at ring nitrogen atom 1490, 1491
 - reactions of C-metallated 1479
 - reactions of pyridyl lithium/grignard derivatives with electrophiles 1479–1481
 - reactions with acids 1468
 - reactions with acyl halides 1470, 1471
 - reactions with amide ions 1474, 1475
 - reactions with bases 1476–1478
 - reactions with carbon nucleophiles 1476
 - reactions with electrophilic reagents 1467
 - reactions with halides 1469, 1470

- reactions with hydroxide ions 1475, 1476
- reactions with metal ions 1468, 1469
- reactions with nucleophilic reagents 1473, 1474
- reactions with oxidizing agents 1472, 1473
- reactions with reducing agents 1489, 1490
- reactivity 1436, 1437
- regioselectivity of reaction 1478
- resonance forms 1436
- six-membered heterocyclic aromatic compound 1431
- SnAr reaction with 1476, 1477
- with sodium amide 1474
- Sonogashira coupling 1485, 1486
- spectroscopic data
 - IR data 1435, 1436
 - NMR data 1434
 - UV data 1434, 1435
- Stille coupling 1483, 1484
- Suzuki coupling 1484, 1485
- synthesis 1642
- synthesis of
 - azadienes/dienophiles, Diels–Alder reaction of 1444–1453
 - by aza-electrocyclization reactions 1462–1465
 - Bohlmann–Rahtz heteroannulation 1462
 - cycloaddition reactions with organometallic derivatives 1454–1456
 - [2+2+2] cycloadditions 1437–1443
 - [4+2] cycloadditions 1443
 - from 1,5-dicarbonyl derivatives 1461, 1462
 - dienes and azadienophiles, Diels–Alder reaction of 1453, 1454
 - from enamines 1459–1461
 - from five-membered rings 1465, 1466
 - Hantzsch cyclocondensation 1456–1458, 1459
 - from six-membered rings 1466, 1467
 - via ring transformation 1465
- UV spectra 1434
- pyridine boron derivatives 1485
- pyridine carboxylic acids 1506, 1507
- zwitterionic forms of 1506
- pyridine derivatives 1432
 - for agrochemical 1434
 - electrophilic substitution reactions 1497
 - natural 1431, 1432
 - oxyderivatives 1495, 1496
 - oxygen function replacement 1499
 - oxypyridine anions with electrophiles 1497, 1498
- photochemical reactions 1499
- reactions with acid chlorides 1496, 1497
- reactions with acids 1496
- reactions with electrophilic reagents 1496
- unnatural 1432–1434
- pyridine drugs 1433
- pyridine-like nitrogen atom 898
- pyridine nomenclature 1432
- pyridine *N*-oxide (PNO) 77, 1511, 1512
 - electrophilic substitutions 1513
- pyridine nucleus 1494
- pyridine ring 1472
 - electron-deficient nature of 1473
 - halogens 1594
- pyridine rings 1462
- pyridines 1468
 - chelates 1469
 - derivatives 1517
 - electrophilic substitution reactions 1471
 - hetero-Diels–Alder synthesis of 1448
 - nitrogen atom 1467
 - π-ligands 1469
 - reactivity of 1516, 1517
 - as reagents 1468
 - synthesis of
 - by cycloaddition reactions 1515, 1516
- pyridines *N*-oxides
 - with electrophilic reagents 1517
- pyridines salts 1455
- pyridine–sulfur trioxide complex 535
- pyridine-type nitrogen
 - electronic density 836
- pyridinium cyclopentadienides 1491
- pyridinium ring
 - reduction of 1509
- pyridinium salt
 - with *n*BuLi 1508
- pyridinium salts 1455, 1468
 - intramolecular free radical substitution of 1510
 - *in situ* generation of 1508
- pyridinium salt synthesis 1643
- pyridinium ylides 1491
- pyridiniumylides
 - 1,3-dipolar cycloaddition 2007
 - 4(1*H*)-pyridinylidene complexes
 - regioselective formation of 1455
- pyridium salts, quaternary
 - α-cyclizations 1510, 1511
 - nucleophilic additions 1507–1509
 - pyridine *N*-oxides 1511
 - deoxygenation reactions 1514, 1515
 - reactions at alkyl side chain 1513, 1514

- reactions with electrophilic reagents 1512, 1513
- reactions at alkyl side chain 1510
- reduction reactions of 1509
- 2-pyridone 1498
- pyridone oxygen 1499
- pyridones
 - electrophilic substitutions 1497
- 1-(2-pyridyl)-1,3-butadiene 2042
- pyridyl-lithium derivatives 1480
- 3-(3-pyridyl)sydnone
- irradiation of 1064
- pyrilium cation 3
- pyrimidine 1683, 1741
- pyrimidine esters 1763
- pyrimidines (1,3-diazines) 1731, 1735, 1737, 1739, 1743, 1748, 1749
- 4-pyrimidinones 1722
- 5-(pyrimidinyl)magnesium chloride 1754
- α -pyrone
 - as dienophile 1666
 - transformation of 1667
- pyrones 1660, 1661
 - pK_a of 1496
- α -pyrones 1661
 - coumarins 1668–1670
 - Diels–Alder cycloaddition of 1665
 - reactivity of 1665, 1668
 - structure of 1661
 - synthesis of 1662–1665
- γ -pyrones. *see* 4H-pyran-4-ones
- chromones 1674–1676
 - as dienophile 1673
- Hetero-Diels–Alder cycloaddition 1672
- intramolecular [5+2] cycloaddition of 1673
- large-scale synthesis of 1671
- photochemical transformation of 1672
- reactivity of 1672–1674
- retrosynthetic approach 1671
- structure of 1661
- synthesis of 1671, 1672
- pyrrocoline 1989
- pyrrole-3-carbodithioates 314
- pyrrole-2-carbonitrile 304
- pyrrole-2-carboxaldehydes 333
- pyrrole-2-carboxylates 337
- pyrrole ring synthesis 274, 275
 - Barton–Zard Synthesis 287, 288
 - cyclizations of four-carbon precursors 278–281
 - cycloaddition reactions and related approaches 289–291
 - Hantzsch Synthesis and related approaches 284
- Knorr synthesis and related routes 281–283
- miscellaneous transition metal catalyzed methods 291–293
- multi-component reactions 291
- Paal–Knorr Synthesis 275–278
- syntheses involving glycine esters 284, 285
- Trofimov synthesis 288
- Van Leusen method 285–287
- pyrroles
 - containing molecules 271
 - electrophilic attack 431
 - inverted systems 2233
 - isomeric mixture 2362
 - nitration of 299
 - polymers 274
 - protonation 294
 - resonance hybrids 5
 - ring system 2362
 - synthesis 2362, 2363
 - Vilsmeier bases 1997
- 1*H*-pyrroles 269
- 2*H*-pyrroles 269
- 3*H*-pyrroles 269
- (pyrrole-2-yl)phthalimide 342
- pyrrolidine derivatives 610
- pyrrolidines synthesis 2359–2361, 2360
- 2-(pyrrolidin-2-yl)pyrrole 308
- pyrrolizine 3
 - 3*H*-pyrrolizine 1993
 - ^1H NMR chemical shifts 1994
- pyrrolizines 1991–2002
 - cycloaddition reactions 2000
 - derivatives 2001, 2202
 - general structure and reactivity 1991
 - reactivity 1997–2000
 - reduction reactions 2000, 2001
 - relevant computational chemistry and physicochemical and spectroscopic data 1993–1994
 - relevant natural/useful compounds 1991–1993
 - ring-opening reactions 2001
 - synthesis by [3+2] approaches 1995–1997
 - synthesis by cyclization reactions 1995–1997
 - Vilsmeier reaction 1998
- 1-pyrrolizin-3-ones 1997
- pyrrolobenzodiazepine ring 2211
- pyrrolo[2,1-c][1,4]benzodiazepines (PBDs) 2181, 2210, 2212
- synthesis 2212
- synthesis from amino dithioketals 2213
- triggered by Swern oxidation 2213
- pyrroloquinoline-based alkaloids 1531

