## Subject Index, 1972

(+)-Abscisic acid, revision of the absolute stereochemistry of, 1190

Acenaphthylene system, comparison of external and internal photochemical heavy-atom effects in, 306

Acenaphthylenes, 1-substituted, photodimerizations in solution and in the solid state, 1267

Acetaldehyde, chain formation in the y-radiolysis of deareated ethylene glycol, 187

oxalodihydrazide, and copper(II) ions, structure of the oxygenated condensation product between, 1163

Acetals from ring expansion of steroid oxetans, 713

Acetamide, NN-dimethyl-, abstraction of an acetyl group from, by a rhodium-porphyrin complex, 1261

Acetic acid, 1:1 complex with deoxycholic acid, crystal structure determination, 530

acid fragments, method for their introduction. Reductive cleavage of succinic esters, 1214

anhydride and acetic acid, carbon-bonded palladium(II) chelates of, synthesis and X-ray structure, 910

Acetic trifluoromethanesulphonic anhydride, dissociation into acetylium ion, 1345

Acetone, hexafluoro-, and 19F nuclear magnetic resonance of adducts with phosphetans. Relative apicophilicities of groups, 554; stereochemistry of acetalization with a bromohydrin, 99, 296

Acetonitrile, amino-, microwave spectrum, 995

anodic oxidation of hydroquinone in, evidence for a oneelectron intermediate, 427

N-t-butylimino-, dimerization, 244

Acetophenone, p-nitro-, photolysis. Unusual formation of an azoxybenzene, 895

3-O-Acetyl-1,2:4,5-di-O-isopropylidene-α-D-glucoseptanose, X-ray crystallographic study, 98

Acetylene, production by laser-generated atomic carbon, 110 Acetylenedicarboxylate, dimethyl, attempted cycloaddition with. New reaction of mesoionic 1,3,4,-thiadiazoles, 1300

dimethyl, reaction with aryl radicals: new aromatic annelation process, 1318

dimethyl, reactions with zerovalent palladium complexes; ligand effects on the formation of palladiacyclopentadiene complexes, 629

Acetylenes, monosubstituted, synthesis of 3-monosubstituted s-tetrazines and their reactions with, 950

terminal, linear dimerisation with: Ziegler-type systems as catalysts for hydrosilylation, 1272

Acetylium ion, formation from ambident base acetic trifluoromethanesulphonic anhydride, 1345

Acids and alcohols, long chain, having alkene unsaturation in positions 3, 4, or 5; new procedure for their identification, analysis, and isolation, 12

aromatic, anomalous product of reductive silylation, 1338 **Acridine** 10-oxides, photolyses; synthesis of dibenzo[c,f]-1,2oxazepines as primary stable photo-products, 1093

Acrylic esters, α-acylamino-, general synthesis, 1322

Acrylonitrile,  $\beta\beta$ -dichloro- $\alpha$ -amino-, 705

Acyl migrations, degenerate, in pyrazole chemistry. Degenerate group movements, 709

Synthesis of a [4,2,2]-propellane Acyloin condensation.  $(tricyclo[4,2,2,0^{1,6}]decane)$  derivative, 96

Acyloins, preparation and photolysis: a new acylation of pyrroles and indole, 77

Adamantane, 1-acetamido-, and 1-acetamido-4-phenylbicyclo-[2,2,2]octane, reactions with sodium hydroxide in ethylene glycol and diethylene glycol, 188

2-methyl-, Lewis acid-catalysed conversion of homoadamantene into, 1030

Adamantanes, methyl, enhanced axial-equatorial enthalpy differences, 1210

Adamantanones. Mechanism of the Wolff rearrangement of α-diazohomoadamantanone: evidence against oxiren participation, 694

Adamantene, and its dimer, 1186

Adamantyl, tetrasila-, silicon-centred radical, formation and selectivity, 1249

**1-Adamantyl**  $\beta$ -D-glucopyranoside steric acceleration in acidcatalysed hydrolysis. Origin of high rates of hydrolyses of tertiary glycosides, 414
2-Adamantyl "Hypoiodite", novel rearrangement: one step

synthesis of oxa-adamantane, 311

Adirubine: a novel carboxy-indole alkaloid, 1007 Aeroplysinin-2, a dibromolactone from marine sponges Aplysina (Verognia) aerophoba and Ianttella sp., 674

Alanine, 3-(3-carboxyphenyl)-, phenylalanine, and tyrosine, steric course and rearrangements in their biosynthesis from shikimic acid in higher plants, 842

or glycine combined with sarcosine in cyclic tetrapeptides; co-existence of neutral and protonated species, 255

Alcohol, oxidation to co-ordinated carboxylate with a dioxygen complex of ruthenium. Examples of reversible hydrogen transfer to an isocyanide ligand, 458

Alcoholic hydroxyl functions, two sulphur-containing protecting groups for, 766

Alcohols and acids, long chain, having alkane unsaturation in positions 3, 4, or 5; new procedure for their identification, analysis, and isolation, 12

novel photochemical reaction in the presence of an olefin and 2-aminobenzenethiol, 209

sterically hindered alcohols, synthesis of olefins from, by pyrolysis of thiocarbonate O-esters, 1215

Alcohololysis,  $\sigma\text{-}2\text{-}\mathrm{acetoxyalkyl}(\mathrm{pyridine})\mathrm{cobaloximes},$ of further evidence pertaining to the mechanism of, 1183

Aldehydes and isocyanates, reaction between, catalysed by metal carbonyls, 484

and ketones from thioacetals, 382

aromatic, as dienophiles, 739

olefinc, stereochemical course of their cyclization, 956

unsaturated, new synthesis, 757

unsaturated, synthesis by sequential Claisen and Cope rearrangements, 248

 $\alpha\beta$ -unsaturated, addition to quinone systems: new annelation reaction, 955

E- and Z-Aldimines, 183

**Aldoximes**, dehydration of using 2,4,6-trichloro-s-triazine (cyanuric chloride), new route to nitriles, 1226

Alkali-metal ions, effect on the torsional barrier in amides, 1099

ions, detection via optical rotatory dispersion: sensitive test for sodium in the presence of lithium and potassium, 1229

tetrafluorocobaltates(III) and their use as fluorinating agents for organic compounds: direct conversion of benzene into hexafluorobenzene, 1028

Alkaloids. Absolute configuration of the alkaloid cularine: an X-ray structure determination, 1072

Absolute configuration of some spirobenzylisoquinoline alkaloids, 310

Adina: Deoxycordifoline,  $3\alpha,5\alpha$ - and  $3\beta,5\alpha$ -tetrahydrodeoxycordifoline lactam, 1006

Adirubine: a novel carboxy-indole alkaloid, 1007

Aromatic hydroxylation in quinoline alkaloids. Biosynthesis of skimmianine from dictammine, and a convenient synthesis of furanoquinoline alkaloids, 1029

Biomimetic synthesis and structure of the bisindole alkaloid alstonisidine, 697

Biomimetic synthesis of the bisindole alkaloid macralstonine, 1346

Biomimetric synthesis of the bisindole alkaloid villalstonine,

Crystal structure of the hemihydrochloride of coccinellin, the defensive N-oxide alkaloid of the beetle Coccinella septempunctata, a case of symmetrical hydrogen bonding,

indole, application of modified Polonovski reaction to total synthesis, 930

Molecular conformation of (+)-tubocurarine chloride, a monoquaternary curare alkaloid, 1174

Alkaloids—continued

Nemuarine, a bis-isococlaurine alkaloid, 980

Nuclear magnetic resonance evidence for the stereochemistry of the indole alkaloids roxburghine B and E, 785

Ring B bridged diterpene, new synthesis of a crucial intermediate, 883

Stereochemistry of the  $\beta$ -hydroxyleucine unit of frangulanine,

Synthesis of the hasubanan ring system from the alkaloid reticuline, 288

Total synthesis of the alkaloid ( $\pm$ )-dendrobine, 1252

Total synthesis of the isoquinoline alkaloid ( $\pm$ )-xylopinine by thermolysis, 675

Two isoquinoline alkaloids with a methylenoxy-bridge, 408 X-Ray crystallographic determination of the structure of the alkaloid serpentinine, 871

X-Ray study of the structure of the alkaloid C-curarine, 805 Alkane-alkyne pair from Nectandra rubra: constitutions of rubrenolide and rubrynolide, 514

Alkanes, nitro-, action on benzofuran, 1040

Alkanethiols, long chain, reaction with p-nitrophenyl acetate; catalysis by stearyltrimethylammonium bromide, 1131

Alkene formation via aluminium trichloride-induced elimination from benzyl alkoxides, 679

Alkoxides, fluorinated, of chromium(v) and vanadium(IV), 944 α-Alkoxybenzyl hydroperoxides, base catalysed dehydration: applications to zwitterion trapping reactions in ozonolysis,

Alkyl bromides, factors affecting trans/cis olefin ratios in elimination reactions, 561

halides, stoicheiometry and synthetic utility of reaction with lithium dihydronaphthylide, 752

iodides, solvent effects on carbon-13 chemical shifts. Deshielding of carbon-13 nuclei by attached iodine atoms, 724 nitroxide radical-anions, primary, and alkylpentacyanocobalt nitroxide, 1087

-substituted nitroxide radical, decomposition, 1142

Alkylation, dienolate, steric course of; solvent dependency, 282 Allene, reaction with dodecatrienylnickel; formation of muscone,

trimer complexes of hexacarbonyldi-iron, X-ray molecular structure, 157

Allenes, acyclic, methoxythallation, 1129

cyclic, short-lived, platinum(0) complexes, 178

photoaddition to benzene, 664

vinyl-, new synthesis, 866
Allenic hydrocarbons, synthesis from 1-halogenoallenes and dialkylcopperlithium reagents, 593

Allenyl ketones, steroidal, synthesis, 241

prostaglandins, synthesis, 904 (+)-Allethronyl (+)-trans-c (+)-trans-chrysanthemate 6-bromo-2,4dinitrophenylhydrazone, configuration and structure by X-ray methods. Absolute configuration of the pyrethrins, 1275

Alloxazine, new synthesis, 503

Allyl aryl ethers, oxidative cyclisation to 3-chromanols, 618 -propynyl ammonium cations, base-catalysed rearrangement and a novel synthetic route to substituted biphenyls, 556; base-catalysed rearrangements in protic media, 557

 $\pi$ -Allyl nickel halides, preparation from nickel vapour, 50

Allylic alcohols, photolysis of diazocarbonyl compounds in: new preparation of bicyclic lactones, 822

halides carrying electron-withdrawing substituents in the  $\gamma$ -position, nucleophilic substitution reactions. Formation of cyclopropanes from dimethyl 2-bromo-2-methylpropylidenemalonate, 375

methyl sulphide, evidence against the significance of C-S hyperconjugation in determining conformation, 824

radicals from simple olefins adsorbed on hydrogen mordenite catalyst: electron spin resonance study, 1282

Allylthioalkylcarbenes,  $\alpha$ - and  $\beta$ -, intramolecular reactions, 62 Allylthioalkyl diazoalkanes,  $\alpha$ - and  $\beta$ -, intramolecular cycloadditions, 63

Alstonisidine, the bisindole alkaloid, biomimetic synthesis and structure, 697

Alternariol and lichexanthone; biogenetic-type syntheses of heptaketide natural products, 953

Alumina, sterochemistry of hydrolysis and elimination reactions of toluene-p-sulphonate esters on, 281

Aluminium. Crystal and molecular structure of di-μ-(tri-carbonyl-π-cyclopentadienyltungsten-OO')bisdimethylaluminium, 650

determination of co-ordination number in some compounds of magnesium and: a comparison of X-ray photoelectron (ESCA) and X-ray emission spectroscopies, 1198

dicarbonyl, infrared spectroscopic evidence for, 338

Exhaustive methylation by trimethylaluminium, 595

Molecular structure of dimethylaluminium fluoride tetramer by electron diffraction, 708

Molecular structure of dimethyl(cyclopentadienyl)aluminium

monomer in the gas phase by electron diffraction, 1300 Non-Saytzeff dehydration of 2-methylpentan-2-ol over  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, 1330 Polyiodine cations. Preparation and nuclear quadrupole

resonance characterization of tri-iodine and penta-iodine tetrachloroaluminates,  $I_3$ +AlCl<sub>4</sub>- and  $I_5$ +AlCl<sub>4</sub>-, 779 t-butoxide, monomeric, and lithium triethylborohydride, as

the active intermediates in the reductive opening of tetrahydrofuran and related ethers by the triethylborane induced reaction of lithium tri-t-butoxyaluminohydride, 868

trimethyl-, dinitrogen and carbonyl-complexes as bases towards, 536

Amide cations, spectrophotometric confirmation of tautomerism in concentrated sulphuric acid, 527

hydrolysis, evidence for a first order mechanism, 525

hydrolysis, rate-determining proton transfer in intramolecular catalysis by the carboxylic acid group, 570

Amides, aliphatic and aromatic, acid-catalysed hydrolysis: evidence for differences in interpretation of mechanism, 720 neutral, explanation for their ambident nucleophilic properties: imidate-amide rearrangement, 303

protonated, ultraviolet spectral properties: question of the site of protonation, 179

O-protonation in dilute acids, 793

secondary, effect of lanthanide-shift reagents on the nuclear magnetic resonance spectra, 1134

secondary, new method for preparation of hydroxamic acids from, 1222

torsional barrier in, effect of alkali-metal ions, 1099

**Amines,** N-acyl- $\beta$ -hydroxy-, formation of  $\Delta^2$ -oxazolines by cyclization of, on zinc acetate. Oxazoline complex of zinc acetate, 639

aromatic, and carbon monoxide, new selenium-triethylamine catalysed synthesis of arylureas from, 307

photochemical addition to diarylcyclopropanes, 1170 secondary aliphatic, reaction with 2-nitrothiophen, 1060

secondary, photolysis of azidobenzo[b]thiophens in, 879 Sulphene-tertiary amine zwitterions: intermediates in the multiexchange of hydrogen in a sulphene reaction, 1313

Amino-acid derivatives, gas-liquid chromatographic separation, 1092

 $enol-ether, antimetabolic, from {\it Rhizobium japonicum}: structure$ of rhizobitoxine, 714

ether, new, from Rhizobium japonicum: dihydrorhizobitoxine,

guanidine-containing, streptolidine, crystal structure, 652

sequence of gamma crystallin, 437 α-Amino-acids, asymmetric synthesis from diastereomeric metal-imine complexes, 750

new synthesis: α-amination of carboxylic acids, 623

Amino-acids, RCH<sub>2</sub>COOH, and related alcohols, simple method for selective isotopic hydrogen labelling of, 135
Amino-diester, hindered, synthesis and anticancer properties,

925

Amino-ethers, chiral crown, versatile synthesis, 107 Amino-sugar, novel branched chain, from the antibiotic

vancomycin. Vancosamine, 361

β-Aminovinyl ketones, phenyl, photochemical reactions, 775 Ammonia, catalytic synthesis by graphite-alkali metal complexes containing transition-metal chloride, 176

Reaction path for the proton transfer NH<sub>4</sub>+/NH<sub>3</sub>; an *ab inito* SCF-LCAO-MO study, 817

Ammonium ions, tetra-alkyl-, entropies of transfer from water to methanol, dimethylformamide, and acetonitrile, 888 Amylose, "V" helix, conformation, 41

 $\beta$ -Amyrin derivative, isomerisation to an  $\alpha$ -amyrin derivative,

Androgens, 7,19-disubstituted, synthesis: potential oestrogen precursors, 7

Anhydropenicillin V, fungal metabolite of: phenoxyacetylthioglycyl- $(\pm)$ -valine, 478

Aniline, diethyl-, and phenol, electron-rich aromatic compounds, photochemical reaction with chloroform, 812

NN-dimethyl-, and condensed aromatic hydrocarbon moieties, intramolecular exciplex formation in some compounds containing, 1009

2,3-dinitro-, mechanism of nitration in aqueous sulphuric acid. Evidence for Bamberger's hypothesis of N-nitration followed by rearrangement, 641

N-methyl-, reaction with N-nitrosodiphenylamine—a direct transnitrosation, 518

Anilines, ortho-acyl-, reaction with α-halogenometallic compounds: synthesis of indoles, 415

new photosensitive protecting group for: quantitative photo-decarbonylation of formanilides, 758

para-substituted, inversion barriers in, from ab initio molecular orbital theory, 669

Anilinofumarate, dimethyl, lead tetra-acetate oxidation, 917 Anisole, shielding effects of the diphenylmethanol substituent in certain derivatives: a method for determination of the site of metallation, 54

Annelation, aromatic, new: reaction of aryl radicals with dimethyl acetylenedicarboxylate, 1318

[22] Annulene, tetra-t-butyldidehydro-, 1003

tetra-t-butyltetradehydro-, 431 [17]Annulenone, 8,11-imino-2,5:14,17-diepoxy-, 807