- pyrrolo[3,4-*b*]quinolines 1551
- pyrrolyl ketone 432
- pyrrolylmagnesium chloride 314
- pyrrolylmagnesium halides 314
- pyrrolylsodium 334
- pyrylium cation 1631, 1650
 - [2+1] cycloaddition reactions 1648
 - [5+2] cycloaddition reactions 1651, 1652
 - dienes in [4+2] cycloaddition reactions 1649–1651
 - dienophiles in [4+2] cycloaddition reactions 1648, 1649
 - heterocyclic systems, synthesis of 1641–1644
 - reactions with nucleophiles 1641
 - reactions with organometallic reagents 1646–1648
 - reactions with reducing agents 1654, 1655
 - reactivity of pyrylium salts 1640, 1641
 - retrosynthetic analysis 1634
 - side chain reactions 1652, 1653
 - structural parameters 1632
 - synthesis of carbocycles 1644–1646
- pyrylium cations
 - chemical behavior 1640
 - general reactivity 1641
 - reactivity 1641
- pyrylium dyes
 - synthesis 1653
- pyrylium ring
 - synthesis of 1633–1637
- pyrylium salts 1631, 1632, 1645, 1646
 - aldol-like condensation 1653
 - with ammonia 1466
 - Balaban synthesis 1635
 - catalytic hydrogenation 1654
 - mechanism of synthesis 1637
 - michael-type addition 1653
 - one-pot synthesis 1637
 - by oxidation of cyclopentadienes 1638
 - reactivity of 1640, 1641
 - reduction 1654
 - reductive amination 1655
 - stereocontrolled synthesis of dienals from 1647
 - synthesis 1634, 1635–1637, 1643
- q**
- quantum chemical methods 1078
- quaternary isoquinolinium salts 1612
- quinazoline *N*-oxides 2183
- quinazolobenzodiazepines
 - microwave-promoted synthesis 2205
- quinidine 45
- quinuimmonium cation 427
- quinoline alkaloids 1530
- quinoline resin 1569
- quinolines 1, 3, 1453, 1527, 1530, 1532, 1533, 1546, 1567
 - *o*-acylanilines plus carbonyl compounds 1537–1541
 - addition to nitrogen 1558
 - from alkynes, propargyl amines 1544–1546
 - *o*-allyl/*o*-isopropenyl-*N*-tosylanilides, palladium-catalyzed coupling of 1547–1550
 - anilines plus 1,3-dielectrophiles 1533–1537
 - benzo-fused pyridine heterocyclic compound 1527
 - C-deprotonation of 1562
 - C-heterocycle 1529
 - ¹³C NMR chemical shifts 1529
 - cycloaddition processes
 - Diels–Alder and Aza-Diels–Alder reactions 1551–1554
 - heterocycles, ring transformations of 1555–1556
 - microwave preparation of 1557
 - radical reactions 1554, 1555
 - Vilsmeier's reagent 1556
 - electrophilic reagents at carbon 1558, 1559
 - electrophilic substitution 1559
 - Friedlander synthesis of 1539
 - halogenation 1559
 - ¹H NMR chemical shifts 1528
 - metal-free method 1564
 - natural compounds 1530–1533
 - nitrogen and oxygen substituents 1559, 1560
 - NMR data 1528, 1529
 - nucleophilic additions 1567, 1568
 - nucleophilic substitution reactions 1561
 - nucleophilic substitution with hydride transfer 1561
 - nucleophilic substitution with leaving groups 1561
 - oxidation of 1560
 - with oxidizing reagents 1560
 - from oximes, azadienes 1546, 1547
 - presence of nitrogen 1528
 - quinolinium salts, cycloadditions of 1568, 1569
 - reactions of alkylquinolines 1567
 - reactions of C-metallated heterocycles 1562, 1563
 - reactions of quinoline *N*-oxides 1570
 - reactions of quinolinium salts 1567

- reactions of quinolones 1565, 1567
 - reactions with bases 1562
 - reaction with radical reagents 1564
 - reaction with reducing agents 1563, 1564
 - reactivity and tautomerism 1529, 1530
 - Reissert-type reaction 1569, 1570
 - ring synthesis of 1533
 - S_NAr reactions of 1561
 - sulfonation of 1559
 - UV data for 1529
 - vapor phase synthesis of 1536
 - from yrones, enones 1541–1544
 - 2-quinoline triflate, alkynylation 1562
 - quinolinium ion 1558
 - quinolinium salt
 - as dyes 2280
 - quinolinium salts 1529, 1569
 - 2-quinolinone derivatives
 - microwave preparation of 1557
 - 3H-quinolin-4-ones 1553
 - quinolinophanes 1533
 - quinolizinium salts 2003–2061, 2048
 - alkyl derivatives 2043, 2044
 - benzoquinolizinium salts and related systems 2052–2061
 - cation, electron densities 3, 2025
 - ¹³C NMR chemical shifts 2025
 - general structure and reactivity 2020, 2021
 - halo derivatives 2048–2052
 - hydroxy and amino derivatives 2045–2048
 - ion, feature 2038
 - physical properties 2026
 - reactivity 2038–2043
 - relevant computational chemistry, and physicochemical and spectroscopic data 2023–2026
 - relevant natural/useful compounds 2021–2023
 - synthesis 2023–2026, 2056
 - synthesis by [3+3] approaches 2026–2029
 - synthesis by [4+2] approaches 2029–2035
 - synthesis by cyclization reactions 2035–2038
 - o-quinone dioximes
 - oxidation of 1149
 - o-quinones, oximation 1144
 - quinoxaline-based antifolates 1405
 - quinoxaline-1,4-dioxides 1162
 - quinoxalines 1162
 - quinozilidine hydroiodide 2042
- r**
- racemic aziridinations
 - with ethyl diazoacetate, reaction conditions 24
 - representative catalysts for 15
 - using ethyl diazoacetate 24
 - radical [3+2] annulation reaction 610
 - radical chemistry 104
 - radical cyclizations 424–426, 609, 610
 - radical reactions 470–474
 - of functionalized epoxides 105
 - Radziszewski reaction 816
 - (R)-alkyl-2-benzofuranmethanamines
 - preparation 616
 - Raney nickel 1116
 - rearomatization 1740
 - rectifier effect 2314
 - red erythropterin 2276
 - redox molecular switch 2292
 - reductive deoxygenation of epoxides 107
 - reductive Mannich addition–cyclization mechanism 2133
 - reductive ring opening of epoxides 106
 - Reformatsky addition reaction 2124
 - regioselective indole 469
 - regioselective intramolecular Heck reaction 601
 - Reissert compounds 1612
 - Reissert–Henze reaction 1512
 - Reissert reaction 1738
 - indole synthesis 398–402
 - quinoline derivatives of 1569
 - remarkable antiplatelet 1330
 - remazol turquoise blue
 - structure 2282
 - use 2281
 - Remfry–Hull synthesis 1719
 - resin-bound amine
 - condensation 2362
 - resin-bound diazoimides 2365
 - resin-bound isonitrile 823
 - resin-capture-release strategy 391
 - resin-supported Hantzsch methodology 2363
 - retro-Claisen type rearrangement 573
 - retro-Diels–Alder fragmentation 752
 - retro-Diels–Alder reaction 867, 1452
 - retro-dipolar cycloaddition 484
 - Rh-catalyzed C–H insertion reaction 901
 - rhodium-catalyzed reaction 573
 - epoxidations of carbonyls 90
 - Rhodosporidium toruloides* 2152
 - Rho-kinase 1170
 - Rhône–Poulenc process 2103

- Rieke zinc 854
 ring-chain tautomerism 1130
 – interconversion of 2/5-oxide isomers 1130
 ring closing metathesis (RCM) 546, 1885, 2037
 – enamides 347
 ring contraction–ring expansion route (RCRE) 1189
 ring-junction nitrogen heterocycles
 – general structures 1990
 – indolizines 2003–2020
 – introduction 1989–1991
 – pyrrolazines 1991–2002
 – quinolizinium salts 2003–2061
 ring-opening reactions 2001
trans-5,6-ring system
 – construction 613
 Rink-isomitrile resin 1419
 Ritter reaction 875
 RNA synthesis 1168, 1426
 Robinson–Gabriel synthesis 824
 – of oxazoles 825
 rosefuran 543
 rotaxane 2288
 – as molecular switch 2288
 Rothemund reaction 2236
 rubyrins 2251
 Ru-catalyzed reaction 1660, 15440
 ruthenium-catalyzed intramolecular hydroamination 1880
 ruthenium-catalyzed isomerization 995
 ruthenium porphyrin catalysts 14
- S**
- saccharides
 – acid-promoted dehydration 533
 saccharins 729
 – derivatives 787
 safety-catch linkers 2344, 2354–2357
 – principle, advantages 2354
 salen catalysts with chirality at the 3-position 74
 salen-chromium complex 95
 salen(Cr) catalyst 73
 – alkene epoxidation 72
 salen metal catalysts for alkene epoxidation 70
 salen(Mn) catalyzed alkene epoxidation 74
 salens designed for biphasic systems 76
 salicylaldehydes 1669
 Samarium diiodide 782
 scanning tunneling microscopy (STM) 2314
 Schiff base complexes 898, 2261
- Schmidt reaction 1412
 Schrock carbenes. *see* titanium benzylidenes selenetanes 238
 – formation by cycloaddition 242
 – formation by ring regression 241, 242
 – reactivity 242, 243
 – synthesis 239
 – synthesis by formation of one Se–C bond 240, 241
 – synthesis by formation of two Se–C bonds 239, 240
 self-assembled complexes
 – artificial nucleotide 2295
 – tetra/trinuclear 2290
 semi-synthetic penicillins 735
 seven-membered heterocycles 1865
 – azepine derivative 1867
 – bond lengths 1870
¹³C NMR data 1874
 – computational chemistry 1869–1874
¹H NMR studies 1871, 1873
 – MOMM calculations 1871
 – natural compounds 1867–1869
 – semiempirical and *ab initio* studies 1871
 – synthesis of azepines 1878
 -- from acyclic compounds 1878, 1880–1882
 -- from cyclic compounds 1883–1885
 – synthesis of oxepines
 -- from acyclic compounds 1885–1890
 -- from cyclic compounds 1890–1896
 – synthesis of thiepines
 -- from acyclic compounds 1896
 -- from cyclic compounds 1897, 1898
 – tetrahydroazepines synthesis by RCM reactions 1879
 – valence tautomerism 1872, 1874–1878
 – valence tautomerism in 1874–1878
 sigmatropic rearrangements 397, 488, 489
 – indole ring syntheses 385
 siletanes 245, 246
 – [2+2] cycloadditions 247
 – other intramolecular cyclizations 246, 247
 – preparation from chlorosilanes 246
 – preparation from other heterocyclic compounds 248
 – reactivity 249–251
 silica sulfuric acid 1033
 silica-supported aluminium chloride 111
 silicon azoles 852–853
 silicon tetrachloride 98
 silver(I) acetate 114
 silylated acetylene
 – uses 1486
N-silylated imidazolylzinc hloride 854

- 2-silylated oxazoles 852
 – preparation of 852
 silylation 1831
 silyl dioxolanones 931
 silyl enol ethers 92, 844, 975
 silyl linker-based macrobeads 621
N-silyl-methyleneaziridine 50
 silyloxy-1,3-butadienes 1569
 2-silyloxyfuran
 – Mannich reactions 562
 silyloxyfuran, Nazarov cyclization 583
 silyloxy-furazan derivative 1151
 4-silyloxyquinolinium triflate 1568
 simple heterocycles 4
 simple ketones, benzylimines 428
 single-crystal crystallography 2246
 six-membered heterocycles 4, 1683, 1777
 – alkyliazines 1766, 1767
 – aminodiazines 1765, 1766
 – diazines N-oxides 1764, 1765
 – general reactivity 1684–1687
 – halodiazines 1770
 – hydroxydiazines 1767–1769
 – pyrazines (1,4-diazines) 1691
 -- cycloaddition reactions 1729, 1730
 -- synthesis by ring-closure reactions 1723–1729
 – pyridazines (1,2-diazines) 1688, 1689
 -- cycloaddition reactions 1700–1702
 -- synthesis by ring atom exchange 1704
 -- synthesis by ring-closure reactions 1692–1700
 -- synthesis by ring contraction 1704–1706
 -- synthesis by ring enlargement 1703
 – pyrimidines (1,3-diazines) 1689–1691
 -- cycloaddition reactions 1720, 1721
 -- one-component couplings 1719
 -- synthesis by ring atom exchange 1722
 -- synthesis by ring-closure reactions 1706–1710
 -- synthesis by ring enlargement 1721, 1722
 -- two-component couplings 1710–1719
 – reactivity of diazines 1730–1764
 – tautomerism 1687, 1688
 – triazine isomers 1777, 1778
 six-membered oxacycles 1631, 1632
 Skraup reaction 1535–1537
 Slid-supported aryl iodides 856
 small-molecular-weight compounds 2325
 small organic molecules synthesis
 – classes 2327
 S_N2 reaction 53
 sodium borohydride 1153
 sodium cyanide
 – use of 844
 sodium-glucose co-transporter (SGTL) 648
 sodium hexamethyldisilazide
 (NaHMDS) 1714
 sodium nitrite 1033
 solid-phase Fischer indole synthesis 391
 solid-phase organic synthesis (SPOS) 428
 – cyclization-assisted cleavage 2348–2352
 – linker molecules releasing one specific functional group 2344–2348
 – linkers 2343–2357
 – multidirectional cleavage strategies 2352–2357
 – schematic outline 2327
 – use 2326
 solid-phase synthesis
 – progress in 621–623
 – protocol 1090
 – of pyrimidines 1715
 solid-supported synthesis 2328
 – of 1,5-benzodiazepines 2215
 Sonogashira conditions 1562, 1838
 Sonogashira coupling reaction 407, 1125, 1599, 1838
 Sonogashira reaction 335, 458–460, 622, 860, 1485
Sophora tomentosa L 619
 Soret band 2231
 S-oxidized 1,2-oxathiolane systems
 – 1H NMR data for 967
 spiro [chroman-3,3'-($2'H$)-benzofurans]
 – synthesis 610
 spiro cyclopropyladamantane 137
 spiroepoxide 104
 3-spiro-fused benzofuran-2($3H$)-ones 601
 spiropyrrolidinylloxindoles 320
 split-mixed technology 2328
 SR141716A derivatives 646
 stabilized iodonium ylide 933
 π -stacking interactions 2286, 2287
 4-stannylated azoles
 – preparation of 854
 5-stannylimidazoles 854, 862
 3-stannylisoquinoline *N*-oxide 1598
 stannylisoquinolines 1598
 stanozolol 649
 Staudinger [$2\pi+2\pi$] cycloaddition 2131
 Staudinger reaction 2121–2124, 2209, 2210
 steric effects 2255
 steric sensors 62
 Stetter reaction 1035
 [1,2]-Stevens rearrangement 503
 stibetanes 254