**Ansa** macrolides, new antileukaemic, from *Mayltenus buchananii*; maytanprine and maytanbutine, 1065

Anthracene, stereochemistry of reductive alkylation, 546

Anthraquinone, dihydro-, novel pigment from Morinda lucida Benth: oruwal, 405

pigments in Dermocybe, biosynthesis, 102

Antibiotic, macrolide; total synthesis of  $(\pm)$ -pyrenophorin, 1031

macrolide, new: structure of YC-17, 744

Antibiotic X-537A, crystal and molecular structure of a derivative of the free acid of, 967 incorporation of [1-13C]butyrate: 13C nuclear magnetic

resonance study, 161

**Antibiotics.** Aphidicolin antibiotic, X-ray crystallographic determination of structure: a tetracyclic diterpenoid containing a new ring system, 1027  $\beta$ -lactam, substituted  $\alpha$  to the  $\beta$ -lactam carbonyl, general

method for synthesis, 1138

macrolide, chemical ionization mass spectra, 796 new: validamycins, unsaturated cyclifol part, 746

structure of the antibiotic validamycin A, 747

Antimony. Hexachloropentalenyl bis(hexachloroantimonate),

Preparation of XeOF<sub>3</sub>+Sb<sub>2</sub>F<sub>11</sub>- and XeO<sub>2</sub>F+Sb<sub>2</sub>F<sub>11</sub>nuclear magnetic resonance and Raman spectra of XeOF<sub>3</sub>+ and XeO<sub>2</sub>F+, 607

reaction with fluorosulphuric acid and antimony pentafluoride, 40

Tetrachlorostibonium(v) undecafluorodiantimonate(v); crystal structure and action as an aromatic chlorinating

trifluoride, substitution of dimethylamino-groups by, 324

Aphidicolin, antibiotic, X-ray crystallographic determination of structure: a tetracyclic diterpenoid containing a new ring system, 1027

Apopinene, preparation of 4-alkylated derivatives, 1110

Apo-polyphenol oxidase, insolubilized, determination of nanogram amounts of copper by activation of, 502

Aprotic solvents, thermodynamics and kinetics of ion-pair formation in, 1157

Arene epoxides, aromatization (NIH-shift); differentiation between the concerted and stepwise mechanisms, 784 -sulphene adduct, formal, thermal retro-Diels-Alder extrusion of sulphene from, 700

Arenes, conversion into cyano-arenes  $\emph{via}$  co-ordination to manganese(I), 330

lithium, metallation of aryl ethers by, 869

Aromatic carbon-hydrogen bonds, photo-induced insertion of bis- $\pi$ -cyclopentadienyltungsten into, 1114

compounds, fluorinated, long-range carbon-fluorine scalar coupling in some, 1158

Aromatic substitution, electrophilic, electron transfer as the first step, 1058

Aromatic substitution—continued

nucleophilic; unusual course of Hem's synthesis of diaryl ethers, 358

**Arsenic.** Crystal and molecule structures of bis[tetracarbonyldiphenylmethylphosphinemanganese(0)] and carbonyldimethylphenylarsinemanganese(0)], 1251

Crystal structure of Hg(SCN)2, As(C6H5)3, a three-co-ordinate mercury complex, 1043

Arsine complexes, tertiary, and tertiary phosphine complexes of transition metals, use of <sup>13</sup>C nuclear magnetic resonance spectroscopy in determining their stereochemistry, 151

Aryl nitrenes, addition to olefins, 1160

radicals, reaction with dimethyl acetylenedicarboxylate, new aromatic annelation process, 1318 radicals, reaction with 1,2,3-benzothiadiazole, 590

Athrotaxin, a C<sub>17</sub>-phenolic constituent from Athrotaxis selaginoides Don., 246

 $(\pm)$ -Atrovenetin, synthesis, 93

Azabenzoisocoumarins, new synthesis, 1237

7-Azabenzonorbornadienyl radical anion, rearrangement, 591 Azabullvalene, reaction with nonacarbonyldi-iron, 1156

Aza-compounds, six-membered aromatic, in neutral methanol, mechanism of formation of semiquinone radicals by u.v. irradiation; and of radical cations by u.v. irradiation of sixmembered aromatic diaza-compounds in methanol acidified with hydrochloric acid, 1207

Azides and nitrenes, triplet aryl, reaction with molecular oxygen, 964

aryl, thermal reaction with arylsulphinylamines, 702

3-Azidotropone, crystal and molecular structure, 101 Azimines as 1,3-dipoles, 688

2H-Azirene, equilibration with vinylnitrene, 565

Azirenes, aryl-, photocyclodimerization to 1,3-diazabicyclo-[3,1,0]hex-3-enes, 409 Aziridine and  $[N^{-2}H]$ aziridine, observation of temperature-

dependent <sup>1</sup>H nuclear magnetic resonance spectra in the gas phase, 582

N-chloro-2,2-diphenyl-, optically active: compounds with molecular asymmetry due solely to a tercovalent nonbridgehead nitrogen atom, 1138

cycloaddition to ketens, 199

dissociation: mild thermal route to phthalimidonitrene adducts, 884

ring expansion in a retro-Diels-Alder reaction. Diazo-compounds in heterocyclic synthesis, 485

Aziridinone, an, X-ray crystallographic structure determination. Demonstration of a non-planar arrangement at

nitrogen in an α-lactam, 43

Aziridinyl ketones, directed asymmetric induction on, 551

Azomethine imines, 1,5-versus 1,3-dipolar reactivity, 806
Azonine, N-acetyl- and N-dimethylcarbamoyl-, thermal cycloaddition on to, 325

anion (1-azacyclonona-2,4,6,8-tetraenide), 149

Azoxybenzene, hexamethyl-, acid-catalysed transformation. An unusual product in the Wallach rearrangement, 1259

Azoxy-system, modified photochemical reactivity arising from homoconjugative interaction with, 867

Barbaratone, photochemical cycloaddition with benzophenone,

Barium thiocyanate complex of the cyclic poly-ether dicyclohexyl-18-crown-6 (isomer A), X-ray crystal structure, 90 Batrachotoxin, steroid, synthesis of its ABC ring system, 622

Benzaldehyde, products of photolysis in solution, 1321

Benzanilide, o-nitro-, photo-rearrangement, 835

2-Benzazocine derivative, thermal and photochemical rearrangements, and X-ray crystal structure, 680

Benzene anions, perfluoro- and nitro-, effect of substituents upon their autodetachment lifetimes, 476

azoxy-, unusual formation. Photolysis of p-nitroacetophenone, 895

catalytic hydrogenation by lamellar compounds  $C_8 K$  and C<sub>24</sub>K, 928

clathrate, Hofmann's, infrared spectrum, 307

derivatives, ortho-substituted, synthesis of heterocycles by photochemical cyclisation of, 126

direct conversion into hexafluorobenzene: alkali-metal tetrafluorocobaltates(III) and their use as fluorinating agents for organic compounds, 1028

Benzene—continued

and olefin cationic complexes of copper(1) trifluoromethanesulphonate, 559

photoaddition of allenes, 664

photochemical reaction with 1,1-diphenylethylene, 418

photoreaction with 1,2-dichloroethylenes, 769

rings in paracyclophane derivatives, rotation studied by nuclear magnetic resonance spectroscopy, 754

some 1,2,3,4-tetramethyl-derivatives, unusual nitration, 340 and substituted benzenes, deuterium isotope effects on <sup>13</sup>C chemical shifts in, 67

trinitro-, and dinitrothiophen derivatives, inverted relationship between stability and rate of formation of Meisenheimer-type adducts, 1143

Benzenediazonium chloride, reaction with perfluoroalkyl carbanions, 618

Benzenes, fluoro-, fluorine nuclear coupling constants: influence of the orbital term on  $J_{meta}^{FF}$ , 939

substituted, <sup>13</sup>C spin-lattice relaxation in, 47

Benzenesulphonyl hydrazide, 2,4,6-tri-isopropyl-, as a hydrogenating agent, 1132

Benzenethiol, 2-amino-, and an olefin, novel photochemical reaction of alcohols in presence of, 209

2,4,6-tri-t-butyl-, displacement of a nitro-group from 2,2-diphenyl-1-picrylhydrazyl in its reaction with, 482

Benzhydryl bromide, decafluoro-, carbanionic character.
Behaviour towards nucleophiles, 943
Benzil, mono-thio, thermal "ene" addition to 2-methylpent-

2-(and-1-)-ene, 1167

Benzilic acid, reverse rearrangements in cyclopropenes, 377 Benzimidazoles and benzoxazoles, synthesis. Novel heterocyclization method, 108

anti-2,7-Benzobicyclo[3,2,1]octene derivatives, Properties of derivatives of tricyclo  $[6, n, 0, 0^{2,7}]$  tri-2, 4,6-enes. Abnormal reactions of toluene-p-sulphonic acid with 8,12dimethyl- and 8-methyl-tricyclo [6,4,0,02,7] tri-2,4,6-en-1-ols, 1238

Benzo[c]cinnolines, formation of biphenylenes by thermal extrusion of molecular nitrogen from, 1219

Benzocyclobutene, 1,2-dihydro-, ("benzocyclobutene"), novel route to 3-derivatives, 840

to o-quinone dimethide, stereoselectivity of the electrocyclic process, 1034

steric course of formation by thermal desulphonylation of 1,3-dihydrobenzo[c]thiophen 2,2-dioxide, 541

1H- and 5H-2,3-Benzodiazepines, photolysis, 827

Benzofuran, action of nitroalkanes on, 1040

Benzofurazans, novel preparation, and formation of phospholimine by thermolytic rearrangements of N-(o-nitroaryl)-1,2,5-triphenylphospholimines, 1242

Benzoheterocycles via aryne C-C cyclisation: 2-methylisoindole, 397

Benzohomotropylium cations, 2,8-polymethylene-, preparation, 472

Benzoic acid, 2,4-hydroxy-3,6-dimethyl-, (3-methylorsellinic acid), isolation from a culture of Aspergillus terreus, 391

Benzophenone, photochemical cycloaddition of barbaralone, 1016

2-Benzopyran-3-one adducts, photodecarboxylation, photoreactions of the derived o-quinodimethanes, 1038

Benzoquinone, 2,3-dichloro-5,6-dicyano-, rearrangements of the gibbane skeleton during dehydrogenerations with, 442

1,4-Benzoquinone 2,3-dimethyl-5-(3-methylbut-2-enyl)-, [plastoquinone-1], molecular structure of a unique photoproduct of, 743

 $2.\overline{5}$ -di-t-butyl-, reaction with n-propylamine, 78

1,2,3-Benzothiadiazole, reaction with aryl radicals, 590

**Benzo**[b]thiepins, a class of  $12\pi$ -electron heterocycles, synthesis, 1232

Benzo[b]thiophens, azido-, photolysis in secondary amines,

Benzotriazole, 1-chloro-, oxidation of sulphinamides with, 151 Benzoyl peroxide and azobis-isobutyronitrile initiated thermal polymerizations of N-vinylcarbazole in solution, 22

Benzyl alcohol, o-hydroxy-, condensation of cyclohexane-1,3-diones with. Synthesis of 3,4-dihydro-1(2H)-xanthenones,

alcohols, substituted, oxidation with ferrate(vi) ion, 38

Benzyl-continued

alkoxides, alkene formation via aluminium trichlorideinduced elimination from, 679

fluoride, products of insertion of diarylmethylenes into, differential effects of radical g-factors on polarization of <sup>1</sup>H and <sup>19</sup>F nuclei, 1323

fluorides, reactions with diphenylmethylene, chemically induced dynamic nuclear spin polarisation in products: novel effects arising from intramolecular interactions of polarised <sup>1</sup>H and <sup>19</sup>F nuclei, 475

radicals,  $\alpha$ -fluoro-, dimerization; mechanistic evidence from chemically induced dynamic polarization of  $^{10}{\rm F}$  nuclei, 1324 Benzylaminoacetonitriles, rearrangement in the synthesis of

isoquinolines from, 643

Benzylic carbon, means of stereospecific isotopic labelling at: palladium-calatysed ring opening of oxazines, 1152 **Benzylidene**, o-nitro-, carbohydrate derivatives, photochemical

rearrangement. Route to partially protected sugars, 532 Benzyne displacement reaction, novel, 707

1-diethylaminopropyne, cycloaddition,

diazanorcaradienes, 1171 Beryllium. Crystal structure of potassium amidoberyllate, 916

allo-Betulone triterpenoid, exhaustive Baeyer-Villiger oxidation, 755

Beyer-15(16)-en-12-one system, acid-catalysed rearrangement product of, X-ray crystal and molecular structure, 196 Biacetyl triplets, deactivation by cyanocobaltate(III) complexes,

Bicarbonate anion, unprecedented nucleophilic displacement by, and its implications in the oxidation of alkyl toluene-psulphonates with dimethyl sulphoxide-sodium bicarbonate, 257

Bicyclobutanes, palladium(II)-catalysed rearrangement; direct observation of intermediate complexes, 471

Bicyclo[1,1,0]butanes, simple, evidence for stepwise bond cleavage in the transition-metal promoted isomerizations of, 80

Bicyclobutylidene, 642

Bicyclo[3,3,2]decane, preferred conformation: crystal structure of 7,8,9,10-tetrahydro-6,10-propano-6H-cyclopenta[b]quinoxaline, 1127

Bicyclo[7,1,0]decane, 10,10-dibromo-, thermal rearrangement,

Bicyclo[4,3,1]dec-1(10)-ene derivative as an intermediate in the solvolysis of 10,10-dibromotricyclo[4,3,1,01,6]decane: evidence, 1231

Bicyclo[3,2,0]hepta-1,4-diene, 3-thia-, 1014

Bicyclo[4,1,0]heptanes, 1-(morpholino)-7-chloro-7-phenyl-, isomeric, rearrangement. Question of quasi-enamine reactivity of aminocyclopropanes, 659

Bicyclo[3,2,0]hepta-1,4,6-triene, fulvenallene, and ethynylcyclopentadiene, pressure dependent formation of, in the pyrolysis of 1,2-diethynylcyclopropane, 49

Bicyclo[3,2,0]hept-3-ene-2,7-dione, 1-aza-, a correction, 547 Bicyclo[3,2,0]hept-2-en-6-one, 7-exo-chloro-7-isopropyl-, rearrangement: conformation and reactivity in 2-chlorocyclobutanones, 997

Bicyclo[3,2,0]hept-2-en-6-ones, 7-chloro-7-methyl-, substitution vs. rearrangement in importance of C-7 stereochemistry, 333

Bicyclo[3,1,0]hex-2-enes, external vs. internal cyclopropyl bond cleavage in their photosensitized epimerization, 33

Bicyclo[2,1,1]hexanes, substituent effects in their thermal rearrangement, 716

Bicyclo[3,3,1]nonan-3-one, endo-7-aminomethyl-, aprotic diazotization, 564

Bicyclo[6,1,0]nona-2,4,6-triene, 9-aza-, and derivatives thereof, 531

Bicyclo[6,1,0]nona-2,4,6-trienes, syn- and anti-9-methyl-, product characterization in thermal bond-relocation, 399

Bicyclo[4,2,1]nona-2,4,7-trien-9-one, Wolff-Kishner reduction. Tricyclo [6,1,0,04,9] nona-2,6-diene (homosemibullvalene),

Bicyclo[5,1,0]octadienyl anion, photochemical behaviour, 352 Bicyclo [2,2,2] octane, 1-acetamido-4-phenyl-, and 1-acetamidoadamantane, reactions with sodium hydroxide in ethylene glycol or diethylene glycol, 188

4-methyl-2,6,7-trioxa-: a convenient ring current probe, 1101

Bicyclo[5,1,0]oct-3-ene, 8,8-dibromo-, action of methyllithium on. Preparation and reactions of some endotricvclo[3,2,1,0<sup>2,4</sup>]octane derivatives, 523

Bicyclo[2,2,1]pyridazine carboxylates, aziridino-, synthesis of 1,4-dihydropyridines by rearrangement of, 1260

Bilirubin, photo-oxidation in hydroxylic solvents: propent-dyopent adducts as major products, 596

regiospecificity in photochemical additions. Photo-induced reaction of 2-vinylbiladienes-a,c with the disulphide bond, 1301

Bilirubin IX-α, direct evidence for acid-catalysed isomeric

scrambling of, 117

Biphenyl, a disulphide-bridged; crystal structure of 5H,8Hdibenzo[d, f][1, 2]dithiocin, 985

Biphenylenes, formation by thermal extrusion of molecular nitrogen from benzo[c]cinnolines, 1219

Biphenyls, substituted, novel synthetic route to; basecatalysed rearrangement of allyl-propynyl ammonium cations, 556

Bipyrazol-4-ylidene (tetra-azafulvalene), new derivatives, 961 Bipyridyl-type ligands, manganese(II) complex formation with in anhydrous methanol, low temperature stopped-flow investigation, 717

1,3-Biradicals, triplet, influence of vibrational excitation energy on their cyclisation stereochemistry, 616

Bis- $(\pi$ -cyclopentadienyl) metal compounds, bent, bonding model, 421

**4,4'-Bithiopyrylium** radical cation, characterisation by electron spin resonance spectroscopy, 60

Blumenols A, B, and C, natural products, structures, 113 Boiling point rule, von Auwers'. A new approach, 42

Borane, (benzylmethylamino)benzylphenyl-, photolytic boroncarbon scission as a second primary photoprocess of, 962 α-bromoethyl-, rapid rearrangement of, induced by electro-

philic reagents, 71

organo-, stereochemistry of formation from Grigand reagents,

Preparation of difluoro(trifluorosilyl)borane, 295

trialkyl-, rate of primary initiation of autoxidation, 202 triethyl-, induced reaction of lithium tri-t-butoxyaluminohydride, reductive opening of tetrahydrofuran and related ethers by: lithium triethylborohydride and monomeric aluminium t-butoxide as the active intermediates, 868 trimethyl-, formation of carboranes by its pyrolysis, 850

Boranes, amino-, boratropylium and boracyclopentadienyl ions in their mass spectra, 206

Bridge proton exchange in B<sub>6</sub>H<sub>10</sub> and 2-CH<sub>2</sub>B<sub>6</sub>H<sub>9</sub>; low temperature nuclear magnetic resonance spectra of static structures,

Formation and properties of bis(borane)alkanethiolate salts and their conversion into  $\mu$ -alkylthiodiboranes, 1090

Isolation of a transition-metal complex of hexaborane(10);  $\mu$ -Fe(CO<sub>4</sub>)—B<sub>6</sub>H<sub>10</sub>, 1155

Negative-ion mass spectrum of 2,3-dicarbahexaborane(8), 68 organo-, mixed, new method for preparation, 566

Borate, tetrahydro-, metal, detection of stereochemical nonrigidity in, and estimation of the barrier: 1H nuclear magnetic resonance study, 1019

Borazines, synthesis; use of thioboranes, 79

Borohydride, sodium, reduction of alkoxythallated compounds of olefins, 517

Boron. Discovery of a triangulated thirteen vertex (1,5,6,1) docosahedron from an X-ray diffraction study of ( $\pi$ -C<sub>5</sub>H<sub>5</sub>)- $Co(\pi-7,9-B_{10}C_2H_{12}), 1326$ 

Geometry of the  $(B_8C_2H_{10}\cdot C_5H_5N^2-)$  anion from an X-ray structural analysis of  $[Et_4N^+][(B_9C_2H_{11})Co(B_8C_2H_{10}\cdot C_5H_5-)]$  $N)^{-}$ ], 901

Isomeric B<sub>10</sub>C<sub>2</sub>H<sub>13</sub>- ions derived from the direct reduction of

 $B_{10}c_2H_{12}$ , 899 Long-range magnetic resonance coupling between the apical and basal hydrogens in pentaborane(9), 351

Metallocarboranes, new synthesis, 1178

Novel 9-vertex metallocarborane containing a mono-carbon carborane ligand, 1329

X-ray crystal and molecular structure of the nido-carborane  $B_7C_2H_9Me_2$ , 665

Simple direct syntheses of iron clathro-chelates derived from dimethylglyoxime and boron compounds, 1291

Structure of the  $B_{10}H_{13}^-$  ion, 474

Boronate, alkyl-, fragmentation of the 1,1,4a-trimethyldecalin system, peripheral bond fission, 846

Boronates, phenyl-, cyclic, of diols and polyols; mass spectrometry, 1051

Bredt's rule: an anomalous decarboxylation, 201

Bromine. Carbon-13 spin-lattice relaxation: carbon-bromine scalar and dipole-dipole interactions, 352

Mechanism of bromination by hypobromous acid, 130

Bromohydrin, stereochemistry of the acetalization of hexafluoroacetone with, 296

Bufotoxin, steroid toad venom constituent, structure, 45

Bullvalene, aza-, reaction with nonacarbonyldi-iron, 1156

Bunte salts, unsaturated, iodine oxidation, 974

Bussein, a tetranortriterpene, structure, 1253

Buta-1,3-diene-1,4-sultone (Pysultone) ring, a non-aromatic  $6\pi$ -election system: X-ray structural determination, 264

**Butane,**  $(\pm)$ -2,3-bis(phenylsulphonyl)-, asymmetric destruction,

n-Butanes, apparent disproportionation on alloy films, 880

cis-Butene, generation of nitrophenylcarbenes and their reactions with, 512

But-1-ene, selective cis-isomerisation by homogeneous catalysts with triphenylphosphinenickel complexes, 203

But-2-ene, 2,3-dimethyl-, solvent participation in photoreaction with 2-naphthonitrile in methanol, 1136

cis- or trans-, unimolecular decomposition of excited biradicals formed by the addition of triplet methylene-14C, 193

n-Butylamine and n-butylammonium ion: carbon-13 spinlattice relaxation and solvation of organic ions, 768

N-t-Butyliminoacetonitrile, dimerization, 244

But-2-yne, hexafluoro-, homo-Diels-Alder addition to a norbornadiene rhodium(t) complex: crystal structure of

the adduct [RhCl(norbornadiene) ( $C_4F_6$ )]4, 509 [1-13C]Butyrate, incorporation into antibiotic X-537A: <sup>13</sup>C nuclear magnetic resonance study, 161

 $\gamma$ -Butyrolactones, useful method for their  $\alpha$ -methylation, 892

Cadmium. Existence of the novel  $\operatorname{Cd}_2I_6{}^{2-}$  anion and of the five-co-ordinate  ${Cd[N(CH_2CH_2NMe_2)_3]I}^+$  $Cd_{2}[N(CH_{2}CH_{2}NMe_{2})_{3}]I_{4}, 1280]$ 

crystal structure of bis(pentacarbonyl-manganese) -2.2':6',2''-terpyridylcadmium C<sub>15</sub>H<sub>11</sub>N<sub>3</sub>Cd-[Mn(CO)<sub>5</sub>]<sub>2</sub>, 760

X-ray crystal structure of hexakis(imidazole)cadmium(II) carbonate pentahydrate, [Cd(C<sub>3</sub>H<sub>4</sub>N<sub>2</sub>)<sub>6</sub>]CO<sub>3</sub>,5H<sub>2</sub>O, a supposed hydroxy-nitrate, 712

and zinc complexes, five-co-ordinate, formed by metal-ioninduced ligand reactions: helical co-ordination, 683

Caesium. Single crystal infrared electronic spectrum of Ni<sup>2+</sup>/Cs<sub>2</sub>ZnCl<sub>4</sub> and Ni<sup>2+</sup>/Cs<sub>2</sub>ZnBr<sub>4</sub>, 1290

Calcium ion binding to unchanged sugars: crystal structures of calcium bromide complexes of lactose, galactose and inositol, 727

Kinetics of the gas-phase reactions  $MOH^+ + e^- \rightleftharpoons M + OH$ as MO + H (M = Ca or Sr), 422

Calodendrolide, a novel terpenoid from Calodendrum capense Thunb., structure, 86

trans- $\pi$ -Camphonic acid, racemic,  $1\alpha,5\beta$ -dimethyl-2-oxo-3oxabicyclo[3,3,0]octane- $6\beta$ -carboxylic acid, a  $\gamma$ -lactone of rare type, crystal structure, 647

Cannabinol, \( \Delta^8\)-tetrahydro-, C-glucosidation, 89

Carbahexaborane(8), 2,3-di-, negative-ion mass spectrum, 68

Carbamate hydrolysis, Elcb mechanism of, isocyanate intermediates, 500

t-butyl NN-dimethyl, <sup>13</sup>O-labelled, thermolysis of its possible bearing on the course of thermal  $\beta$ -elimination reaction mechanisms, 552

Carbamates, NN-dimethyl-, thermolysis, and implications for thermal  $\beta$ -elimination reaction mechanisms, 911

Carbamoyl-type complexes, Mn-N bond formation by their decarbonylation. Manganese carbonyl-diaza-allyl plexes, 774

Carbazole, from thermal cyclization of diphenylamine: synthesis of the natural product glycozolidine, 537

Carbene, dibromo-, addition to 1-methoxynaphthalene, 667 benzylidene-, formed by pyrolysis of the benzylidene deriva-tive of Meldrum's acid at 560°, rearrangement, 1175

dichloro-, insertion into a tungsten-hydrogen bond, 295—metal complexes, synthesis from 1,2,3-thiadiazoles and selenadiazoles, symmetrical intermediates, 418

Carbene-continued

reactions with 1,1-dicylopropylethylene. New tool to investigate radical cycloadditions, 389

secondary, CNHMe2, complexes; three-fragment oxidative addition of chloroform-iminium or amidinium chlorides to Rh<sup>I</sup> or Pt<sup>II</sup> substrates, 851

sulphonyl, intramolecular aromatic cyclization, 893

Carbenes,  $\alpha$ - and  $\beta$ -allylthioalkyl-, intramolecular reactions, 62 bearing sulphide linkages at the δ-position, reactions, 860 nitrophenyl-. Generation and reactions with cis-butene, 512 nucleophilic, 2,3-sigmatropic rearrangement. New approach to stereospecific synthesis of carbon-carbon bonds, 354

Carbohydrate derivatives, configuration dependence of the longitudinal relaxation times, 1319

derivatives, o-nitrobenzylidene, photochemical rearrangement. Route to partially protected sugars, 532 enones, ground and excited state 1,4-addition reactions of

some, 1286

furoxan derivatives, synthesis, 1117

Carbon, atomic, laser-generated; production of acetylene by,

-bromine scalar and dipole-dipole interactions: carbon-13 spin-lattice relaxation, 352

<sup>13</sup>C spectral assignments, simplified, using a graphical method to present <sup>13</sup>C spectra recorded under conditions of proton off-resonance spin-coupling, 316

-carbon bonds, new approach to stereospecific synthesis. 2,3-Sigmatropic rearrangement of nucleophilic carbenes, 354
Carbon dioxide and hydrogen, formation of dimethyl ether

from, over a graphite-PdCl2-Na catalyst, 1266

Carbon disulphide, insertion into a metal-fluorine bond: crystal structure of [Pt(S<sub>2</sub>CF)(PPh<sub>3</sub>)<sub>2</sub>][HF<sub>2</sub>], 72 participation in Friedel-Crafts reaction: new method of

synthesis of aromatic dithioesters, 345

Carbonate. Acid-base properties of the CO<sub>3</sub>- radical in aqueous solution, 991

CO2- radicals, photochemical generation in neutral aqueous solution, 227

Carbonium ions, formation from dihydropyrimidyl radicals in the  $\gamma$ -radiolysis of aqueous solutions of dihydropyrimidines, 1082

 $\begin{array}{ll} \textbf{bonyl} & \text{compounds,} & \text{organometallic,} & \text{shiftless} & \text{relaxation} \\ \text{reagent for carbon-} \textbf{13} & \text{magnetic resonance of,} & \textbf{456} \end{array}$ Carbonyl compounds, rhodium complex catalysed hydrosilylation, 938

metal, chemistry, studied with implanted ions, 1177

Carbonyls, metal, photoinitiation of polymerizations and hydrogen abstraction, 762

Carborane complex, bimetallic, direct synthesis by polyhedral

expression of a monometallocarborane, 611 nido-, B<sub>7</sub>C<sub>2</sub>H<sub>9</sub>Me<sub>2</sub>, X-ray crystal and molecular structure, 665 metallo-, 11-atom polyhedral, prepared by polyhedral contraction, 900

Carboranes, formation by pyrolysis of trimethylborane, 850 Carboxylate, co-ordinated, from oxidation of alcohol with a dioxygen complex of ruthenium. Examples of reversible hydrogen transfer to an isocyanide ligand, 458

Carboxylic acids,  $\alpha$ -amination: new synthesis of  $\alpha$ -amino-acids,

Carboxypeptidase A, linear free energy relationship for inhibitor binding to, 826

( $\pm$ )-Car-3-ene, two-stage synthesis of (+)-cis-homocaronic acid from, 684

(-)-Carlosic acid, absolute configuration, 1047

Carolic acid, biosynthesis in Penicillium charlesii: intermediate precursors, 243

(+)-Carotol, (+)-daucene, and (-)-daucol, total synthesis of the sesquiterpenes, 855

Catalysts. A new series of homogeneous metal catalysts for very rapid hydrogen isotope exchange in aromatic compounds, 1172

Cation-radical salts, novel anodic synthesis; stabilization of organic cation-radicals, 156

Cellulose, laser-induced fluorescence in, 1049

Centaurepensin, guaianolide sesquiterpene lactone ester containing two chlorine atoms, isolation: determination of structure and absolute configuration by X-ray crystallography, 460

Cephalosporanic acids, reduction with chromium(II) salts: synthesis of 3-methylenecepham derivatives, 800

Cephalosporin esters,  $7\alpha\text{-}aminophenylacetamido-, intramolecular nucleophilic attack in, <math display="inline">1162$ 

7-methyl-, total synthesis of nuclear analogues, 589

Cephalosporins, reactions with N-bromosuccinimide, 941 transformation of penicillin sulphoxides into, by azo-compounds, 1304

Cerium. Dethioacetalisation with cerium ammonium nitrate, 791

Chalcogenides, transition-metal, novel organometallic sandwich complexes based on, 301

Chalcones, 2'-hydroxy-, direct conversion into isoflavones using thallium(III) nitrate: synthesis of (±)-sophorol and  $(\pm)$ -mucronulatol, 825

Chelate rings, six-membered, charged delocalized, reactivity patterns: N-alkylation, deacylation, and protonation, 737

Chiral alcohols, saturated, circular dichroism, 81

β-Chitotetraoside, 3,4-dinitrophenyl tetra-N-acetyl-, a good chromophoric substrate for hen's egg-white lysozyme, 828

Chlorinating agent, aromatic, action of tetrachlorostibonium(v) undecafluorodiantimonate(v) as; its crystal structure, 262

Chlorine. Microwave spectrum, structure, and nuclear quadrupole coupling constants of chloryl fluoride, 285

Steady state and pulse radiolysis studies of Cl2 reactivity in micellar systems, 14

Chlorocarbons, reaction with lithium atoms at 800°C; new route to polylithium compounds, 1078

Chlorocarbonyl disulphides, alkyl, desulphurization—a method for replacement of -SH by -Cl, 773
Chloroform, photochemical reaction with the electron-rich

aromatic compounds phenol and diethylaniline, 812

Chloroform-iminium or -amidinium chlorides, three-fragment oxidative addition to RhI or PtII substrates; complexes of the secondary carbene CHNMe, 851

m-Chloroperbenzoic acid, new epoxidation with, at elevated

temperatures, 64
Chlorosulphonyl isocyanate and 2-cyclopropylpropene, initial  $\beta$ -lactam formation from, 878

Cholesterol biosynthesis, removal of the 32-carbon atom as formic acid, 383

conversion of  $\beta$ -sitosterol to, in the silkworm: fucosterol-24,-28-epoxide as a probable intermediate, 1275

fate of the C-25 hydrogen of 28-isofucosterol during conversion into, in the insect Tenebrio molitar, 1296

**3-Chromanols** from oxidative cyclisation of allyl aryl ethers, 618

Chromanones. Potential controlled anodic of 4-(3,4-dimethoxybenzyl)-6,7-dimethoxyisochroman-3-one, 718

Chromenes, 2,2-disubstituted, photochemical transformations,

Chromium-carbon bonds, formation in aqueous solution: a pulse radiolytic study, 320

Crystal structure of a tri-tertiary phosphine complex of manganese(I) and chromium(0), 799

Direct and sensitized photoisomerization of 1,1,1-trifluoro-5,5-dimethylhexane-2,4-dionatochromium(III), 966

Fluorinated alkoxides of chromium(v) and vanadium(IV), 944 X-Ray crystal structure of dicarbonylpentamethylcyclopentadienylchromium dimer, 1333

Reduction of cephalosporanic acids with chromium(II) salts: synthesis of 3-methylenecepham derivatives, 800  $Cr^{2+}$  reduction of  $\mu$ -superoxo- and  $\mu$ -peroxo-complexes, 1340

Reduction of thioether and carboxylate chelates of cobalt(III)

by chromium(II), 181
Square planar and tetrahedral chromium(II) complexes: crystal structure determinations, 567

Synthesis of tricarbonylhexachlorocyclotriphosphazenechromium, 407

Tetracarbonylchromium(0) complexes of syn-7-alkoxynorborn-2-enes, 1335

Claisen rearrangement, novel, producing a furo[3,2-b]pyrone, 896

Cobalt. Absolute configuration of sodium (-)<sub>546</sub>-bis[trans-N-methyl-(S)-alaninato]oxalatocobaltate(III) dihydrate by an X-ray crystal structure determination, 701

Alkali-metal tetrafluorocobaltates(III) and fluorinating agents for organic compounds: direct conversion of benzene into hexafluorobenzene, 1028

Alkylpentacyanocobalt nitroxide and primary alkyl nitroxide

radical-anions, 1087

## Cobalt-continued

Bis(biuretato)cobaltate(III) ion: paramagnetic planar CoN4 species, 221

Chromatographic separation of optically active neutral trischelated cobalt(III) complexes, 1277

complexes, self-exchange reactions and implications concerning

redox reactivity of vitamin B<sub>12</sub>, 495 Crystal and molecular structure of a trimeric cobalt(II) complex: trisdimethoxyethane-tri- $\mu$ -trifluoroacetato- $\mu_3$ chloro-µ3-sulphato-tricobalt(II), 862

Crystal structure of (\pi-cyclopentadienyl)-[\pi-trans-diphenylbis(trimethylsilyl)cyclobutadiene]cobalt, 1169

Crystal structures of two five-co-ordinated cobalt(II) and nickel(II) complexes having the  $MN_2P_2Br$  chromophore (M =  $Co^{II}$  or  $Ni^{II}$ ), 651

Deactivation of biacetyl triplets by cyanocobaltate(III) complexes, 1018

Electron spin resonance spectra of five- and six-co-ordinate cobalt(II)-methyl isocyanide complexes in CoIIY zeolites,

Electron spin resonance study of the interaction of sulphur dioxide with tetraphenylporphyrincobalt(II), 776