- stilbene oxide 95
 Stille couplings 862
 – of chloropyrazines 1761
 – cross-coupling 462, 463
 Stille process 2050
 [2,3]-Stille–Wittig rearrangement 620
 stoichiometric organometallic reagents
 – use of 861
 stoichiometric silver(I) oxide
 – use of 862
Streptomyces aureus 42
Streptomyces ficellus 12
Streptomyces griseofuscus 11
Streptomyces jamaicensis 1688
Streptomyces violaceoniger 1688
Streptomyces xanthocidens 1688
 strychnine, Shibasaki's total synthesis 401
 styrene aziridination, reaction conditions
 for 16
 styrene monomers
 – copolymerization 2330
 (R)-styrene oxide 79
trans-styrylpyrazoline derivative 1063
 5-styrylthiadiazoles
 – with CO₂ 1323
 6-substituted-3-methyl-2-pyrones 1661
 5-substituted-3-methyl-1,2,4-thiadiazoles 1291
 1-substituted 3-acyl-1,2,4-triazoles 1030
 α-substituted alkynylphospholes
 synthesis 2107
 2-substituted amino derivatives 895
 1-substituted-3-aminoisoquinolines 1580
 1,5-substituted 3-aminopyrazole-4-carboxylic
 esters 1210
 3-(N-substituted)-aminoquinolin-2-ones 1565
 2-substituted aniline 881
 o-substituted benzaldimines 26
 5-substituted-2,1-benzisoxazoles 765
 3-substituted 2,1-benzisoxazoles
 synthesis 768
 2-substituted benzothiazole derivative 885
 1-substituted 1*H*-benzotriazole
 – physical and chemical properties of 1009
 1-substituted benzotriazoles 1010
 – synthesis of 1011
 – synthetic utility of 1016
 2-substituted benzotriazoles 1011
 5-substituted-1-(benzyloxy)-1*H*-1,2,3-triazoles
 – catalytic hydrogenation of 1007
 4-substituted-3,5-bis(trifluoromethyl)-4*H*-
 1,2,4-triazoles 1205
 5-substituted-4-carbaldehyde-1,2,3-triazole
 derivatives 991
 1-substituted-4-carboxylic acid imidazoles
 – synthesis of 823
 1-substituted-3,5-diaryl-4,5-dihydro-1*H*-
 pyrazoles 663
 2-substituted-4,5-dicyanoimidazoles
 – preparation of 820
 N-substituted dihydroazepines 1881
 2-substituted 5,7-diphenyl-1,3,4-thiadiazolo
 [3,2-*a*]pyridilyum derivatives 1351
 2-substituted-1,3-dithiolanes
 – with NBS 964
 2-substituted-1-hydroxybenzimidazole-3-
 oxides 1164
 1-substituted imidazoles
 – phosphorylation of 840
 2-substituted indoles
 – one pot synthesis of 407
 2-substituted isothiazolin-3-ones
 bromination 788
 2-substituted nitrobenzene 397
 4'-substituted-3'-nitrophenylsydnone 1074
 o-substituted nitrosoarenes
 – cyclization of 1143
 β-substituted-oazidostyrenes
 – thermolysis of 405
 2-substituted-1,3,4-oxadiazoles 1226
 5-substituted-1,3,4-oxadiazolin-2-ones 1222
 2-substituted 1,3-oxathiolanes 979
 5-substituted 1,3-oxathiolanes 976
 6-(4-substituted-phenyl)-2-
 diphenylverdazylum salts 1838
meso-tetra-substituted porphyrin 2259
meso-substituted porphyrins 2265
 4-substituted-4*H*-pyrans synthesis 1647
 N-substituted pyrrole 5
 2-substituted-5-stannylazoles 854
 5-substituted-1,3,4-thiadiazole-2-
 thiones 1357, 1358
 1,4-substituted-1,2,3-triazole-peptide
 compounds 997
 1-substituted-1,2,3-triazoles 1005
 N-substituted-1,2,3-triazoles
 – nucleophiles 1006
 Sugawara synthesis 404
 sulfides, oxidation of 1211
 sulfinylfuran, nucleophilic substitution 553
 sulfonamides 735, 1313
 sulfonation 700, 886
 – of pyrrole 299–301
 N-sulfonyl-2-imidazolines 878
 2-sulfonylimino-2*H*-1,2,4-thiadiazolo[2,3-*a*]
 pyridine derivatives 1330
 N-sulfonylpyridinium salts 1470
 sulfonylurea 1691

- sulfoxide 1215, 1374
 sulfur atom
 – soft nucleophiles attack 1314
 sulfur-mediated asymmetric epoxidation of
 benzaldehyde 89
 sulfur-mediated epoxidation of
 benzaldehyde 89
 sulfur ylide methodology 26
 sultams 729
 superoxide dismutase
 – enzyme model 2301
 Suzuki–Miaura cross-coupling 460–462
 Suzuki reactions 335, 862, 1484, 2049
 – conditions 1421
 – coupling reactions 335, 1416, 1485,
 1756, 1761, 2123
 – cross-coupling reactions 618, 789
 – on imidoyl chlorides 2198
 – reductive debenzyloxycarbonylation
 sequence 1584
 Swern oxidation
 – of *N*-protected amino alcohol 2212
 sydnone ring 1057
 – electron impact mass spectra of 1056
 sydnone system 1060
 – acidhydrolysis of 1060
 – carbonyl stretching frequencies of 1055
 – cycloaddition reactions of 1071
 – frontier orbital energies and coefficients
 for 1054
 – photosensitized oxidation of 1063
 – ring cleavage of 1060
 sydnonimines
 – alkaline hydrolysis of 1060
 – $^1\text{H}/^{13}\text{C}$ spectra of 1055
 sydnonyl-substituted α,β -unsaturated
 ketones 1068
 synthetic indigo 2278
- t**
 TADDOL complexes 937
 talampanel, synthesis 2220
 tandem Nef reaction 1740
 tautomeric equilibria of some monofunctional
 azines 1687
 tautomerism 642–644, 733, 734
 Te electrophiles 1066
 telluretanes 244
 tellurium-containing porphyrins 2235
 TentaGel polymers 2340, 2341
 – features 2341
 TentaGel resins 2340, 2341
 terpenes 101
 tertiary ammonium salts 938
 2,3,4,5-tetraalkyl-1,3,4-oxadiazolidines 1199
 2,3,6,7-tetraarylbenzo[1,2-*b*:4,5-*b*]difurans
 (BDFs) 627
meso-tetra-aryl porphyrins 2266
 tetrabutylammonium bromide (TBAB) 116,
 1214
 tetrabutylammonium fluoride (TBAF) 32,
 1826
 tetrabutylammonium monopersulfate 70
 tetracationic derivative
 – π -stacking interaction 2288
 tetrachlorobenzyne 325
 tetrachloroethylene, uses 959
 tetracyanobisisimidazole 859
 tetracyanoethylene (TCNE) 1364, 1911
 tetralhalocyclopropenes 1703
 2,5,6,7-tetrahydroazepine 1886
 1,2,3,4-tetrahydroderivatives 1574
 tetrahydrofuran (THF) 1, 1493
 tetrahydro-1*H*-indazoles
 – dehydrogenation 691
 4,5,6,7-tetrahydro-2*H*-indazoles 690
 2,3,4,5-tetrahydro-1,3,4-oxadiazoles 1171,
 1199
 2,3,4,5-tetrahydroxepines 1886
 4,5,6,7-tetrahydroxepines 1887, 1889
 tetrahydropyran 1899
 tetrahydropyridazines 1702
 1,2,3,4-tetrahydropyridine 2
 1,2,3,4-tetrahydroquinolines
 – with zinc borohydride 1563
 2,3,4,5-tetrahydro-1,3,4-thiadiazoles 1365
 tetrahydro-1*H*-s-triazolo[4,3-*d*][1,4]
 benzodiazepin-2-ones
 – synthesis 2207
 5-(1,2,3,4-tetrahydroxybutyl)-3*H*-[1,3,4]
 oxadiazole-2-thione 1196
 tetrakis(pyridine)cobalt(II) dichromate
 (TPCD) 741, 2008
 tetrameric porphyrin assembly 2293
 1,1,3,3-tetramethoxypropane 1710
 tetramethyl ethylenediamine (TMEDA) 536
 tetramethylurea (TMU) 116
 tetranactin synthesis 568
 tetranitromethane 95
 tetraphenanthroporphyrin synthesis 2248
 1,1,4,4-tetraphenyl-2,3-*O*-isopropylidene-D-
 threitol (TADDOL) 81
 tetra phenyl porphyrins (TPPs) 2231
 tetrapropylammonium perruthenate
 (TPAP) 1022
 – oxidation of the hydroxyl group 1124
 tetrapyrrolic pigments 2231
 tetrapyrrolic systems 2232, 2233

- tetrasubstituted imidazoles
 - preparation of 821
- tetrathiafulvalene derivatives 2309
 - as TFTs 2310
- tetrathiafulvalene (TTF) system 947, 957
 - 2-methylsulfanyl-1,3-dithiolylum iodide 962
 - synthesis of 957–960
- 1,2,4-tetrazine 1839
- tetrazines 3
 - physicochemical and spectroscopic data 1835, 1836
 - reactivity 1838
 - cycloaddition reactions 1839, 1840
 - reactions with nucleophilic reagents 1838, 1839
 - reactions with oxidizing reagents 1840
 - relevant computational chemistry 1835
 - relevant natural and useful compounds 1836, 1837
 - synthesis 1837, 1838
 - tautomerism 1836
- 1,2,4,5-tetrazines. *see* tetrazines
- 1,2,4,5-tetrazines derivatives
 - X-ray crystallographic analysis of 1835
- tetrazole compounds, uses 1402
- tetrazole ring 1405
- tetrazoles 1401
 - acid chlorides as substrates 1406
 - acylation reactions of 1423
 - amides as substrates 1403–1406
 - from amidines, carbodiimides, carbonimidic dichlorides, isocyanates 1414, 1415
 - arylation of 1424
 - benzylation of 1422
 - from β -keto esters 1413
 - as catalysts 1426
 - C-phenyltetrazoles 1425
 - from cyclic ketones 1414
 - derived from proline 1427
 - electrophilic addition 1421
 - with epoxides 1425
 - five-membered ring aromatic compounds 1401
 - fused, multi-component syntheses of 1420
 - isocyanides as substrates 1410, 1411
 - from isothiocyanates, isocyanides, nitrilium salts, oxazolones and thiocyanates 1414, 1415
 - from ketones 1413, 1415
 - ketones as substrates 1412–1414
 - Michael addition reactions of 1423
 - under microwave conditions 1418
 - microwave syntheses 1416–1418
 - multicomponent reactions 1418–1420
 - nitriles as substrates 1406–1410
 - orthoesters as substrates 1411, 1412
 - oximes as substrates 1411
 - reactions at C5 1420, 1421
 - reactions at N1 and N2 1421–1425
 - reactions of 1420
 - ring as ortho-directing group 1425
 - under solid-phase conditions 1415, 1416, 1417, 1419
 - solid-phase syntheses 1415, 1416
 - synthesis of 1403, 1404, 1406, 1407, 1408
 - synthetic methods 1402, 1403
 - tautomers of 1402
 - Ugi reaction 1418
 - using 1402
 - as catalysts 1426
 - multiple components 1419
 - nucleotide coupling 1426
 - PEG 1417
 - tetrazolo[1,5-*a*]pyrimidines
 - thermolysis 677
 - Theonella* aff. *mirabilis* 12
 - thermal decomposition 46
 - thermolysis 47
 - thiacyclohexan-3-one 1901
 - thiadiazine dioxide 1267
 - thiadiazole 1263
 - 1,2,3-thiadiazole
 - geometry of 1255
 - photochemical decomposition of 1273
 - pyrolysis of 1275
 - thermal decomposition of 1276
 - 1,2,4-thiadiazole 1288, 1309
 - 1,3,4-thiadiazole
 - Fukui functions for 1333
 - heterocyclic ring, reactivity of 1374–1382
 - mass spectrometry 1338, 1339
 - in medicine and agriculture 1385–1388
 - NMR spectroscopy 1336
 - reactions of substituents 1382–1385
 - reductive and oxidative processes 1372–1374
 - ring cleavage reactions 1367–1372
 - ring systems 1331, 1332
 - synthesis of
 - 2,3-dihydro-(Δ^2), 3,4-dihydro-(Δ^3), and 2,3,4,5-tetrahydro-1,3,4-thiadiazoles 1361–1366
 - 2-oxo/2-thio mesoionic 1,3,4-thiadiazoles 1349–1354
 - 1,3,4-thiadiazoles 1340–1349

- thiadiazolinones, thiadiazolinethiones, and thiadiazolimines 1355–1361
- theoretical aspects 1332–1334
- thermodynamic aspects 1339, 1340
- UV/ESR/IR spectroscopy 1336–1338
- X-ray diffraction 1334–1336
- 1,2,4-thiadiazole[2,3-*a*]pyridinium salts
- structure of 1289
- 1,2,3-thiadiazole-4-carbonylhydrazide derivatives
- base-catalyzed ring cleavage of 1277
- 1,2,3-thiadiazole derivatives 1269
- 1,2,4-thiadiazole derivatives 1308
- 1,3,4-thiadiazole derivatives 1361
- Mannich reaction of 1377
- 1,3,4-thiadiazole-2(3*H*)-thiones
- thiocarbonyl moiety of 1380
- 1,2,4-thiadiazole nucleus 1328
- 1,2,4-thiadiazole 4-oxides
- mass spectra of 1297
- 1,3,4-thiadiazole ring systems 1257, 1266, 1331
- 1,2,3-thiadiazoles 1253, 1254, 1257, 1258, 1281, 1282, 1285, 1286
- in agriculture 1286
- alkylation of 1283
- base-catalyzed decompositions 1276–1279
- ^{13}C NMR spectral data 1258
- cornforth-type rearrangement 1281, 1282
- Dimroth rearrangement 1280, 1281
- elaboration of 1269
- electron-impact mass spectra of 1258, 1296
- heterocycles of 1253
- transformations of 1266–1268
- heterocyclic ring, reactivity of 1283–1285
- Hurd–Mori synthesis 1259–1262
- mass spectrometry 1258, 1259
- in medicine and agriculture 1286, 1287
- methylation of 1284
- NMR spectroscopy 1257, 1258
- Nold synthesis 1265, 1266
- oxidative and reductive processes 1282, 1283
- Pechmann synthesis 1265, 1266
- photolysis of 1274
- proton NMR data for ring hydrogens of 1257
- reactions with nucleophiles 1285, 1286
- reactivity of 1269
- rearrangement processes 1279, 1280
- ring cleavage reactions 1270–1276
- solid-phase synthesis of 1262
- structural aspects 1254, 1255, 1256
- synthesis of 1265
- theoretical studies 1255, 1256
- thermolysis of 953
- UV/IR spectroscopy 1258
- Wolff's synthesis 1262–1265
- Wolff's synthesis of 1262
- X-ray diffraction 1256, 1257
- X-ray structures of 1256
- 1,2,4-thiadiazoles 1273, 1289, 1294, 1306, 1310, 1316, 1328
- aromatic ring reactivity 1311–1316
- Δ^2 -1,2,4-thiadiazolines, reactions of 1317–1320
- Δ^3 -1,2,4-thiadiazolines, reactions of 1320, 1321
- Δ^4 -1,2,4-thiadiazolines, reactions of 1321, 1322
- IR/UV spectroscopy 1296
- mass spectrometry 1296, 1297
- in medicine 1328–1331
- NMR spectroscopy 1294, 1295
- properties of 1291
- reactions of substituents 1322–1328
- reactivity 1310, 1311
- ring systems 1287
- structure of 1288–1291
- synthesis of 1306–1310
- Δ^2 -1,2,4-thiadiazolines 1300–1305
- 1,2,4-thiadiazolidines 1297–1300
- theoretical studies 1291–1293
- 1,2,4-thiadiazolidines, reactions of 1317
- weak bases 1311
- X-ray diffraction 1293, 1294
- 1,3,4-thiadiazoles 1332, 1345, 1386
- electronic spectra of 1336
- ^1H NMR signals of 1336
- IR absorption spectra for 1338
- Mulliken population analysis of 1334
- preparation of 1341
- reducing and oxidizing agents 1372
- 1,2,3-thiadiazoles, monocyclic 1275
- thiadiazoles, types 1253
- 1,2,3-thiadiazole system 1259, 1269, 1279, 1367
- ring cleavage reactions 1270
- 1,2,4-thiadiazole system 1287, 1290
- cephalosporins 1329
- 1,3,4-thiadiazole system 1367
- 1,2,4-thiadiazol-5(2*H*)-iminium chlorides 1330
- 1,3,4-thiadiazolidine 1366
- thiadiazolidinediones 1329
- 1,3,4-thiadiazolidine-2-thiones 1340
- 1,2,4-thiadiazolidone system 1298
- 1,2,4-thiadiazoline nucleus