Electronic configuration and oxygenation of NN'-ethylenebis-(salicylaldehydeiminato)cobalt(II) studied by electron spin resonance spectroscopy, 489

Further evidence pertaining to the mechanism of alcoholysis of σ-2-acetoxyalkyl(pyridine)cobaloximes, 1183

Geometric isomers of chlorammine[tris-(2-aminoethyl)amine]cobalt(III) chloride, 656

Geometry of the  $(B_8C_2H_{10}\cdot C_5H_5N^2-)$  anion from an X-ray structural analysis of  $[Et_4N^+][(B_9C_2H_{11})Co(B_8C_2H_{10}-)$  $C_5H_5N)^-$ ], 901

Inversion of configuration in nucleophilic displacement from alkylcobalt(IV) complexes and its relevance to the halogenation of the corresponding alkylcobalt(III) complexes,

Linkage isomerization of the co-ordinated thiocyanate ion in cobalt(III) complexes, 109

119mSn Mössbauer parameters and crystal structure of the SnCl<sub>8</sub>- ion in two forms of chlorobis[bis-(1,2-diphenyl-

phosphino)ethane]cobalt(II) trichlorostannate(II), 630 nitrosyl complexes, reactions of some with oxygen, 670

Radical anions formed by reaction of cobaltocene with protic acids, 294

Reduction of thioether and carboxylate chelates of cobalt(III) by chromium(II), 181

Reactions of azobenzene-cobalt carbonyl complexes with  $C_2(CF_3)_2$ : structure of PhN:  $NC_6H_4C(CF_3)$ :  $C(CF_1)COCo(CO)_2$  and a new quinolone synthesis, 1228

Stable cobalt(I) complexes of tetradehydrocorrins, 453

Stereochemistry of cobalt(II) in a complex of cobalt(II) chloride with dodeca (dimethylamino) cyclohexaphosphazene, 23

Structural and chemical studies defining the configurational isomers of the triethylenetetra-amineglycinatocobalt(III) ion, [Co(trien)(gly)]2+, 57

Structural evidence for ground-state steric effects in chloropentakis(methylamine)cobalt(III) nitrate, 515

Three co-ordinate cobalt(II). Crystal structure of fully-dehydrated partially-Co<sup>II</sup>-exchanged Zeolite A, 1287

Three-co-ordinated complexes of cobalt(II) and nickel(I) containing bistrimethylsilylamino- and triphenylphosphineligands, 872

Transmission of electronic effects in cobalt(III) complexes of macrocyclic ligands: <sup>1</sup>H nuclear magnetic resonance study,

Coccinellin, crystal structure of its hemihydrochloride, the defensive N-oxide alkaloid of the beetle Coccinella Septempunctata, a case of symmetrical hydrogen bonding, 626

Complexes, inorganic, containing iron(II) low spin, correlation between core-electron binding energies and Mössbauer chemical isomer shifts, 751

metal, application of strain energy minimization to geometric isomers, 726

Complex formation in methanol, mechanism: solvent exchange rates for some bivalent metal ions, 106

Copaborneol, biological conversion into tutin, 598

Copacamphor and longicamphor, base-catalysed enolization,

Copper carbonyl complex, stable, 1124

Copper-continued

Cationic benzene and olefin complexes of copper(1) trifluoromethanesulphonate, 559

Circular dichroism of bis(diamine)copper(II) complexes, 578 Complex-forming reactions of an arylcopper(I) cluster compound with organophosphines. Unexpected C(alkyl)-P

bond cleavage in 1,2-bis(diphenylphosphine)ethane, 452 Crystal and molecular structure of tris(ethylenethiourea)copper(I) sulphate and tris(tetramethylthiourea)copper(I) tetrafluoroborate [examples of trigonal planar copper(I) stereochemistry], 1140

Crystal and molecular structures of bis-(N-benzylprolinato)copper(2+) complexes, 1328

α-Cupriobenzylideneamines, a novel class of thermally stable organocopper compounds, 59

Determination of nanogram amounts of copper by activation of insolubilized apo-polyphenol oxidase, 502

Ferromagnetic and antiferromagnetic interactions in copper(II) complexes of Schiff bases of S-methyl dithiocarbazate, 909

Geometry of metal-flavin interactions: crystal structure of bis-(10-methylisoalloxazine)copper(II) perchlorate hydrate, 1220

Intersystem crossing and internal conversion from the lowest charge-transfer singlet excited state of the (2,9-dimethyl-

1,10-phenanthroline)copper(1) cation, 1135

Models of copper-protein interaction: copper(II) complexes
of glycyl-L-histidylglycine in solution and in the crystalline state, 983

Novel aryl-bridged tetranuclear copper-lithium cluster compounds: synthesis and characterization by 13C and 1H nuclear magnetic resonance spectroscopy of bis-{2-[(dimethylamino)methyl]phenyl}copper(I) lithium, 940

Preparation, identification, and crystal structure of a novel hexanuclear iridium-copper cluster complex, 858

X-ray crystal structure of [Cu2OH(O2CCF3)3(quinoline)2]2, tetranuclear basic copper(II) carboxylate adduct with significant metal-metal interaction, 228

X-ray structure analyses and magnetic correlation of four copper(II) complexes, 359

Reactions of copper(t) phenylacetylide with nitrones, 466 Structure of oxygenated condensation product between

copper(II) ions, oxalodihydrazide, and acetaldehyde, 1163 Synthesis of allenic hydrocarbons from 1-halogenoallenes and

dialkylcopperlithium reagents, 593

Synthesis and crystal structure of tris-(2-picoline)copper(1) perchlorate (C<sub>6</sub>H<sub>7</sub>N)<sub>3</sub>CuClO<sub>4</sub>; a trigonal copper(1) ion, 661

Synthesis of a novel macrocyclic compound and of its copper complex, 577

Tetranuclear cluster complex of copper(1) with bridging aryl ligands: crystal structure of (4-methyl-2-cupriobenzyl)dimethylamine, 446

Unique six-membered ring in a sulphur bridged trigonal copper(I) trimer: crystal structure of cyclo-tris-μ-trimethylphosphine sulphide)-tri[chlorocopper(1)], 1141

Coproporphyrinogen-III, biosynthesis of protoporphyrin-IX from, 1118

Coproporphyrin-III, from protoporphyrin-IX, 1347

Cordiachromes: new group of terpenoid quinones from Cordia spp., 363

**difoline**, deoxy-,  $3\alpha$ , $5\alpha$ - and  $3\beta$ , $5\alpha$ -tetrahydrodesoxy-cordifoline lactam: Adina alkaloids, 1006Cordifoline,

Corrin analogues, template synthesis of metal complexes, 706 Corrins, tetradehydro-, stable cobalt(I) complexes, 453

Coumalate, methyl, Diels-Alder reactions with 1,3-dienes, 388 Coumarins. New synthesis of azobenzoisocoumarins, 1237

Crombenin, a natural spirocoumaranone, structure and synthesis, 392

Cryptates, proton, 487

[3]-Cryptates: metal cation inclusion complexes with a macrotricyclic ligand, 1100

γ-Crystallin, amino-acid sequence, 437

Cularine, an alkaloid, absolute configuration: X-ray structure determination, 1072

**C-Curarine**, X-ray study of the structure of the alkaloid, 805 Cyanide ion, bidentate nature in anodic addition reactions, 441 ion, photoinduced reactions with some aromatic hydrocarbons, 710

Cyanides from photo-induced isomerization of aryl isocyanides, 429

Cyanobenzyl carbanions, intramolecular nucleophilic aromatic substitution reactions involving novel displacement of hydride ion, 849

2-Cyano-2-propyl radicals, effects of viscosity on cage recombination, 1071

Cyclisation, novel transannular, in the solid state, 957

Cycloadditions of 3,4-diazanorcaradienes with benzyne and 1-diethylaminopropyne, 1171

keten, in unconstrained systems, intra-molecular, 1337

radical, new tool to investigate. Reactions of carbene with 1,1-dicyclopropylethylene, 389

Cycloalkynes, strained, synthesis, 787

Cycloamylose hydrates, trapping of radiation-induced electrons in: electron spin resonance study, 1335

Cyclobutadiene, 1268

evidence for the existence of dianion, 365

matrix preparation, 1111

Cyclobutane, r-1,c-2-dideuterio-t-3,t-4-dimethyl-, decomposition, 1213

Cyclobutanones, 2-chloro-, conformation and reactivity: rearrangement of 7-exo-chloro-7-isopropylbicyclo[3,2,0]hept-2-en-6-one, 997

Cyclobutene, benzo-, steric course of formation by thermal desulphonylation of 1,3-dihydrobenzo[c]thiophen dioxide, 541

benzo-, to o-quinone dimethide, stereoselectivity of the electrocyclic process, 1034

Cyclobuteno[c]thiophen, synthesis of derivatives, 623

trans,trans-Cyclodeca-1,6-diene derivatives, conformations, 332

Cyclodeca-1,6-diyne-3,8-diol and its dimethyl ether, preparation, 331

Cyclodeca-1,2,5,8-tetraene, mercury(II) ion-catalysed rearrangements, 1091

trans, trans, trans-Cyclododeca-1,5,9-triene ring contraction by reaction with cis-bis(trimethylgermyl)tetracarbonylruthenium, 1227

Cyclohepta-2,4-dienone, convenient preparation: isomerization of protonated cyclohepta-3,5-dienone to protonated cyclohepta-2,4-dienone, 144

and 2-methylcyclohepta-2,4-dienone, photoisomerization reactions, 145

Cyclohepta-1,3,5-triene, octafluoro-, and hexafluorotropone.

 $9\hbox{-}(7\hbox{-}Cycloheptatrienyl)\hbox{-}{\it cis,cis,cis,cis-} cyclonona\hbox{-}1,3,5,7\hbox{-}$ tetraene; synthesis and bond-relocation, 913

Cyclohexadecanes, 1,5,9,13-tetraoxa-, lithium

plexes, 1012 Cyclohexa-1,3-dienes, 5-alkyl-, influence of ground state

conformation on the photochemical ring-opening of, 24 Cyclohexa-2,5-dienone, 4-hydroxy-3,5-dimethyl-4-neopentyl-2,6-dinitro-; unusual product of aromatic nitration, 828 new photoextrusion reaction, 493

Cyclohexa-2,5-dienones, 4-diazo-, chemically induced dynamic nuclear polarization in photo-reactions, 970

Cyclohexadienylide ion, 1,1-dimethoxy-2,4,6-trinitro-,

composition in benzene: catalysis by reversed micelles in non-polar solvents, 269

Cyclohexane, stability of N<sub>2</sub>O- in, 1001

Cyclohexane-1,3-dione, 2-t-butyl-, synthesis and structure,

Cyclohexane-1,3-diones, condensation with o-hydroxybenzyl alcohol. Synthesis of 3,4-dihydro-1(2H)-xanthenones, 839

Cyclohexanone, 4-t-butyl-, kinetic studies on catalytic deuteriation; application of nuclear magnetic resonance shift reagents, 280

Cyclohexanones, 2-N-alkyl-N-arylamino-, light-induced reactions, 1108

Cyclohexene, 1-bromo-, from trans-1,2-dibromocyclohexane; a  $\beta$ -elimination by a "complex base", 1289 Cyclohex-3-ene, (+)-(1R)-1-formyl-2,2,4-trimethyl-, synthesis

of (-)-7-epicrysanthenol and its conversion into, 314

Cyclohexenes, some conjugated, stereochemistry of nucleo-

philic addition to, 94

Cyclononatetraenyl cation, generation and thermal bond relocation, 92

Cyclo-octatetraene, structure of the  $C_{16}H_{16}$ ·Fe<sub>3</sub>(CO)<sub>9</sub> complex

derived from iron tricarbonyl complexes of dimers, 736 Cyclopentadienes. Bonding model for bent bis- $(\pi$ -cyclopentadienyl) metal compounds, 421

Cyclopentadienylidenemethylene, addition reactions pyridines and thiophens. Bicyclic heterocycles and heterovlides, 1257

Cyclopentadienylides and cyclopentadienylidenepyrans, mode of formation from diazocyclopentadienes, 912

Cyclopentane, 2,2-dimethyl-1,1,1,1-tetracarbonyl-1-ferra-2sila-: insertion of [Fe(CO)<sub>4</sub>] into a strained organosilicon ring, 445

Cyclopentenone and cyclohexenone, contrasting photochemistry, 698

Cyclopent-2-enone, 3-phenyl-, phosphorescence, and crystal structure of its solution photodimer, 1095 2-prop-2-enyl-, "free-rotor", triplet di- $\pi$ -methane rearrange-

ment, 864

Cyclopentenones, 4-methyl-2-aryl-, photochemical rearrangement, 226

Cyclophosphamide hydrate, crystal and molecular structure,

Cyclopropa[b]naphthalene, synthesis of a, 1341

Cyclopropane, 1,2-diethynyl, pressure-dependent formation of bicyclo[3,2,0]hepta-1,4,6-triene, fulvenallene, and ethynylcyclopentadiene in pyrolysis of, 49

ring hydrogenolysis, stereospecific, 813

ring, substituent-induced asymmetry, 666

very long carbon-carbon bond in a derivative, 1073 vinyl-, activated, stereochemistry of ring-opening of, 821

Cyclopropane-1,1-dicarboxylate, 2-vinyl, diethyl,

opening, 820 **Cyclopropanes,** amino-, question of *quasi*-enamine reactivity in. Rearrangement of isomeric 1-(morpholino)-7-chloro-7-

phenylbicyclo[4,1,0]heptanes, 659 Crystal structure and absolute configuration of two cyclopropane containing marine steroids, 215

diaryl-, photochemical addition of amines to, 1170

formation from dimethyl 2-bromo-2-methylpropylidenemalonate. Nucleophilic substitution reactions of allylic halides carrying electron-withdrawing substituents in the  $\gamma$ -position, 375

 $\textbf{Cyclopropenes,} \ \text{cyano-,} \ \text{formation;} \ photolysis of \ tetrazolo[1,5-b]$ pyridazines, 1059

phospha-: synthesis of triphenylphosphiren oxide, 1085 reverse benzilic acid rearrangements in, 377

Cyclopropenethione, diphenyl-, X-ray structure, 528

Cyclopropenyl ketones, formation; photolysis of pyridazine N-oxides, 550

Cyclopropyl group, gem-dimethyl-, circular dichroism, 191 ketones, charge-transfer band in their ultraviolet spectrum,

Cyclopropylethylenes, ionization potentials, 1114

2-Cyclopropylpropene and chlorosulphonyl isocyanate, initial  $\beta$ -lactam formation from, 878

Cynaropicrin and related guaianolides, absolute stereochemistry, 386

Cypridina luciferin, model for biosynthesis, cyclization of a dehydropeptide derivative, 894

**L-Cysteine**, S-(cis-prop-1-enyl)-,  $\gamma$ -radiolysis in aqueous solution: new cis-trans-isomerization of the prop-1-enyl thiyl

 $S-\beta$ -(2-pyridylethyl)-, novel mercury(II) chloride complex, 812 Cytosine, 5-fluoro-, and its nucleoides, direct synthesis of,

using trifluoromethyl hypofluorite, 18

(+)-Daucene, (+)-carotol, and (-)-daucol, total synthesis of the sesquiterpenes, 855

)-Daucene, sesquiterpene, total synthesis, 606

Decafluorobenzhydryl bromide, ca Behaviour towards nucleophiles, 943 carbanionic character.

Decalin. Peripheral bond fission in the alkylboronate fragmentation of the 1,1,4a-trimethyldecalin system, 846

Decarboxylation, anomalous: Bredt's rule, 201

cis-Dec-5-en-1-yl 3-methylbutanoate as the pheromone from the Pine Emperor moth (Nudaurelia cytherea cytherea Fabr.). Sex-pheromones, 686

Decoupling proton magnetic resonance signals located under

the H<sub>2</sub>O peak, 1055 ±)-**Dendrobine**, alkaloid, total synthesis, 1252

Deoxycholic acid, 1:1 complex with acetic acid, crystal structure determination, 530

( $\pm$ )-15-Deoxyprostaglandin E<sub>1</sub>, total synthesis, 240

**Deuterium.** Disproportionation of HOD in condensed phases, 479

Homogeneous platinum(II)-catalysed hydrogen-deuterium exchange at a saturated carbon atom, 1258

ortho-, and parahydrogen, conversion, catalysed by neodymium oxide, extrinsic magnetic field effect, 1176

Diamantane derivatives, a new series of plastically crystalline

compounds. Strain energy of diamantane, 1042

1-, 3-, and 4-methyl, equilibration on a chlorinated platinumalumina catalyst, gas-phase conformational preference of the methyl group, 1209

Diamantan-1-ol and diamantan-4-ol, equilibration. formational enthalpy of the hydroxy-group, and an unusual example of how entropy and symmetry factors can influence relative thermodynamic stabilities, 29

Diamine ligands co-ordinated to low-spin iron(II), oxidative dehydrogenation, 207

1,3-Dianion, new type: lithiotriphenylphosphinioacetonide, 876 Dianthrone, tetramethyl-, photochromism—an adiabatic photoreaction in solution, 1315

1,3-Diazabicyclo[3,1,0]hex-3-enes, from photocyclodimerizations of arylazirenes, 409

1,5-Diazabicyclo[5,1,0]octa-3,5-diene system, photochemical rearrangement, 74

3,4-Diazanorcaradienes, cycloadditions with benzyne and l-diethylaminopropyne, 1171

3,4-Diaza-1,6,6a-trithiapentalene, 2,5-diphenyl-, crystal

structure, 182
Diazepines, 1H- and 5H-2,3-benzo-, photolysis, 827

1,2-Diazepines, protonation, 504

1,5-Diazepines, tetrahydro-1*H*-benzo-, synthesis, 962

 $\Delta^3$ -1,2-Diazetine-1,2-dicarboxylate, dimethyl; a new fourmembered  $6\pi$ -ring system, 818

Diazo-compounds in heterocyclic synthesis. A expansion in a retro-Diels-Alder reaction, 485 Aziridine ring

Diazoalkane-nickel(0) complexes, 1105

**Diazoalkanes**,  $\alpha$ - and  $\beta$ -allylthioalkyl, intramolecular cycloadditions, 63

Diazocarbonyl compounds, photolysis in allylic alcohols: new preparation of bicyclic lactones, 822

α-Diazohomoadamantanone, mechanism of its Wolff rearrangement: evidence against oxiren participation, 694 Diazomethane, reaction on a cobalt molybdate catalyst.