- equilibrium geometry parameters 1292
- 1,2,3-thiadiazoline products 1266
- thiadiazolines 1294, 1321
 - *ab initio* calculations 1292
 - with trichloroacetonitrile 1320
- 1,3,4-thiadiazolines
 - synthesis of 1362
 - thermolysis of 1372
- 1,3,4-thiadiazolin-2-ones 1339, 1355
- 1,3,4-thiadiazolium cations 1331, 1354
- 1,2,4-thiadiazolium ion 1310
- 1,3,4-thiadiazolium-3-methanide 1,3-dipoles 1380
- 1,3,4-thiadiazolium perchlorates 1352
- 1,2,4-thiadiazol-3-one 976
- 1,3,4-thiadiazolo[3,2-*a*]pyrimidines 1370
- 1-(1,2,3-thiadiazol-5-yl)-1*H*-1,2,3-benzotriazole 1269
- thiazole 839
 - electron-releasing substituent 838
- 1,3-thiazole
 - nomenclature and numbering 811
- thiazole analogs 860
- 1,2-thiazole, bicyclo[3.3.1]tetrasiloxane 1
- thiazole moiety 862
- thiazole reduction 866
- thiazoles 842, 846
 - synthesis of 809, 827
- thiazoles derivatives
 - β -hydroxythioamides, cyclodehydration of 873
- thiazoles synthesis 830, 833, 2372–2374
- thiazolidine 888
- 1,3,4-thiazolidine-2,5-dione
 - oxidation of 1374
- 1,2,4-thiazolidine *N*-oxide
 - formation of 1295
- thiazolidinones 942, 1291
- thiazolines
 - synthesis of 879
- Δ^4 -thiazolin-2-ones
 - alkylation of 898
- thiazolylmagnesiums metalated
 - bromine-magnesium exchange 851
- thiazolyl peptides
 - synthesis of 851
- thiazolyl triflates 860
- 4-thien-2-yl furoxans
 - hydroxylamine in aqueous KOH 1156
- thiepane 1901
- thiepane 1,1-dioxide 1866
- thiepanes synthesis 1898
- thiepan-2-one 1901
- thiepan-3-one 1901
- thiepine 1,1-dioxide 1866, 1870
- thiepines 1870, 1871
 - reactivity 1958
- and benzofused derivatives 1958–1968
- partially reduced derivatives 1968–1975
- thietanes 214, 215
 - cleavage, reactions 237, 238
- electrocyclic reactions 235, 236
- natural and bioactive compounds 215
- physicochemical data 215
- reactions with bases 233, 234
- reactions with electrophilic reagents 231
- reactions with metal complexes and salts 234, 235
- reactions with nucleophilic reagents 233
- reactions with oxidizing agents 231, 232
- synthesis 216–221
 - synthesis by [2+2] cycloaddition 228–230
 - synthesis by formation of C–C bond 221
 - synthesis by formation of S–C bond 216–221
 - synthesis by formation of two S–C bonds 221–224
 - synthesis from other sulfur heterocycles 224–228
- thietan-2-ones, oxidative ring expansion 970
- thiiranes 109
 - from alkenes 113
 - desulfurization 116, 117
 - from epoxides 110–112
 - from halo ketones 113, 114
 - nucleophilic ring opening 114–116
 - properties 109–110
 - reactivity 114–117
 - synthesis 110–114
- thiiranyl acetal 114
- 1-thioacyl hydrazine
 - thermal cyclization of 1349
- 1,3-thioalcohols 968
 - chlorination of 967
- thioanilides 885
- ortho*-thioaniline 1556
- thiobenzoylthioglycolic acid
 - reacts with acetic anhydride 951
- 1,1'-thiocarbonyldiimidazole (TCDI) 1355
- thiocarbonyl sulfides
 - cycloaddition of 940
- thiocyanate 112
- thiocyanuric acid 1820
- thioformaldehyde
 - frontier molecular orbital theory 1256
 - frontier molecular orbital theory prediction of 1256
- thiohydrazides 1351

- thioketenes 1273
 – formation of 1270
 thiolactam formation 2194
 thione 1209
 2-thione 1,3-oxathiolane derivative 975
 thiopeptide antibiotic 1532
 thiophene oligomers 2309
 – as TFTs 2309
 thiophenes synthesis 266–2369
 thiophene-thiazole oligomer 2309
 thiophenol 97, 1196
 2-thiopyridazines 1710
 thiopyrylium synthesis 1644
 thiosemicarbazides
 – cyclodesulfurization of 1181, 1182
 thiostrepton 1532
 5-thiosubstituted-1,3,4-thiadiazol-2-yl-2-carbamates 1384
 thiourea 896, 1718
 thiourea-based organocatalyst 443
 thioxo-dithiocarbamates
 – acid-catalyzed cyclization of 950
 2-thioxo-1,3-dithioles
 – dethi oxygenation of 959
 – electron-withdrawing groups 959
 thyrotropin releasing hormone (TRH) 1405
 tin azoles 853–854
 tin-promoted cyclizations 424
 tin zeolite 1901
 titania-supported gold nanoparticles 99
 titanium-based catalysts 935
 titanium benzylidenes 621
 titanium binolate catalyst 33
 titanium-catalyzed Markovnikov hydroamination 394
 titanium enolates 889
 titanium-mediated benzofuran synthesis 615
 TMEDA 2338
 toddquinoline, isolation 1531
 tofisopam 2181
 toluene 38
p-toluenesulfonamide 14, 15
para-toluenesulfonic acid (PTSA) 693
N-(*p*-toluenesulfonyl)imino-phenyliodinane 344
 1-(*p*-toluenesulfonyl)pyrroles 311, 333
N-toluenesulfonyl-1,2,3,4-tetrahydropyridine 73
 4-toluenesulfonyl chloride 904
 o-tolyl analog 27
p-tolylsulfonyliminopyridinium ylides 1491
 TosMIC reagents
 – structures of 819
 TosMIC route 827
 tosylacetophenone
 – transfer hydrogenation of 934
N-tosyl aziridine 31
N-tosylimines 346
 tosylmethyl isocyanide (TosMIC) 818
 toxic α -halocarbonyl compounds
 – use of 833
 traceless strategy 2366
 trans aziridino epoxide 18
 transition-metal carbonyls 782
 transition metal catalyzed benzofuran synthesis
 – 2,3-disubstituted benzo[*b*]furans
 synthesis 596–607
 transition metal catalyzed reactions 457–470
 – C–N bond-forming reactions 463, 464,
 511, 512
 – cross-coupling reactions with organometallic
 reagents 460
 – direct alkenylation, alkynylation, and
 arylation reactions 509–511
 – palladium-catalyzed cross-coupling
 reactions, considerations on 457
 – pericyclic reactions 512, 513
 – reactions with alkenes and alkynes, Heck
 reactions 457, 458
 – Sonogashira reaction 458–460
 – Stille cross-coupling 462, 463
 – Suzuki–Miyaura cross-coupling 460–462
 transmetallation of pyrrolylsodium 314
 trapping reagent 2081
 Traube's oxazomalonic acid 1051
 trialkylaluminium 1762
 trialkyloxonium tetrafluoroborate 1733
 trialkylstannyl-1,3-azoles 861
 trialkylstannylisoquinoline derivatives 1598
 triallyl cyanurate 1819
 triallyl isocyanurates 1819
 2,4,6-triaryl(alkyl)oxy-1,3,5-triazines 1820
 1,3,5-triaryl-hexahydro-1,3,5-triazines 1828
 triazapentadienium iodides 1823
 1,3,5-triazine 936
 triazines 3
 1,2,3-triazines 1778
 – computational chemistry 1778, 1779
 – physicochemical and spectroscopic
 data 1778, 1779
 – reactivity
 -- cycloaddition reactions 1788–1790
 -- Direct Diels–Alder reactions with fullerene
 C₆₀ 1792
 -- reactions with electrophilic reagents
 1784, 1785
 -- reactions with nucleophilic
 reagents 1785–1788