Mechanism of olefin disproportionation, 104

5H,8H-Dibenzo[d,f][1,2]dithiocin, a disulphide-bridged biphenyl crystal structure, 985

Dibenzo[c,f]-1,2-oxazepines, synthesis of as primary stable photo-products in the photolyses of acridine 10-oxides, 1093

3,4,5,6-Dibenzophenanthrene, 4a,4b-dihydro-, photo-formation and erasure, optical and <sup>1</sup>H nuclear magnetic resonance spectra, 84

Dibenzo[1,2,3-df]triazepine, 982

Dicarboxylic acids, photodecarboxylation in the presence of iron(III) chloride, 287

Dictammine, biosynthesis of skimmianine from, and a convenient synthesis of furanoquinoline alkaloids. Aromatic hydroxylation in quinoline alkaloids, 1029

Dicyanomethylenecarbene ligands, terminal, metal complexes with, formed by chlorine migration reactions, 1053

**Dicyclohexyl-18-crown-6** (isomer A), cyclic poly-ether, X-ray crystal structure of the barium thiocyanate complex, 90

1,1-Dicyclopropylethylene, reactions with carbene. New tool to investigate radical cycloadditions, 389

Dieldrin. Synthesis of 9-hydroxy-HEOD, a major mammalian metabolite of HEOD, 735

Dienes, conjugated, kinetically controlled displacement reactions with rhodium(I) and iron(0) complexes, 745 conjugated, mechanism of thermal HI addition, 782

cyclic, reactions with chlorosulphonyl isocyanate. Evidence for a true dipole in 2+2 addition, 1247

metal  $\pi$ -complexes with crossed double bonds: dichloro-(5-methylenecycloheptene)platinum(II), 459

1,3-Dienes, acylic, photosensitized oxygenation, 1332 Diels-Alder reactions with methyl coumalate, 388

Dienophiles, aromatic aldehydes as, 739

Dihydroimidazo-compounds, new synthesis, 511

Di-imine, iron(II) complexes, autoxidation, 772

Diketones, unsymmetrical, intramolecular aldolization, and reductive cyclization of disubstituted pyridines, 374

β-Diketones, reaction with dimethyloxosulphonium methylide,

1,2-Diketones, Norrish Type II photoelimination in, 1288

1,4-Diketones, 1,3-dithian-derived, ready route to cis-jasmone via, 529

Dimethylamino-groups, substitution by antimony trifluoride, 324

gem-Dimethylcyclopropyl group, circular dichroism, 191

Dimethyl ether, formation from hydrogen and carbon dioxide over a graphite-PdCl2-Na catalyst, 1266

Dimethylglyoxime and boron compounds, simple direct syntheses of iron clathrochelates derived from, 1291

Diols, vicinal, direct deoxygenation with tungsten(IV). New olefin synthesis, 370

1,3-Dioxan derivatives, ring contraction accompanying nucleophilic substitution, 722

1,3-Dioxan, 4-phenyl-, reaction with sodium-potassium alloy: formation of naphthalene anion, 1230

1,3,2-Dioxaphosphorinan-2-ones, carbon-13 nuclear magnetic resonance, 406

1,6-Dioxa-6a-thiapentalenes, synthesis: sulphur-oxygen coupling by thallium(III) trifluoroacetate, 1283

Dioxetan intermediate involved in photosensitized oxygenation of 3-methylpyrrole, 625

1,2-Dioxolans, thermolysis, 279

**Dioxoles**, thermal rearrangements of some  $\alpha$ -aroyl epoxides into,

Diphenylacetylene and 1,1-dimethyl-2,5-diphenyl-1-silacyclopentadiene, novel solid-state molecular complex, 690

and stilbenes, novel photochemical reactions in amines, 313 novel cycloaddition reactions with isocyanides using transitionmetal complexes, 837

reaction with bis(trichlorosilyl)bipyridylnickel(II), 1208

Diphenylamine, thermal cyclisation to carbazole: synthesis of the natural product glycozolidine, 537

Diphenylcyclopropenethione, X-ray structure, 528

Diphenyldiazasuccinic anhydride, preparation and photolysis,

1,1-Diphenylethylene, photochemical reaction with benzene,

Diphenylketen, reaction with N-alkyl nitrones, 1146

Diphenylmethylene, reactions with benzyl fluorides, chemically induced dynamic nuclear spin polarisation in products: novel effects arising from intramolecular interactions of polarized <sup>1</sup>H and <sup>19</sup>F nuclei, 475

2,2-Diphenyl-1-picrylhydrazyl, displacement of a nitro-group in its reaction with 2,4,6-tri-t-butylbenzenethiol, 482

1,4-Diphosphoniacyclohexa-2,5-diene salts, radical cations of; new class of radical cations, 1130

1,11-Dipolar cycloaddition, 1281

Dipyrazol-1-yl ketone, novel metal-catalysed reactions with

ketonic solvents, 841

Dispiro[2,2,2,2]deca-4,9-diene: preparation and reactions, 284 Disulphide bond, photoinduced reaction of 2-vinylbiladienesa,c with. Regiospecificity in photochemical additions to bilirubin, 1301

Diterpenoid, tetracyclic, containing a new ring system: X-ray crystallographic determination of the structure of the antibiotic aphidicolin, 1027

1,3-Dithian-derived 1,4-diketones, ready route to cis-jasmone via, 529

Dithians, alkylidene-, improved and extended synthesis for 1-carbon homologation: Wittig-type reactions of 2-lithio-2trimethylsilyl-1,3-dithian, 526

**1,2,4-Dithiazolidines,** 3,5-bis(thiocarbamoyl)-, X-ray crystal structure, 1153

Dithiocarbazate, S-methyl, ferromagnetic and antiferromagnetic interactions in copper(II) complexes of Schiff bases of, 909

Dithioesters, aromatic, new method of synthesis: participation of carbon disulphide in Friedel-Crafts reaction, 345

1,2-Dithiol, ethane-, structure and rotational isomerism; an electron diffraction study, 323

1,3-Dithiols, 2-thioacylmethylene-, mechanism of rearrangement to 1,6,6a-trithiapentalenes (6a-thiathiophthens), 540

1,2-Dithiolylium ions, radicals derived from: a new class of stable organic free radicals, 430

Dithiourethanes, new route to: aminolysis of tertiary alkyl xanthates, 638

Dithizone, dehydro-, X-ray crystal and molecular structure of adduct with mercury(II) chloride, 604

Doisynolic acid, D-seco-steroid, stereochemistry, 1110 **Dysprosium**(**III**)-acetate system, successive complexation steps in its co-ordination kinetics, 1067

Ecdysones, Biosynthesis and interconversion of phytoecdysones in Sesuvium portulacastrum L., 692

Electrodes, glass, cation selective, for measurement of solvent isotope effects, 989

Electron donor-acceptor complexes, isomeric, steric effects on formation, 277

Electrons, matrix trapped, detrapping excitation spectra and optical absorption, 759

radiation-induced, in cycloamylose hydrates, trapping: electron spin resonance study, 1335

secondary, negative ion production by, in a mass spectrometer ion source, 245

trapped, transient photobleaching, 1064

β-Elimination reaction mechanisms, thermal, implications of thermolysis of NN-dimethylcarbamates, 911

reaction mechanisms, thermal, thermolysis of <sup>18</sup>O labelled tbutyl NN-dimethyl carbamate and its possible bearing on the course of, 552

β-cis-Elimination, thermal, of esters, transition-state structure in. 1182

Emission, X-ray, and X-ray photoelectron (ESCA) spectroscopies, a comparison, determination of co-ordination number in some compounds of magnesium and aluminium, 1198

Enamine, reaction with 3-acetyl-2-hydroxy-6-methylpyran-4one, new synthetic route to \(\beta\)-triketone derivatives, 890

Enedi-imines, cis- and trans-substituted, thermal and photochemical reactions, 1116

Enhydrin bromohydrin, X-ray crystal structure and configuration, 1327

Enmein, total synthesis, 1107

Enolates, metal, as protecting groups for ketones during metal hydride reduction, 1017

Enones, intramolecular photoreactions, 55 **Enzyme** model studies, aggregation of p-nitrophenyl alkanoates in aqueous solution and a caution concerning their use in, 897

Enzymes. Linear free energy relationship for inhibitor binding to carboxypeptidase A, 826

Preparative-scale reductions of cyclic ketone and aldehyde substrates of horse liver alcohol dehydrogenase with in situ sodium dithionite recycling of catalytic amounts of NAD, 856

Enzymic formation of siccanochromene-A, a key intermediate in the biosynthesis of siccarin, 1166

(-)-7-Epichrysanthenol, synthesis and conversion (+)-(1R)-1-formyl-2,2,4-trimethylcyclohex-3-ene, 314

exo-2,3,-Epithionorborn-5-ene, photochemical and thermal rearrangement, 1298

Epoxidation, new, with m-chloroperbenzoic acid at elevated temperatures, 64

**Epoxides**,  $\alpha$ -aroyl, thermal rearrangements of some into dioxoles,

Epoxy-germacrone, biogenetic model reactions, 689

 $\beta\gamma$ -Epoxy-ketones, steroidal, photolysis, 1122 Ergosta-5,7,9(11),22-tetraen-3 $\beta$ -ol, isolation and biosynthesis from Mucor rouxii, 882

Ergosta-5,7,22,24(28)-tetraen-3 $\beta$ -ol and steroidal 22,24(28)dienes, synthesis: some steroidal 22-enes, 167

Ergosterol acetate peroxide, unusual synthesis, 447

peroxide from Rhizoctonia repens: composition, conformation, and origin, 1217

Esters, transition-state structure in thermal  $\beta$ -cis-elimination of. 1182

Ethane-1,2-dithiol, structure and rotational isomerism: an electron diffraction study, 323

Ethanes, substituted, secondary steric effects on barriers to rotation in, 908

sulphonyl-fluoro-, syn-stereospecificity in an ElcB elimination from, 250

Ethers, aryl, metallation by lithium arenes, 869

diaryl, unusual course of Hems' synthesis: aromatic nucleophilic substitution, 358

Ethyl radicals, rate of recombination in the gas phase, 764

Ethylene, 1,1-diphenyl-, photochemical reaction with benzene,

Tetrachloro-, liquid, electric-field induced vibrational spectrum, 435

Ethylene—continued

tetracyano-, unexpected fragmentation reaction with isobenzimidazoles, 1302

Ethylene glycol, deareated, chain formation of acetaldehyde in γ-radiolysis of, 187

Ethylenes, cyclopropyl-, ionization potentials, 1114

1,2-dichloro-, photoreaction with benzene, 769

trans-dihalogeno-, photoelectron spectra and molecular properties: substituent effects spin-orbit coupling, 602

tetra-substituted, new synthesis, 4

thio-, addition of singlet oxygen, 73

Ethyne, crystallographic determination of sorption sites for, in Zeolite 4A, 1201

Ethynylcyclopentadiene, bicyclo[3,2,0]hepta-1,4,6-triene, and ethynylcyclopentadiene; pressure-dependent formations of, in the pyrolysis of 1,2-diethynylcyclopropane, 49

Europium. Crystal and molecular structure of a nuclear magnettic resonance shift reagent, the dipyridine adduct of tris-[(2,2,6,6-tetramethylheptane-3,5-dionato)europium(III), Eu- $(dpm)_3(py)_2$ , 400

Secondary deuterium isotope effect on Lewis basicity: tris-(dipivaloylmethanato)europium as a simple and effective

probe, 436

Upfield carbon-13 shift induced by tris(dipivalomethanato)europium, 636

Exchange reaction, multiple, the nature of the  $\alpha\beta$ -process in palladium-catalysed, of polycyclic hydrocarbons with deuterium: significance of bridgehead olefin stability, 1185

Farnesyl pyrophosphate homologues, new, enzymatic synthesis, 881

Fatty acid esters, unsaturated, metathesis by a homogeneous tungsten hexachloride-tetramethyltin catalyst, 1221

methyl esters, biosynthetic <sup>1</sup>H—<sup>2</sup>H hybrid, gas chromatography -mass spectromtery, 719

Ferrocenes, a-carbonyl-, and related compounds, photochemistry, 265

Ferrocenylcarbonium ions, rearrangements by a novel intercation exchange mechanism, 947

3-Ferrocenyl-1-(4'-methoxyphenyl)prop-1-ene, photolysis in methanol, 1236

Ferrocenyl(trichloromethyl) - and ferrocenyl(dichloromethyl) methanol, usual reaction, 216 Fétizon's reagent (silver carbonate on Celite), fragmentation

reactions catalysed by, 468 Five-membered ring alcohol, fused, nitrite of, mechanism of

photochemical formation of a cyclic nitrone from, 376

Flames, laser Raman and resonance fluorescence spectra, 381 Flavanone, 2,5-dihydroxy-7-methoxy-, synthesis, cyclic structure of the benzoyl-(2,6-dihydroxy-4-methoxybenzoyl)-

methane from Populus nigra buds, 107 photochemistry, 451

Flavin. Geometry of metal-flavin interactions: crystal structure of bis-(10-methylisoalloxazine)copper(II) perchlorate tetrahydrate, 1220

molecular complex: 10-propylisoalloxazine bis(naphthalene-2,3-diol), crystal structure, 205

Flavones, 6- and 8-C-glycosyl-, chiroptical differentiation, 648 Fluorenyl radicals, photochemically generated, environmental effects on their spectra, 1293

Fluorinating agents for organic compounds; use of alkali-metal tetrafluorocobaltates(III): direct conversion of benzene into hexafluorobenzene, 1028

Fluorine. Crystal structure of  $N_3S_3F_3$ , 548

Evidence for tetragonally distorted silver(II) in complex fluorides, 291

Insertion of carbon disulphide into a metal-fluorine bond: crystal structure of [Pt(\$\hat{S}\_2CF)(PPh\_3)\_2][HF\_2], 72

Long-range carbon-fluorine scalar coupling in some fluorinated aromatic compounds. 1158

Microwave spectrum, structure, and nuclear quadrupole coupling constants of chloryl fluoride, 285

Participation of hydrogen-bonded donor molecules in vicinal H-F spin-spin coupling, 1089

Fluorobenzenes, fluorine nuclear coupling constants: influence of the orbital term on  $J_{meta}^{\rm FF}$ , 939

Fluoroethanes, sulphonyl-, syn-stereospecificity in an E1cB elimination from, 250

Fluorophosphoranes: new synthesis. Diequatorial four-membered ring in a difluorophosphorane, 272

Fluorosulphonate, methyl, reaction with some sulphur heterocycles, 726

Fluorosulphuric acid, reaction with antimony and antimony pentafluoride, 40

Fluoroxy-compounds, generalised electrophilic fluorination by, 122

Formaldehyde, rate of hydration in aqueous solution, 1

Formanilides, quantitative photodecarbonylation: new photosensitive protecting group for anilines, 758

Four-membered  $6\pi$ -ring system, new: dimethyl  $\Delta^3$ -1,2diazetine-1,2-dicarboxylate, 818

Fragmentation reactions catalysed by Fétizon's reagent (silver carbonate on Celite), 468

Fragmentations, collision-induced, kinetic energy loss: asymmetric metastable peaks in mass spectra, 341

Frangulanine, stereochemistry of  $\beta$ -hydroxyleucine unit, 915

Free radicals, organic, new class of stable: radicals derived from 1,2-dithiolylium ions, 430

Fremy's salt, triplet excitons in, 69 Fucosterol-24,28-epoxide, as a probable intermediate in the conversion of  $\beta$ -sitosterol to cholesterol in the silkworm, 1275

Fulvenallene, bicyclo[3,2,0]hepta-1,4,6-triene, and ethynylcyclopentadiene, pressure-dependent formation of, in the pyrolysis of 1,2-diethynylcyclopropane, 49

Fulvenes, and furans, mild retro- $[\pi 4_8 + \pi 2_8]$  cleavage route to,

Fumarate, dimethyl, and singlet-excited phenanthrene, reactions of the exciplex from: oxetan formation, intersystem crossing, and emission, 711

Furan, isobenzo-, a retro Diels-Alder reaction as a convenient route to. Preparative flash vacuum thermolysis, 347