- reactions with oxidizing reagents 1790–1792
- reactions with reducing reagents 1790
- thermal and photochemical reactions 1783, 1784
- relevant natural and useful compounds 1779–1781
- synthesis
 - cycloaddition of [3+3] fragments 1782
 - cycloaddition of [5+1] fragments 1782, 1783
 - cycloaddition of [6+0] fragments 1783
 - from pentacycles 1782
 - from tricycles 1781
- 1,2,4-triazines 1792
 - computational chemistry 1792
 - physicochemical and spectroscopic data 1792–1794
 - reactivity 1805
 - cycloaddition reactions 1809–1811
 - Diels–Alder reaction 1812
 - metallation and intramolecular inverse Diels–Alder strategy 1811
 - with nucleophilic reagents 1807–1809
 - with oxidizing reagents 1811
 - reactions with electrophilic reagents 1806, 1807
 - with reducing reagents 1811
 - thermal and photochemical reactions 1805, 1806
 - relevant natural and useful compounds 1795–1797
 - synthesis
 - cycloaddition of [3+3] fragments 1799
 - cycloaddition of [4+2] fragments 1799–1803
 - cycloaddition of [5+1] fragments 1803
 - cycloaddition of [6+0] fragments 1803–1805
 - from more than two fragments 1805
 - from other heterocycles 1797, 1798
 - tautomerism 1795
 - 1,3,5-triazines 1812
 - mass spectra of 1815
 - ^{15}N NMR spectroscopy 1815
 - physicochemical and spectroscopic data 1812–1815
 - reactivity 1830
 - cycloaddition reactions 1833, 1834
 - with electrophilic reagents 1830, 1831
 - of metallated 1,3,5-triazines 1835
 - with nucleophilic reagents 1831–1833
 - with oxidizing reagents 1834, 1835
 - with reducing reagents 1834
 - thermal and photochemical reactions 1830
 - relevant computational chemistry 1812–1815
 - relevant natural and useful compounds 1816–1819
 - synthesis 1819–1829
 - of *N*-amino and *N*-oxide 1,3,5-triazines 1829
 - of hydro-1,3,5-triazines 1827–1829
 - of 1,3,5-triazines and mono-, di- and tri- 2-, 4-, 6-substituted derivatives 1820–1823
 - of 1,3,5-triazinones and 1,3,5-triazinthiones 1823–1827
 - tautomerism 1815, 1816
 - triazinetrione 1827
 - 1,3,5-triazine-2,4,6-triones 1825
 - 1*H*-1,2, 4-Triazol-3-amines 1029
 - 1*H*-1,2,3-triazol-5- amines
 - azides with acetonitrile derivatives 1001
 - 1,2,4-triazol-3,5-diones
 - dehydrogenation of 1032
 - 1,2,3-triazole 1009
 - $^1\text{H}/^{13}\text{C}$ NMR spectra of 989
 - 1*H*-1,2,3-triazole 989
 - 1,2,4-triazole compounds 1025, 1029
 - $^1\text{H}/^{13}\text{C}$ NMR spectra of 1018
 - ^1H NMR spectra of 1017
 - 1,2,3-triazole derivatives, synthesis 996
 - 1,2,4-triazole-3,5-diamine derivatives
 - novel one-pot synthesis of 1024
 - 1,2,3-triazole formation
 - via 1,3-dipolar cycloaddition 991
 - 1,2,4-triazole-3-ones 1022
 - 1*H*-1,2,3-triazole reacts 1008
 - nitration of 1008
 - 1,2,4-triazole ring
 - pharmaceutical products 1018
 - 1,2,3-triazoles 989
 - α,β -unsaturated systems 998–1000
 - acidic cleavage 997
 - active methylene compounds
 - reactions of azides and hydrazines 1000–1002
 - *N*-arylation of 1007
 - β -lactam antibiotics, structure of 991
 - 1,3-dipolar cycloaddition, of azides to alkynes 991–998
 - electrophilic reactions 1008
 - hydrazone, oxidation/cyclization of 1002, 1003
 - natural products 990
 - NMR data 989, 990
 - preparation methods 1003–1005

- reactions of carbon 1005, 1006
- reactions of nitrogen 1006–1008
- synthesis 990, 991
- tautomeric structures of 990
- 1,2,4-triazoles 1017, 1018, 1028, 1030
- acylhydrazines with nitrogen-containing reagents 1018–1020
- *N*-alkylation of 1028–1030
- carbene reactions of 1031, 1032
- carbons of 1030
- C-substitution by triazolylolithium 1030, 1031
- halogenation reactions of 1032
- hydrazones, reactions of 1021–1023
- natural compounds 1018
- oxadiazoles/thiadiazoles, reactions of 1023, 1024
- physicochemical data and NMR data 1017, 1018
- radical reactions of 1031
- reactions on nitrogen 1028
- reagents 1033–1035
- semicarbazides reactions 1026, 1027
- synthesis of 1018, 1019, 1027, 1028
- oxadiazoles 1023
- 1,2,4-triazoles via benzotriazole methodology 1027
- tautomerism of 1017
- 1,2,4-triazoles from thioureas, thiocyanates, and thioamides 1024–1026
- urazoles 1032, 1033
- 1*H*-1,2,3-triazoles 1006, 1007
- lithiation of 1005
- triazole synthesis 992
- Δ^2 -1,2,4-triazolin-5-ones 1024
- 1,2,4-triazolium salt catalysts 1034
- [1,2,3]triazolo[5,4-*a*][1,4]benzodiazepines
 - multicomponent synthesis 2203
- [1,2,4]triazolo[4,3-*a*][1,5]benzodiazepines synthesis 2218
- 1,2,3-triazoloheterocycles 1003
- 1*H*-1,2,3-triazol-5-ols
 - azides with malonic esters and amides 1001
- 1,2,3-triazolo[4,5-*b*]pyridin-4 (7*H*)-thione 1267
- 1,2,3-triazolopyrimidine diones 1004
- 1,2,4-triazolospiro compounds 1021
- 2,4,5-tribromoimidazole 838
- tributylammonium fluoride (TBAF) 33
- tributyl phosphite 33
- 4-tributylstannyl imidazole
- palladiumcatalyzed coupling of 862
- tributyltin hydride 117
- tributyl(3,3,3-trifluoro-1-propynyl)stannane
 - 1,3-dipolar cycloaddition of 993
- 2,2,2-trichloroacetyl chloride 840
- 3-trichloroacetyl-4,5-dihydrofuran
 - aromatization 545
- 2-(trichloroacetyl)pyrrole 303, 304
- trichloroisocyanuric acid 1032
- trichloromelamine 1818
- 3-trichloromethyl isomer 1112
- 5-trichloromethyl-1-phenyl-1*H*-pyrazoles 662
- 2,4,6-trichlorotriazine, uses 964
- Trichovirin I derivatives 52
- trickier approach 2097
- 2,4,6-tricyano-1,3,5-triazine 1834
- tricyclic benzimidazo derivatives 1299
- tricyclic 1,5-benzodiazepines 2217
- tricyclic derivatives 465
- tricyclic fused-1,3,4-oxadiazole systems 1200
- tricyclic heterocycle 19
- triethylamine–tetrahydrofuran mixture 1125
- triethyl orthoformate 1346
- 4-(triethylsilyl)oxazoles 853
- triflic acid 1824
- trifluoroacetic acid 92
- trifluoroacetic acid (TFA) 1265, 1416, 2244
- trifluoroacetic acid solution
 - benzene ring 1601
- trifluoroacetic anhydride (TFAA) 1057, 1724, 1901
- trifluoromethanesulfonic acid (TfOH) 903
- trifluoromethanesulfonic anhydride 1578
- 3-(trifluoromethyl)-4-aryl-furazans, synthesis 1140
- trifluoromethylated propargylic alcohols
 - cycloaddition of 996
- 2-trifluoromethylated quinolines 1544
- trifluoromethyl diazirines 126
- trifluoromethyl hemiaminal 25
- trifluoromethylphenylazirine 45
- trifluoromethylphenyl derivative 647
- 4-trifluoromethyl-substituted quinoline 1550
- 2,2,2-trifluoro-N-(4-phenyl-1,2,5-oxadiazol-3-yl)acetamide
 - irradiation of 1186
- trifluoropropanone (TFP) 138
- 2,4,6-trifluoro-1,3,5-triazine 1832
- 2,4,6-trihalotriazines 1833
- 1,3,5-trihydroxycyanuric acid 1826
- triisopropylsilyl (TIPS) 294
- 1-triisopropylsilyl-(E)-2-(2-phenylsulfinylvinyl) pyrrole 327
- 1-triisopropylsilyl-3-iodopyrrole 335
- 1-(triisopropylsilyl)pyrrole 305