Furan- and thiophen-2-carbaldehydes, alkyl furan-2-carboxylates, and 2-furoyl chloride, causes of the multiple carbonyl bands, 742

Furanoquinoline alkaloids, convenient synthesis; biosynthesis of skimmianine from dictammine. Aromatic hydroxylation in quinoline alkaloids, 1029

Furans and fulvenes, mild retro- $[\pi 4_8 + \pi 2_8]$  cleavage route to, 211

substituted, conversions of oxazol-4(5H)-ones into: cycloadditions with tautomeric systems, 1000

Furo[3,2-b]pyrone produced by a novel Claisen rearrangement, 896

Furoxan, synthesis of carbohydrate derivatives, 1117

Furyl, thienyl, and pyrrolyl ketones, reactivity of excited states of, 155

Fusidic acid, mechanism of squalene cyclisation: the chiral origin of the C-22 hydrogen atoms of, 1191

Galactose, lactose, and inositol, crystal structures of calcium bromide complexes: calcium ion binding to uncharged sugars, 727

Gallium. 35Cl Nuclear relaxation study of the exchange of chloride ion on tetrachlorogallate(III) ion, 1069

Preparation and crystal structure of a novel hydroxo-bridged gallium complex [Ga<sub>2</sub>(OH)<sub>2</sub>Cl<sub>2</sub>(C<sub>14</sub>H<sub>17</sub>N<sub>3</sub>)<sub>2</sub>]Cl<sub>2</sub>,H<sub>2</sub>O, 1218 Geraniol and nerol in organic synthesis. Useful intermediates

for the synthesis of C<sub>17</sub>-juvenile hormone, 486

Germacranolide dihydronovanin, transformation of α-santonin into, 698

new, from Melanpodium leucanthum Torr. and Gray var. leucanthum (Compositae): melampodin, 137

sesquiterpenes, proposed conventions for describing, 142 Germacranolides. Lipiferolide, a cytotoxic germacranolide, and γ-liriodenolide, two new sesquiterpene lactones from Liriodendron tulipifera, 1137

Germacrene, reactions with singlet oxygen and the triphenyl phosphite-ozone adduct, 424

Germacrone, epoxy-, biogenetic model reactions, 689

Germanium and tin carbonyls, infrared spectroscopic evidence for, 26

Gas phase structures of three germyl pseudohalides, 748

Gibbane skeleton rearrangements during dehydrogenations with 2,3-dichloro-5,6-dicyanobenzoquinone, 442

Gibberellin synthon, multifunctional, synthesis, 951

Gibberellin A<sub>37</sub>, partial synthesis by selective reduction of the hindered 10-carboxy-group in Gibberellin A<sub>18</sub>, 808

Gibberellins, fluoro-, production by Gibberella fujikuroi from a fluorinated analogue of a gibberellin precursor, 649

Glass wool as an oxidation catalyst, 1030

Gliotoxin biosynthesis, stereospecific exchange reaction at the β-CH<sub>2</sub> of phenylalanine competing with, 100

D-Glucose 1- and 6-phosphates, 3-deoxy-3-fluoro-, synthesis and their interaction with phosphoglucomutase and UDPGpyrophosphorylase, 691

α-D-Glucoseptanose, 3-O-acetyl-1,2:4,5-di-O-isopropylidene-X-ray crystallographic study, 98

Glucoside, cyanogenic: triglochinin, revision of structure, 572 Glutaric acid, 2-oxo-, evidence for involvement in biosynthesis of bacterial menaquinones, 232

α-Glycerophosphate; X-ray study of disodium DL-α-glycerophosphate hexahydrate, 465

Glycine, NN-dimethyl-, lead tetra-acetate oxidation of, and its relevance to the biosynthesis of the pyrrolidine ring of nicotine, 1022

or alanine combined with sarcosine in cyclic tetrapeptides; coexistence of neutral and protonated species, 255

Glycosides, tertiary, origin of high rates of hydrolysis. Steric acceleration in the acid-catalysed hydrolysis of 1-adamantyl β-D-glucopyranoside, 414

 $N \rightarrow N$  Glycosyl migration in the v-triazolo [4,5-d] pyrimidine ring system, 1279

 and 8-C-Glycosylflavones, chiroptical differentiation, 648 Glycozolidine, natural product, synthesis. Thermal cyclisation of diphenylamine to carbazole, 537

Glycyl-L-histidylglycine, copper(II) complexes in solution and in the crystalline state: models of copper-protein interaction, 983

Gold, new oxidation state: preparation and some properties of [AuF<sub>6</sub>] salts, 903

Preparation and structure of the hexakis(tris-p-tolylphosphinegold) salt of tetraphenylborate and electronic structure of gold cluster compounds, 1035

Reactions of the gold-methyl bond, 938 Synthesis and properties of monoarylgold(III) complexes, 26

Graphite-potassium lamellar compounds, methane deuterium exchange, 177

Grignard reagents, activation by transition-metal complexes. New and simple synthesis of trans-stilbenes and polyphenyls,

organoborane formation from, stereochemistry, 671

Grisorixin, antibiotic, crystal structure of the thallium salt, 175

Group II metals, new and convenient method for the preparation of their complex metal hydrides, 998

Group VI tetrahydrides and stereochemical non-rigidity, 34 Guaianolide sesquiterpene lactone ester containing two chlorine atoms: isolation of centaurepensin and determination of structure and absolute configuration by X-ray crystallography, 460

Guaianolides, cynaropicrin and related, absolute stereochemistry, 386

Guanidine-containing amino-acid, streptolidine, crystal structures, 652

1-(4-hydroxy-3-methyl-cis-but-2-enyl)-, the naturally occurring hydroxygalegine, synthesis, 133

Gymnomitrol, a novel tricyclic sesquiterpenoid from Gymnomitrion obtusum (Lindb) Pears (Hepaticae), 1320

Haem biosynthesis, mechanism and stereochemistry of vinyl group formation in, 1263

α-Halogenometallic compounds, reaction with ortho-acylanilines: synthesis of indoles, 415

Halogenomethyl groups, tri- and di-, mild dehalogenative reduction by nickel carbonyl, 885

Hasubanan ring system, synthesis from the alkaloid reticuline, 288

 $\begin{array}{lll} \textbf{Heptaketide} & \text{natural} & \text{products,} & \text{biogenetic-type} & \text{syntheses:} \\ & \text{alternariol and lichexanthone,} & \textbf{953} \end{array}$ 

Hept-2-ene, disproportionation of by a homogeneous tungsten hexachloride-Grignard reagent catalyst, 838

Heterocycle, novel, an i.r.-spectroscopic study of a postulated C-H · · · N hydrogen bond suggested by the X-ray structure of, 1081

Heterocycles, synthesis by photochemical cyclisation of orthosubstituted benzene derivatives, 126

Heterocyclic ring system, new 12-membered, 1059

Heterocyclization method, novel. Synthesis of some benzimidazoles and benzoxazoles, 108

Heteronins, question of ring current in, 286

Hexa-2,4-diene derivative, oxidative dimerisation of propene to, and related reactions: arene molybdenum chemistry, 987

Hexa-3-enopyranosides, ready route to, 31

Hexafluoroacetone, stereochemistry of acetalization with a bromohydrin, 99

Hexamethylbenzene metal cluster compounds of niobium and tantalum, novel redox systems in, 1072

Hexane-2,5-dioxyl, perfluoro-2,5-diaza-, and its use in polymer

chemistry and in polymer cross-linking, 833

Hexatriene, carbonyl substituted, intramolecular photocycloaddition: new reaction pathway ( $_6\pi + _2\pi$ ), 1103

**n-Hexenes**, palladium acetate as a catalyst in their oxidation, and a direct preparation of tri-hapto-hexenylpalladium complexes, 642

**Hexitol**, disulphonylated, acid *versus* base hydrolysis. Dianhydro-D-iditol (D-isoidide) versus 2,3:4,5-dianhdyro-Diditol, 19

+)-14-Hibaone, synthesis, 886

Histidine peptides, simplified synthesis, 276

Homoadamantene, Lewis acid-catalysed conversion into 2methyladamantane, 1030

3-Homoadamantyl acetate, pyrolysis to 4-methyleneprotoadamantane and 3-vinylnoradamantane, 1310

-cis-Homocaronic acid, two-stage synthesis from (+)-car-3-ene, 684

E)-D-Homo-oestrone, ready synthesis, 373

Homosemibullvalene, tricyclo[6,1,0,04,9]nona-2,6-diene. Wolff-Kishner reduction of bicyclo[4,2,1]nona-2,4,7-trien-9-one,

Horse liver alcohol dehydrogenase, cyclic ketone and aldehyde substrates, preparative-scale reductions of, with in situ sodium dithionite recycling of catalytic amounts of NAD. 856

Hydrazyl, 2,2-diphenyl-1-picryl-, displacement of a nitro-group in its reaction with 2,4,6-tri-t-butylbenzenethiol, 482

Hydride ion, intramolecular nucleophilic aromatic substitution reactions involving novel displacement by cyanobenzyl carbanions, 849

Hydridic agents as co-catalysts in the olefin-metathesis reaction, 1202

Hydrocarbon, condensed aromatic, and NN-dimethylaniline moieties, intramolecular exciplex formation in some compounds containing, 1009

Hydrocarbons, alicyclic and aliphatic, first-order spectra from. <sup>1</sup>H nuclear magnetic resonance at unnatural abundance, 542 aromatic photoinduced reactions of some with cyanide ion, 710 aromatic, photoreduction of, by lithium aluminium hydride and sodium borohydride, 1195

unsaturated, reactions with nickel atoms, 1098

Hydrogen and carbon dioxide, formation of dimethyl ether from, over a graphite-PdCl<sub>2</sub>-Na catalyst, 1266

deuterium equilibration reaction catalysed by graphitepotassium compounds, 39

evolution, electrolytic, catalysis at lead by absorbed atomic hydrogen, 266

extrinsic magnetic field effect on parahydrogen and orthodeuterium conversion catalysed by neodymium oxide, 1176
Homogeneous platinum(II)-catalysed hydrogen-deuterium exchange at a saturated carbon atom, 1258

Hydrogenating a hydrazide, 1132 agent: 2,4,6-tri-isopropylbenzenesulphonyl

Hydrogenation, asymmetric, catalytic, 10

homogeneous catalytic, asymmetric reduction of ketones by,

**Hydrogen bond,** postulated  $C-H \cdots N$ , i.r.-spectroscopic study suggested by the X-ray structure of a novel heterocycle,

Hydrogen iodide, mechanism of thermal HI addition to conjugated dienes, 782

Hydrogen-like molecules, non-empirical SCF calculations: effect of nuclear charge on binding energy and bond length,

Hydrogen peroxide. Stabilization of the transition state of the  $\mathrm{HO_2^-H^+}$  reaction by a lone pair on the  $\beta$ -oxygen atom, 1115

Hydroperoxides, reaction with trans-IrX(CO)L, complexes,

Hydroquinone, anodic oxidation in acetonitrile, evidence for a one-electron intermediate, 427

Hydrosilylation of carbonyl compounds, rhodium complex catalysed, 938

Ziegler-type systems as catalysts: linear dimerisation with terminal acetylenes, 1272

Hydroxamic acids, new method of preparation from secondary amides, 1222

O-thiocarbamoylated, thermal rearrangement: a 1,3-radical shift, 935

Hydroxy-functions, alcoholic, two sulphur-containing protecting groups for, 766

Hydroxylamine derivatives, nitrenium ions from. A comparison of the transition state for heterolytic cleavage of the N-O versus C-O bond, 853

Hydroxy-o-quinone dimethide, cycloaddition reactions, 30

**D-Iditol**, 1,4;3,6-dianhydro-, (D-isoidide), versus 2,3:4,5-dianhydro-D-iditol. Acid versus base hydrolysis of a disulphonylated hexitol, 91

Imidate-amide rearrangement: explanation for the ambident nucleophilic properties of neutral amides, 303

Imidazole group at the polar head of a cationic detergent,

catalysis in ester hydrolysis by, 219 Imidazol[2,3-a]isoquinolinium 2-thione, 3-p-nitro-, mesoionic,

synthesis, 696 Imidoyl halides and rhodium(1) compounds as precursors for

rhodium(III) carbenes: three-fragment oxidative addition reaction as a route to transition-metal carbene complexes, 274

Imines. Asymmetric synthesis of α-amino-acids from diastereomeric metal-imine complexes, 750

 $\textbf{8,11-Imino-2,5}: \textbf{14,17-diepoxy} \textbf{[17]} annulenone,\ 807$ 

**Inclusion** complexes, metal cation, with a macrotricyclic ligand: [3]-cryptates, 1100

Indole alkaloids, application of modified Polonovski reaction to total synthesis, 930

alkaloids: roxburghine B and E, nuclear magnetic resonance evidence for their stereochemistry, 784

Fisher synthesis, suggested intermediate: isolation of a 2aminoindoline derivative, 1067

6-(3-methylbuta-1,3-dienyl)-, from Monodora tenuifolia, 327 and pyrroles, new acylation of; preparation and photolysis of acyloins, 77

Indoles. Adirubine: a novel carboxy-indole alkaloid, 1007 Biomimetic synthesis and structure of the bisindole alkaloid

alstonisidine, 697 Biomimetic synthesis of the bisindole alkaloid, villalstonine,

2-ethylthio-, oxidation with hydrogen peroxide. Oxidative migration of the ethylsulphonyl group, 473

6-methoxy-, electrophilic substitution, 461

reactivity in electrophilic substitution, 427

synthesis: reaction between α-halogenometallic compounds and ortho-acylanilines, 415

Indolo[2,3-a]quinolizine, 1,2,3,4,6,7,12,12b-octahydro-, carbon-13 Fourier transform nuclear magnetic resonance spectroscopy, 703

Inositol, lactose, and galactose, crystals structures of calcium bromide complexes: calcium ion binding to uncharged sugars, 727

Intramolecular nucleophilic aromatic substitution reactions involving the novel displacement of hydride ion by cyanobenzyl carbanions, 848

Iodides, alkyl, solvent effects on carbon-13 chemical shifts in. Deshielding of carbon-13 nuclei by attached iodine atoms,

Iodine, molecular, resonance fluorescence and absorption spectra: identification and molecular assignment, 1054

oxidation of unsaturated Bunte salts, 974

Polyiodine cations. Preparation and nuclear quadrupole resonance characterization of tri-iodine and penta-iodine tetrachloroaluminates, I<sub>3</sub>+AlCl<sub>4</sub>- and I<sub>5</sub>+AlCl<sub>4</sub>-, 779 Trifluoromethyliodine(v) tetrafluoride, 839

Iodinin, incorporation of 6-hydroxyphenazine-1-carboxylic acid into, 355

Iodolactonization reaction,  $\beta$ -lactones as kinetic products, 472 Ion, negative, production by secondary election n a mass n a mass spectrometer ion source, 245

Ion-pair formation in aprotic solvents, thermodynamics and kinetics, 1157

Iridium, low-energy photochemical reactions of the tetrakis-(methyl isocyanide)iridium(I) cation and some oxidative additions of a stable complex of five-co-ordinate iridium(I),

Preparation, identification, and crystal structure of a novel hexanuclear iridium-copper cluster complex, 858

Reaction of hydroperoxides with trans-IrX(CO)L<sub>2</sub> complexes,

Reaction of tetrafluoroethylene and hexafluorobut-2-yne with nitrosyltris(triphenylphosphine)iridium: X-ray diffraction of di-\(\mu\)-hexafluorobut-2-enylene-bis-\([cis\)-triphenylphosphinenitrosyliridium(I)], 53

Iron. Autoxidation of iron(II) di-imine complexes, 772 Bis-(π-arene-π-cyclopentadienyliron) dications, 907

 $\begin{array}{ll} {\rm Bis}\cdot(\mu\text{-}{\rm diphenylphosphido}-\mu'\text{-}{\rm carbonyl-}\pi\text{-}{\rm methylcyclopenta-}\\ {\rm dienylcarbonyliron)rhodium} & {\rm hexafluorophosphate:} & {\rm next}\\ \end{array}$ 

nonclosed trinuclear rhodium-iron complex, 990  $\mu$ -(Carbonyltriphenylphosphineplatinio)octacarbonyldi-iron:

an unusual platinum-iron cluster complex, 200 clathro-chelates derived from dimethylglyoxime and boron

compounds, simple direct syntheses, 1291

compounds, origin of the  $K\beta'$  satellite peak in X-ray fluorescence spectra: correlation with magnetic susceptibility, 564

Correlation between core-electron binding energies and Mössbauer chemical isomer shifts for inorganic complexes containing iron(II) low spin, 751

Crystal structure of a bis(tricarbonyliron) complex of 3, \alphadimethylstyrene, 1077

Cycloaddition to a nitrogen-bridged iron complex. Preparation and crystal structure of the maleic anhydride adduct of  $\iota$ -(3,6-diphenylpyridazine)—hexacarbonyldi-iron, 810

2,2-Dimethyl-1,1,1,1-tetracarbonyl-1-ferra-2-silacyclopentane: insertion of [Fe(CO)<sub>4</sub>] into a strained organosilicon ring, 445

Enthalpies of activation for the iron(II)-iron(III) redox reaction at platinum and palladium electrodes in chloride and sulphate media, 159

Evidence for a trigonal twist mechanism in the intramolecular rearrangement of tris-(N-methyl-N-phenyl-dithiocarbamato)iron(III), 6