- 2,4,6-trimercapto-1,3,5-triazine (TMT) 1818
 trimerization of cyanogen chloride 1820
 1,3,3-trimethyl-6-azabicyclo[3.2.1]octane
 (TABO) 1537
 trimethylsiloxy cyclohexadiene 54
 4-(trimethylsiloxy)pyrrolidine-2-one 339
 trimethylsilyl azide (TMSN₃) 994, 1406
 trimethylsilyl cyanide (TMSCN) 32, 92
 o-[(trimethylsilyl)ethynyl]phenyl acetates
 – *in situ* coupling/cyclization 597
 2-(trimethylsilyl)-2*H*-1,2,3-triazoles 1006
 3-trimethylsilylmethyl-1,3,4-thiadiazolium
 trifluoromethanesulfonates
 – synthesis of 1354
 trimethylsilylmethyl
 trifluoromethanesulfonate 1191, 1376
 2-(trimethylsilyl)thiazole 853
 – use of 853
 2-(trimethylsilyl)ethoxymethyl 1006
 trimethylsulfonium iodide 25
 1,3,3-trinitroazetidine 164
 1,3,5-trinitrobenzene 1158
 1,2,4-trioxolanes
 – Lewis acid treatment of 927
 triphenyl-1,3-dithiol-2-yl azide,
 thermolysis 760
 triphenylmethyl chloride 115
 triphenylmethyl hydroperoxide (T_iOOH) 78
 triphenylphosphine 92, 106, 1404
 – used as nucleophilic catalyst 837
 triphenylphosphine dibromide 27
 triptamines synthesis 503
 2,4,6-tris[di(*t*-butoxycarbonyl)nitromethyl]-
 1,3,5-triazine 1833
 tris(*p*-bromophenyl) ammonium
 hexachloroanitimonate (TBAH) 2262
 tris(dimethylamino)sulfonium
 difluorotrimethylsilicate (TASF) 399
 tris(pyrrol-2-yl)alkanes 307
 1,3,5-tris(1,2,3-thiadiazolyl-4-yl)
 benzene 1279
 tris(trimethylsilyl)silane (TTMSS) 1554
 2,4,5-trisubstituted azoles, synthesis 832
 2,2,4-trisubstituted 1,2-
 dihydroquinolines 1536
 1,5-trisubstituted-1*H*-1,2,3-triazoles
 – preparation of 997
 trisubstituted imidazoles 842
 1,4,5-trisubstituted imidazoles 818
 2,4,5-trisubstituted imidazoles
 – *N*-alkylation of 820
 trisubstituted indoles
 – solid-phase synthesis 420
 2,4,5-trisubstituted oxazoles
 – synthesis of 824
 2,4,6-trisubstituted pyrimidines 1716
 trisubstituted 1,2,3-triazoles 995
 3,4,5-trisubstituted triazoles 1027
 1,2,4-trisubstituted urazoles 1019
 Tröger's bases 708
 tropinones 103
 tropiporphyrin 2243
Trypanosoma cruzi 1167
 tryptamine analog
 – one-pot synthesis 417
 tryptophan 383, 477
 Tsuji–Trost reaction 449
 tunable BOX-mediated asymmetric
 aziridination 22
 tungsten Fischer dienyl carbenes 692
 tyrian purple 2276, 2278
 – structures 2277
- U**
- Ugi 4CC/S_NAr sequence
 – 1,4-benzodiazepine-2,5-diones
 synthesis 2193
 Ugi four-component condensation
 (4CC) 2188, 2190, 2192
 – 1,4-benzodiazepine-2,5-diones
 synthesis 2191
 – plausible mechanism 2190
 Ugi reaction 822, 884, 2129, 2369
 Ullmann conditions 859
 Ullmann reactions 860
 Ullmann-type arylation couplings 1030
 ultrasonic irradiation 1058
 unnatural enzyme models 2300–2304
 α,β-unsaturated enones
 – Michael addition–aldol condensation
 reactions 549
 α,β-unsaturated imines 927
 α,β-unsaturated ketone 433
 α,β-unsaturated oxathiolanes
 – titanium tetrachloride mediated reaction
 of 980
 α,β-unsaturated oximes
 – nitrosation 655
 N-unsubstituted imidazoles
 – behavior of 814
 N-unsubstituted pyrazole-4-
 carbaldehydes 657
 N-unsubstituted 1,2,3-triazoles 989, 991,
 995, 998
 unsymmetrical 3-substituted furan
 – regioselective oxidation 564
N-(uracil-6-yl)-*S,S*-diphenylsulfilimine
 1003

- urea-hydrogen peroxide adduct (UHP) 129
 UV absorption bands 626
 – of diazines vs. pyridine 1686
 UV light 1064
 UV spectroscopy 774, 2045
 – of 1*H*-azepine 1873
 UV-Vis light 1439
- v**
 vacataporphyrin 2246
 VAPOL phosphoric acid derivative 35
Venturia inaequalis 1388
 versatile ligand 2232
 vicarious nucleophilic substitution (VNS)
 process 1739
 – of hydrogen 399
 vicinal aminoalcohols 899
 vicinal bis(arylsulfonylhydrazones) 1002
 vicinal diamines 875
 Vilsmeier formylation 2015
 Vilsmeier–Haack conditions 535
 Vilsmeier–Haack reaction 302, 381, 701
 Vilsmeier–Haack reagent 308, 657
 Vilsmeier reagent 1556, 2255
 Vilsmeier salts 1999
 vinamidium salts 1534
 Vindoline 1218
 (–)-vindoline synthesis 484
 N-vinyl-2-azetidinones
 – three-step synthesis 2143
 vinyl azides 45, 1141
 6-[(4-vinylbenzyl)propylamino]-1,3,5-triazine-
 2,4-dithione (VBATDT) 1815
 S-vinyl-*N,N*-dialkylthiocarbamates 950
 vinyl esters 931
 vinylic fluoride 1580
 vinylidene intermediate
 – nucleophilic capture 606
 3-vinyldoles
 – enantioselective organocatalytic [4+2]
 cycloaddition 513
 – intramolecular Diels–Alder reactions 485
 vinylnitrenes generation 772
 vinylpalladium intermediate 426
 vinylphosphonate Michael acceptor 1034
 von Braun–Rudolph reaction 1403
- w**
 Wacker-type process 406
 Wadsworth–Emmons reactions 1123
 Wallach's reaction 818
 Wang resin 824, 2034, 2359
 Wang resin-bound 1,2,4-oxadiazole 1115
 Wang resin derivatives 28
- Wang-supported nitrile oxide, uses 1108
 water–borane complex 33
 water-soluble alkenes 67
 Watson–Crick base pair interactions
 2294
 Weinreb amides 851, 2353
 Weintraub reaction 1071
 Westphal condensation product 2035
 Westphal process 2034
 Westphal reaction 892, 2029, 2030, 2054
 Wipf–Miller cyclodehydration synthesis 826
 Wittig-like intramolecular reaction 423
 Wittig olefination 2161
 Wittig reactions 47, 552, 955, 1067, 2001
 Wolff rearrangement 1059
 Wolff's methodology 1264
 Woodward–Hoffmann rules 1876
 Woodward method 2026
 Woodward's total synthesis
 – of cephalosporin C 2149
- x**
 xanthphos ligand 1004
 xenobiotics 1867
 XPD^{II}(CO)OR-activated alkyne 600
 X-ray analysis 2097
 X-ray crystallography 638, 2322
 X-ray crystal structure analysis 2080, 2108
 X-ray diffraction analysis 538, 1135, 2023
 xylenes 881
 D-xylose
 – use of 1195
- y**
 yellow xanthopterin structures 2276
 ylide/haloanion approach to aziridines 26
 ylides 25
 ylidine-*N*-phenylhydrazine-
 carbothioamides 1198
 ynamines, cycloaddition 976
 yttrium triflate 1094
- z**
 zinc chloride 1712
 zinc–copper reduction 29
 3-zincobenzofurans 607
 zinc-mediated couplings 863
 zirconacyclopentanes 1826
 zirconium tetrachloride–sodium
 borohydride 105
 zwitterionic 6-diazocyclohexa-2,4-
 dienone 1054
 zwitterionic structures 1048