Evidence for 'C' terms in the magnetic circular dichroism of  $Fe(CN)_6^{3-}$ , 832

Exchange coupling in binuclear oxy-bridged iron(III) protoporphyrin IX dimethyl ester, 263

Isolation of a transition-metal complex of hexaborane(10);

 $\mu$ -Fe(CO)<sub>4</sub>-B<sub>6</sub>H<sub>10</sub>, 1155 Kinetically controlled displacement reactions of conjugated dienes with rhodium(I) and iron(0) complexes, 745

Labile product in the photoreduction of tetrakis-(1,10-phenanthroline)-diaquo- $\mu$ -oxo-di-iron(III), 1151

3-Methoxybuta-1,3-dienone(tricarbonyl)iron. Novel carbonylation and a stabilised vinylketen, 574

Oxidative dehydrogenation of diamine ligands co-ordinated to low-spin iron(II), 207

Photochemical preparation of thiophen 1,1-dioxide-tricarbonyliron complexes, 501

Photoreduction of iron(III) chloride in aqueous media, 1294

Photochemistry of tricarbonyl(cyclo-octatetraene)iron, 814 X-Ray molecular structure of allene-trimer complexes of

hexacarbonyldi-iron, 157
Redox behaviour and Mössbauer spectra of some dinuclear bridged sulphido-derivatives of iron, 1094

Single-crystal study of Prussian Blue: Fe<sub>4</sub>[Fe(CN)<sub>6</sub>]<sub>3</sub>,14H<sub>2</sub>O,

Stereochemical non-rigidity of tricarbonyl(cyclo-octatetraene)iron as shown by Fourier transform carbon-13 nuclear magnetic resonance, 1165

Structure of the C<sub>16</sub>H<sub>16</sub>.Fe<sub>4</sub>(CO)<sub>9</sub> complex derived from iron tricarbonyl complexes of dimers of cyclo-octatetraene, 736

Sulphur dioxide as an unsupported bridging ligand: synthesis and X-ray crystallographic characterization of μ-(sulphur dioxide)-bis(π-cyclopentadienyldicarbonyliron), 981

Tetracarbonylallyliron cations. Proton exchange reactions,

Reaction between azabullvalene and nonacarbonyldi-iron, 1156 Photochemistry of tricarbonyl(cyclo-octatetraene)iron, 814

Isoalloxazine bis(naphthalene-2,3-diol), 10-propyl-, a flavin molecular complex, crystal structure, 205

Isoalloxazine—continued

(flavin) dehydrogenation of dimethyl trans-1,2 dihydrophthalate, 847

Isobenzimidazoles, unexpected fragmentation reaction of tetracyanoethylene with, 1302

Isobenzofuran, reactivity, 841

retro Diels-Alder reaction as a convenient route to. Preparative flash vacuum thermolysis, 347

Isochroman-3-one, 4-(3,4-dimethoxybenzyl)-6,7-dimethoxy-, potential controlled anodic oxidation, 718

Isococlaurine, bis-, alkaloid: nemuarine, 980

Isocyanate, chlorosulphonyl, control over cyclisation pathways in reaction with olefin, 1244

chlorosulphonyl, reaction with cyclic trienes. Stepwise conjugate addition, 1246

chlorosulphonyl, reactions with cyclic dienes. Evidence for a true dipole in  $2\,+\,2$  addition, 1247

intermediates in Elcb mechanism of carbamate hydrolysis, 500 phenyl, photocycloaddition, 362

Isocyanates, and aldehydes, reaction between, catalysed by metal carbonyls, 484

Isocyanide ligand, examples of reversible hydrogen transfer to. Oxidation of alcohol to co-ordinated carboxylate with a dioxygen complex of ruthenium, 458

Isocyanides, aryl, photo-induced isomerization into cyanides, 429 novel cycloaddition reactions with diphenylacetylene using transition-metal complexes, 837

Isoflavones, direct conversion of 2'-hydroxychalcones into, using thallium(III) nitrate: synthesis of (±)-sophorol and  $(\pm)$ -mucronulatol, 825

28-Isofucosterol, fate of the C-25 hydrogen during conversion into cholesterol in the insect Tenebrio molitar, 1296

Isoindole, 393
2-methyl-: benzoheterocycles via aryne C—C cyclisation, 397 synthesis by retro-Diels-Alder reaction, 1149

Isoleucine biosynthesis, absolute configuration of an intermediate: 2,3-dihydroxy-3-methylpentanoic acid, 398

Isopentane glass, phosphorescence quenching by diffusion in, 184
Isopropoxides, metal, magnetic nonequivalence of methyl
protons in, 189

**Isoquinoline** alkaloid,  $(\pm)$ -xylopinine, total synthesis by thermolysis, 675

alkaloids, two, with a methylenoxy-bridge, 408

Isoquinoline-platinum(II) complex, rigid conformers, 1249 Isoquinolines, rearrangement in their synthesis from benzyl-

aminoacetonitriles, 643 Isotope exchange, hydrogen, very rapid, new series of homogeneous metal catalysts for, in aromatic compounds, 1172

Jgem, effect of adjacent heteroatoms (groups) on its magnitude, 124

Jahn-Teller theorem applies to transition states, 1044

cis-Jasmone, ready route to, via 1,3-dithian-derived 1,4diketones, 529

Juvenile hormone, Cecropia, racemic, new approach to stereospecific total synthesis, 1311

C<sub>17</sub>-Juvenile hormone, useful intermediates for synthesis. Geraniol and nerol in organic synthesis, 486

**Keten** and N-phenylhydroxylamines, preparation of N-hydroxyphenacetin and formation of 1-acetyloxindoles from keten and N-phenylhydroxylamines, 891

Keten, intramolecular cycloadditions in unconstrained systems, 1337

Ketens, cycloaddition of an aziridine, 199

Keto-enol tautomerism, ab initio molecular orbital study of effects of α-substitution, 771

Ketones, aliphatic, heats of formation: structure correlations based on environment treatment, 932

and aldehydes from thioacetals, 382

aromatic, Arrhenius parameters for some type II photofragmentations, 390

asymmetric reduction of, by homogeneous catalytic hydrogenation, 1188

 $\alpha\alpha'$ -dibromo-, debromination with a zinc-copper couple in methanol. Formation of α-methoxy-ketones as a criterion for the intervention of 2-oxyallyl cations, 963

circular dichroism at 185-195 nm, 35

enolisable, reactions with triphenylphosphine in carbon tetrachloride, 443

Ketones—continued

metal enolates as protecting groups for, during metal hydride reduction, 1017

β-tri-, new synthetic route to derivatives; reaction of an enamine with 3-acetyl-2-hydroxy-6-methylpyran-4-one, 890 triplet, slow quenching of by alkyl thiols, 167

 $\beta\gamma$ -unsaturated, nature of triplet state, 580

 $\alpha\beta$ -unsaturated, new synthesis. Silyl alkenyl ethers as the synthetic equivalent of enols, 741

 $\beta\gamma$ -unsaturated, new photochemical reaction, 809

Ketonic solvents, novel metal-catalysed reactions of dipyrazol-1yl ketone with, 841

 $\beta$ -Keto-sulphides and 1,3-diketones, new syntheses. alkenyl ethers as the synthetic equivalent of enols, 946

( $\pm$ )-Kreysigine, synthesis via a p-quinol acetate, 740

α-Lactam, demonstration of a non-planar arrangement at nitrogen. X-Ray crystallographic structure determination of an aziridinone, 43

 $\beta$ -Lactam antibiotics substituted  $\alpha$  to the  $\beta$ -lactam carbonyl, general method for synthesis, 1138

initial formation from 2-cyclopropylpropene and chlorosulphonyl isocyanate, 878

β-Lactams, trans- and cis-, related to penicillin, synthesis. Nucleophilic substitution of a 3-chloro-β-lactam, 319

Lactone, apparent stabilization to ring opening: stereopopulation, 403

new natural steroidal, with a  $17\alpha$ -side-chain; crystal and molecular structure of withanolide E, 877

Lactones,  $\gamma$ - and  $\delta$ -,  $\alpha$ -hydroxymethylation: new synthesis of  $\alpha$ -methylene- $\gamma$ -butyrolactones, 1317

bicyclic, new preparation: photolysis of diazocarbonyl compounds in allylic alcohols, 822

 $\beta$ -Lactones as kinetic products in the iodolactonization reaction,

Lactose, galactose, and inositol, crystal structures of calcium bromide complexes: calcium ion binding to uncharged sugars, 727

Lanosulin, metabolite, molecular structure, 1168

Lanthanide, alcohol-, evidence for octa-co-ordination in shift reagent complexes of, and its implications in the search for the geometric factor governing observed shifts, 1193

chemistry, three-co-ordination in: tris[bis(trimethylsilyl)amido lanthanide(III) compounds, 349

induced 18C nuclear magnetic resonance shifts in pyridine and  $\beta$ -picoline, contact term contribution to, 1343

induced nuclear magnetic resonance shifts, pseudo-contact contributions, 1180

nuclear magnetic resonance shifts, origin of, and their uses, 791 phenyl, o-bonded, preparation and molecular structure, 1225 shift reagent system, direct observation of free and complexed substrate in, 312

shift reagents, contact effects in nuclear magnetic resonance spectra, 535

Lanthanides, organo-, Lewis acidity. Evidence for isocarbonyl and isonitrosyl complex formation, 268

shifts induced by tris(dipivalomethanato)lanthanides in <sup>19</sup>F nuclear magnetic resonance spectroscopy, 619

**Lanthanum.** Stereochemistry of the octakis (pyridine N-oxide)lanthanum(III) ion, 516

Laser Raman and resonance fluorescence spectra of flames, 381 Lead. Catalysis of electrolytic hydrogen evolution at lead by absorbed atomic hydrogen, 266

tetra-acetate oxidation of dimethyl anilinofumarate, 917 tetraethyl, adsorbed, evidence for surface activation in its photolysis, 147

**Leucine** unit,  $\beta$ -hydroxy-, of frangulanine, stereochemistry, 915 Levopimaric acid and related dienes, conformation, 16

Lewis basicity, secondary deuterium isotope effect on: tris-(dipivaloylmethanato)europium as a simple and effective probe, 436

Lichexanthone and alternariol: biogenetic-type syntheses of heptaketide natural products, 953

Ligands and organomercurials, softness scale for, determined by bromine nuclear magnetic resonance relaxation, 587

Lipids. Carbon-13 nuclear magnetic resonance in biosynthetic studies of, 318

Lipiferolide, a cytotoxic germacranolide, and γ-liriodenolide, two new sesquiterpene lactones from Liriodendron tulipifera, Liquid crystals, phase diagrams of binary mixtures, 926

Lithium. 1,2- or 1,4-Addition in the interaction of quinolines and organolithium compounds, 259

arenes, metallation of aryl ethers by, 869

atoms, reaction with chlorocarbons at 800 °C; new route to polylithium compounds, 1078

dihydronaphthylide, stoicheiometry and synthetic utility of reaction with alkyl halides, 752

Lithiotriphenylphosphinioacetonide, a new type of 1,3dianion, 876

Mechanism of reactions of sulphonium salts with organolithium reagents, 1079

methyl-, action on 8,8-dibromobicyclo[5,1,0]oct-3-ene. Preparation and reactions of some endo-tricyclo[3,2,1,02,4]octane derivatives, 523

Novel aryl-bridged tetranuclear copper-lithium cluster compounds: synthesis and characterisation by <sup>13</sup>C and <sup>1</sup>H nuclear magnetic resonance spectroscopy of bis-{2-[(dimethylamino) methyl phenyl copper(1) lithium, 940

salt complexes of 1,5,9,13-tetraoxacyclohexadecanes, 1012 salts, complexes with 1,4,8,11-tetra-azacyclotetradecane, 1303 Synthesis of allenic hydrocarbons from 1-halogenoallenes and

dialkyl copper lithium reagents, 593

triethylborohydride and monomeric aluminium t-butoxide as the active intermediates in the reductive opening of tetrahydrofuran and related ethers by the triethylborane induced reaction of lithium tri-t-butoxyaluminohydride, 868
Wittig-type reactions of 2-lithio-2-trimethylsilyl-1,3-dithian:

improved and extended synthesis of alkylidenedithians for

1-carbon homologation, 526

Longicamphor, and copacamphor, base-catalysed enolization,

**Longipinenes,**  $\alpha$ - and  $\beta$ -, racemic, total synthesis, 1173

Luciferin, Cypridina, model for biosynthesis: cyclisation of a dehydropeptide derivative, 894

Lycorine, stereochemistry of hydroxylation in its biosynthesis in Clivia miniata Regel, 936

Lysozyme, hen's egg-white, good chromophoric substrate for, 3,4-dinitrophenyl tetra-N-acetyl- $\beta$ -chitotetraoside, 828

Macralstonine, bis-indole alkaloid, biomimetic synthesis of,

Macrocycles, effect of ring size on threading reactions, 231 Macrocyclic compound, novel, and its copper complex, synthesis, 577

Magnesium and aluminium, determination of co-ordination number in some compounds of: a comparison of X-ray photoelectron (ECSA) and X-ray emission spectroscopies,

transition-metal carbonyl derivatives, synthesis, 972

Magnetic field, extrinsic, effect on parahydrogen and orthodeuterium conversion catalysed by neodymium oxide, 1176 Magnetic susceptibilities, determination, by a new nuclear magnetic resonance method, 153

Magnoflorine, biosynthesis from reticuline by direct oxidative

coupling, 1269

Maleic anhydride adduct of  $\mu$ -(3,6-diphenylpyridazine)-hexacarbonyldi-iron, preparation and crystal structure. Cycloaddition to a nitrogen-bridged iron complex, 810

Malonates. Crystal structure of potassium trihydrogen dimalonate: a neutron diffraction study, 972

Malonyl anhydrides, novel route to; triphenylphosphine deoxygenation of malonyl peroxides, 797

Manganese and molybdenum, thiocarboxamido complexes, 804 σ- and π-Bonded dinitrile complexes of Mn<sup>I</sup> and Re<sup>I</sup> carbonyl halides, 513

carbonyl-diaza-alkyl complexes. Mn-N bond formation by decarbonylation of carbamoyl-type complexes, 774

carbonyls, electron spin resonance studies of metal-metal and metal-halogen bonding, 1020 Conversion of arenes into cyano-arenes *via* co-ordination to

manganese(1), 330

Crystal and molecular structures of bis[tetracarbonyldiphenylmethylphosphinemanganese(0)] and bis[tetracarbonyldimethylphenylarsinemanganese(0)], 1251

Crystal structure of a tri-tertiary phosphine complex of manganese(1) and chromium(0), 799

Low temperature stopped-flow investigation of manganese(II) complex formation with bipyridyl-type ligands in anhydrous methanol, 717

Manganese-continued

'Red band' in the spectrum of MnO<sub>8</sub>Cl, 1046

X-Ray crystal structure of bis(pentacarbonylmanganese)- 2.2': 8',2"-terpyridylcadmium  $C_{18}H_{11}N_3Cd[Mn(CO)_6]_2$ , 760 Synthesis of manganese(I) carbene complexes, 1339

Mass spectrometer, ion storage, application of novel type: a lowpressure chemical ionisation source, 1179

Mass spectrometry, chemical ionization. Nitric oxide as a reagent gas, 620

Maytanprine and maytanbutine, new antileukaemic ansa macrolides from Maytenus buchananii, 1065

Meerwein reagent, new. O-Methyldibenzofuranium fluoroborate, 315

Melampodin, new germacranolide from Melampodium leucan-thum Torr. and Gray var. leucanthum (Compositae), 137 novel sesquiterpenoid, X-ray determination of structure and absolute configuration, 140

Menaquinones, bacterial, biosynthesis evidence for the involvement of 2-oxoglutaric acid, 232

5-Mercaptopyrimidine nucleosides, easy access to, through onestep synthesis of 5-thiocyanato-uridine and -2'-deoxyuridine, 1025

Mercury. Intramolecular delivery of a water equivalent in the oxymercuration reaction. Conversion of an allylic alcohol into a cis-vicinal diol, 1196

Methylation by common nuclear magnetic resonance reference compounds, 780

Novel mercury(II) chloride complex of  $S-\beta$ -(2-pyridylethyl)-Lcysteine, 812

Quadrupole-coupling constants of halogen atoms in methylmercury halides, 1216

X-Ray crystal and molecular structure of the adduct of mercury(II) chloride with dehydrodithizone, 604

X-Ray crystal structure of the 1:1 adduct of trichloromethylmercury chloride and 1,10-phenanthroline, 1119

Softness scale for ligands and organomercurials determined by bromine nuclear magnetic resonance relaxation, 587

three-co-ordinate complex; crystal structure of Hg(SCN)<sub>3</sub>,

 $As(C_0H_0)_0$ , 1043 Metabolite. Molecular structure of the metabolite lanosulin,

[2,2] Metacyclophanes, iodine-induced transformations 1,2,3,3a,4,5-hexahydropyrenes: a highly selective cycloisomerisation reaction involving intermolecular hydrogen transfer, 163

Metal carbonyl chemistry studied with implanted ions, 1177 carbonyls, photoinitiation of polymerization and hydrogen abstraction by, 762

complexes, application of strain energy minimisation to geometric isomers, 726

complexes with terminal dicyanomethylenecarbene ligands formed by chlorine migration reactions, 1053

enolates as protecting groups for ketones during metal hydride reduction, 1017

-imine complexes, diastereomeric, asymmetric synthesis of αamino-acids from, 750

ion incorporation into porphyrin molecules, general mechanism,

ions, some bivalent, solvent exchange rates: mechanism of complex formation in methanol, 106

isopropoxides, magnetic nonequivalence of methyl protons in,  $\bar{1}89$ 

-metal bonds, new types, vibrational frequencies, 164

Metallation, internal, of tertiary and secondary carbon atoms, 65 of aryl ethers by lithium arenes, 869

Metallocarborane, 11-atom polyhedral, prepared by polyhedral contraction, 900

Metallocenes, first transition series, ring exchange reactions, 687 Methaemoglobin, human, electrochemical reduction, 621

Methane deuterium exchange on graphite-potassium lamellar compounds, 177
planar, calculations on the lowest state, 933

Methanol, debromination of  $\alpha,\alpha'$ -dibromo-ketones with a zinc-copper couple in. Formation of  $\alpha$ -methoxy-ketones as a criterion for the intervention of 2-oxyallyl cations, 963

mechanism of complex formation in: solvent exchange rates for some bivalent metal ions, 106

Methines, poly-, electronic polarizability, 1056 Methoxide, intramolecular displacement by the ionised carboxygroup, 834

Methoxy-group, aromatic, ipso-nitration, 1216

S-Methoxymethyl thioacetates and derivatives, thermolysis, novel  $\beta$ -elimination reaction in the vapour phase, 848

Methyl-gold bond, reactions, 938

protons, magnetic nonequivalence of in metal isopropoxides,

1-Methylallyl radical, kinetics of the cis-trans-isomerisation. New technique for the study of unimolecular radical reactions, 783

O-Methyldibenzofuranium fluoroborate. A new Meerwein

reagent, 315 (Z)-Methyl-ONN-azoxymethanol, methylation with, nature of the reactive species, 887

Methylene, kinetic evidence for a large separation between singlet and triplet, 1024

 $\alpha$ -Methylene ketones, photochemistry; competitive  $\beta$  and  $\gamma$ hydrogen abstraction, 729

3-Methylenecepham derivatives, synthesis: reduction of cephalosporanic acids with chromium(II) salts, 800

Methylenes, diaryl-, insertion into benzyl fluoride, differential effect of radical g-factors on the polarization of <sup>1</sup>H and <sup>19</sup>F nuclei in products, 1323

Micellar systems, steady state and pulse radiolysis studies of Cl. - reactivity in, 14

Micelles, reversed, catalysis by, in non-polar solvents: decomposition of 1,1-dimethoxy-2,4,6-trinitrocyclohexadienylide ion in benzene, 269

Molecular orientation, measurement of, within bulk polymeric samples using anisotropic Raman scattering, 1187

Molybdenum and manganese, thiocarboxamido complexes, 804 Arene molybdenum chemistry: oxidative dimerisation of propene to a hexa-2,4-diene derivative and related reactions, 987

Attainment of an eighteen-electron configuration by means of hydrogen bridging in a purported sixteen-electron pyrazolylborate complex of molybdenum: structure of (3,5-dimethylpyrazolylborato)dicarbonyl-(trihapto-cycloheptatrienyl)molybdenum, 777

Carbon-sulphur bond cleavage. Structure of [Mo(SCNPr<sub>2</sub>)-

(S<sub>2</sub>CNPr)]<sub>2</sub>S<sub>2</sub>, 906 **Molybdenum.** Crystal structure of tetrabromotris(dimethylphenylphosphine)molybdenum(IV), 1278

hexacarbonyl disproportionation catalyst, supported, X-ray photoelectron spectra, 198

rhenium, and osmium, novel routes to new organoimido (organonitrene) complexes, 549

Versatile synthesis of cyclic molybdenum- and tungsten-carbon σ-bonded complexes, 571

2- and 4-Monoacetyldeuteroporphyrin IX, synthetic, 413 Monothiobenzil, preparation and reversible polymerisation, 616 Mopanols and peltogynols, immediate biogenetic precursors of,

1-(Morpholino)-7-chloro-7-phenylbicyclo[4,1,0]heptanes, isomeric, rearrangement. Question of quasi-enamine reactivity of aminocyclopropanes, 659

 $(\pm)$ -Mucronulatol, and  $(\pm)$ -sophorol, synthesis: direct conversion of 2'-hydroxychalcones into isoflavones using thallium(III) nitrate, 825

Multiplet spectra, first-order, in chemically induced dynamic nuclear polarization, a graphic method for their semiquantitative analysis, 45

Muristerone A, a new photoecydsone, structure, 1060

Muscone, formation; reaction of dodecatrienylnickel with allene, 802

Mycolic acids of Mycobacterium phlei, 111

cis-Myrtanylamine, ring expansion by a 1,3-shift of carbon during reaction with nitrous acid, 789

NADH models, hydrogen transfer in. Intramolecular photochemical redox reaction, 1023

Naphthalene anion, formation of, by the reaction of 4-phenyl-1,3-dioxan with sodium-potassium alloy, 1230

1,4-endoperoxide, octamethyl-, 254

1-methoxy-, addition of dibromocarbene, 667

Naphthalenes, alkyl-, formation of 1,4-endoperoxides from their dye sensitized photo-oxygenation, 253

isomeric mono- and di-chloro-, ion kinetic energy and mass spectra, 260

perfluoro-, substitution of, by aryl-nitrenes, 366 photoreductions by sodium borohydride, 592

 ${\bf Naphthalen-2 (1 H)-one, 3,4-} dihydro-7-hydroxy-, new synthesis. \\$ Photolysis of p-[2-(2-halogenomethyl-1,3-dioxolan-2-yl) ethyl]phenol and 1,4-dioxadispiro[4,1,5,2]tetradeca-8,11dien-10-one, 210

Naphthols, oxidation by ruthenium tetroxide, 428

1-Naphthols, 4-arylazo-, photochemical oxidation, 4632-Naphthonitrile, solvent participation in photoreaction with 2,3-dimethylbut-2-ene in methanol, 1136

Naphthoquinone. Catalytic activity of the electron donoracceptor complex of polynaphthoquinone with potassium, 1051

Naphthylide, dihydro, -lithium, stoicheiometry and synthetic utility of reaction with alkyl halides, 752
Narciclasine, absolute configuration: biosynthetic approach,

tetra-acetate, crystal and molecular structure, 240

Nemuarine, a bis-isococlaurine alkaloid, 980

Neodymium oxide, extrinsic magnetic field effect on parahydrogen and orthodeuterium conversion catalysed by, 1176 Nerol and geraniol in organic synthesis. Useful intermediates for

the synthesis of C<sub>17</sub>-juvenile hormone, 486

Nickel atoms, reactions with unsaturated hydrocarbons, 1098 carbonyl, mild dehalogenative reduction of tri- and dihalogenomethyl groups by, 885

Crystal and molecular structure of iodo-[1,1,1-tris(diphenylphosphinomethyl)ethane]nickel(1), 1160

Crystal structures of two five-co-ordinated cobalt(II) and nickel(II) complexes having the  $MN_2P_2Br$  chromophore (M=Co<sup>II</sup> or Ni<sup>II</sup>), 651

Diazoalkane-nickel(0) complexes, 1105

Dichlorobis(triorganostannyl)bis(triphenylphosphine)nickel(IV) complexes, 881

dodecatrienyl-, reaction with allene; formation of muscone, 802 halides, π-allyl, preparation from nickel vapour, 50

Infrared spectrum of Hofmann's benzene clathrate, 307

Low-spin trigonal-bipyramidal nickel(II) complex containing an asymmetric trigonal field, 379

Novel class of dimeric nickel(II) compounds with quadridentate nitrogen ligands: crystal structure of  $[Ni_2(C_{16}H_{16}N_6)_2]$ , 681

Paramagnetic 1:1 adduct of triphenylphosphine and bis-(diethyldithiophosphato)nickel(II), 499

X-Ray crystal structure of meso-chloroaqua-6,16-dimenthyl-1,5,9,13-tetra-azacyclohexadeca-6,16-dienenickel(II) chloride,

Reaction of the  $\pi$ -allyl groups of the dodecatrienylnickel complex with aldehydes, acetyl chloride, and allyl bromide,

Reaction of bis(trichlorosilyl)bipyridylnickel(II) with diphenylacetylene, 1208

Selective cis-isomerisation of but-1-ene by homogeneous catalysts with triphenylphosphinenickel complexes, 203

-silicon complexes, new: bis(substituted silyl)bipyridylnickel(11) 105

Single crystal infrared eletronic spectrum of  $\rm Ni^2+/Cs_2ZnCl_4$  and  $\rm Ni^2+/Cs_2ZnBr_4$ , 1290

Template synthesis and X-ray structure determination of a complex of a novel monoanionic macrocyclic ligand, 1239

Three-co-ordinated complexes of cobalt(II) and nickel(I) containing bistrimethylsilylamino- and triphenylphosphineligands, 872

Nicotine, biomimetic synthesis, 1091

biosynthesis of the pyrrolidine ring; relevance of lead tetraacetate oxidation of NN-dimethylglycine, 1022

Niobium. Convenient route to three-valent bis-π-cyclopentadienyl niobium hydrides and related derivatives, 1005

Novel redox systems in hexamethylbenzene metal cluster compounds of niobium and tantalum, 1072

Nitrenes aryl-, substitution of perfluoronaphthalenes by, 366 addition to olefins, 1160

and azides, triplet aryl, reaction with molecular oxygen, 964 by photolysis of quinone imine N-oxides, 483

Nitrenium ions from hydroxylamine derivatives. A comparison of the transition state for heterolytic cleavage of the N-O versus C-O bond, 853

Nitric oxide as a reagent gas. Chemical ionization mass spectrometry studies, 620

insertion into tungsten-alkyl bonds: X-ray structure of the complex tetramethylbis(N-methyl-Neight-co-ordinate nitrosohydroxylaminato)tungsten(vI), 922

Nitriles,  $\alpha$ - and  $\beta$ -ethylthio-, interactions between cyano-group and sulphur atom in some, 236

Nitriles, new route to. Dehydration of aldoximes using 2,4,6-trichloro-s-triazine (cyanuric chloride), 1226

Nitroalkanes, action on benzofuran, 1040

Nitrogen. Crystal structure of N<sub>3</sub>S<sub>3</sub>F<sub>3</sub>, 548 Effect of paramagnetic species on the nuclear magnetic resonance spectra of nitrogen-15, 1159

Five-centre transition complex involving  $N_2T$ , 585 -fixing system,  $(\pi \cdot C_5H_5)$  TiCl + MeMgI +  $N_2$ , isolation of a new intermediate complex, 1178

Formation of a nitrogen to carbon bond in a reaction of a dinitrogen complex, 444

Involvement of titanocene and related species in the reduction of dinitrogen and olefins, 481

Reduction of ligating dinitrogen to yield a ligating N2H2 moiety, 1010

Nitrone, cyclic, mechanism of photochemical formation from the nitrite of a fused five-membered ring alcohol, 376

Nitrones, N-alkyl, reaction with diphenylketen, 1146 reactions with copper(I) phenylacetylide, 466

p-Nitrophenyl acetate, catalysis by stearyltrimethylammonium bromide of reaction with long chain alkanethiols, 1131

alkanoates, aggregation in aqueous solution: a caution concerning their use in enzyme model studies, 897

phosphate, decomposition in aqueous solutions at 73 °C, effect of polyethyleneimine, 1013

sulphate, methyl, bond scission processes in methanolysis, 918 N-Nitrosoacetamide, N-n-butyl-, acid-catalysed decomposition—an unusual slow proton transfer to nitrogen. Nitroso-compounds, 627

Nitroso-compounds, aliphatic, inter- and intra-molecular 'ene' reactions, 329

compounds. Reaction of N-nitrosophenylamine with Nmethylaniline-direct transnitrosation, 518

**Nitrosyl** ligands, geometry. Preparation, reactions, and X-ray structure determination of  $[Os(NO)(CO)_2(PPh_3)_2]^+$ , 119

Nitrous acid, ring expansion by a 1,3-shift of carbon during reaction of cis-myrtanylamine with, 789

Nitrous oxide, formation of  $N_2O^-$  from by  $\gamma$ -radiation, electron spin resonance evidence, 510Stability of  $N_2O^-$  in cyclohexane, 1001**Nitroxide** radical, allyl-substituted, decomposition, 1142

synthesis, convenient, 328

Norbornadiene rhodium(1) complex, homo-Diels-Alder addition of hexafluorobut-2-yne: crystal structure of the adduct [RhCl(norbornadiene)( $C_4F_6$ )]<sub>4</sub>, 509

Norbornene derivatives, substituted, stereocontrolled synthesis of a prostanoid synthon by their oxidative cleavage, 609

Norborn-2-enes, syn-7-alkoxy-, tetracarbonylchromium(0) complexes, 1335

Norcaradienes, stabilization by electronic effects, 973

Novanin, dihydro-, the germacranolide, transformation of  $\alpha$ santonin into, 698

Nuclear magnetic resonance. Carbon-13 magnetic resonance of organometallic carbonyl compounds, shiftless relaxation reagent for, 456

 $^{13}$ C, shifts in pyridine and  $\beta$ -picoline, lanthanide-induced, contact term contributions to, 1343

Fourier transform carbon-13, stereochemical non-rigidity of tricarbonyl(cyclo-octatetraene)iron as shown by, 1165

<sup>1</sup>H, at unnatural abundance. First-order spectra from alicyclic and aliphatic hydrocarbons, 542

Method, new, for determination of magnetic susceptibilities, 153 Shift reagent, the dipyridine adduct of tris-[(2,2,6,6-tetramethylheptane-3,5-dionato)europium(III),  $Eu(dpm)_3(py)_2$ ], crystal and molecular structure, 400

shifts, lanthanide-induced, pseudo-contact contributions, 1180

shifts, lanthanide, origin of, and their uses, 791 spectra, contact effects with lanthanide shift reagents, 535

spectra, <sup>1</sup>H; interpretation of lanthanide-induced shifts in, 127 spectroscopy, 19F, shifts induced by tris(dipivalomethanato)lanthanides, 619

Nuclear polarization, dynamic, chemically induced; a graphic method for the semi-quantitative analysis in first-order multiplet spectra in, 45

Nuclear spin polarisation, chemically induced dynamic, in products of reactions of diphenylmethylene with benzyl fluorides: novel effects arising from intramolecular interactions of polarized <sup>1</sup>H and <sup>19</sup>F nuclei, 474

Nucleophiles, carbanionic character of decafluorobenzhydryl bromide and its behaviour towards, 943

Nucleophilic reactivity, enhanced, general treatment, 522

Nucleosides, 5-mercaptopyrimidine, easy access to, through onestep synthesis of 5-thiocyanato-uridine and -2'-deoxyuridine,  $10\bar{2}5$ 

structural and enthalpic relationships, 51

**C-Nucleosides**, potential intermediates for their synthesis; synthesis of 2,3,5-tri-O-benzyl- $\alpha$ -(and  $-\beta$ -)-D-ribofuranosylethyne, 346

Nucleotides. Complete analysis of the fast Fourier transformed 100 MHz <sup>1</sup>H nuclear magnetic resonance spectra of oxidized and reduced pyridine mononucleotides, 975

Use of fast Fourier transform <sup>1</sup>H nuclear magnetic resonance spectroscopy to determine the helical sense of pyridine dinucleotides, 977

 $\pm$ )-Obtusafuran, isolation and synthesis, 992

Octa-2,6-dienes, acetone-sensitized cis-trans photoisomerization, 129

Octamethylnaphthalene 1,4-endoperoxide, 254

Oestrogen precursors, potential: synthesis of 7,19-disubstituted androgens, 7

Olefin and 2-aminobenzenethiol, novel photochemical reaction of alcohols in presence of, 209

and benzene, cationic complexes of copper(1) trifluoromethanesulphonate, 559

disproportionation, mechanism. Reaction of diazomethane on a cobalt molybdate catalyst, 104

factors affecting trans/cis ratios in elimination reactions of alkyl bromides, 561

insertion reactions, nickel-catalysed, 1015

-metathesis reaction, hydridic agents as co-catalysts, 1202

Direct deoxygenation of vicinal diols with tungsten(IV),

rotation in  $[Os(CO)NO(C_2H_4)(PPh_3)_2]PF_6$ , mode, 1312

stereospecific trisubstituted, synthesis via interconversion of allylic sulphoxides and sulphenates, 702

synthesis, Wittig, in alcoholic solution, stereochemistry, 191

Olefinic aldehydes, stereochemical course of their cyclization, 956

Olefins, addition of aryl nitrenes, 1160

alkoxythallium(III) compounds, reaction with palladium(II) chloride. Evidence of Tl-Pd exchange in oxymetallates, 234 and dinitrogen, involvement of titanocene and related species in their reduction, 481

arylation by palladium(II) acetate and triarylphosphine: reaction of co-ordinated phosphines, 695

control over cyclisation pathways in reaction with chloro-sulphonyl isocyanate, 1244

Convenient preparation of novel palladium- $\pi$ -olefin complexes from bis(dibenzylideneacetone)palladium(0), 629

electron-rich, rhodium(1)-catalysed dismutation: rhodium(1) carbene complexes as intermediates, 927

mono-, linear and circular dichroic study, 411

simple, allylic radicals from, adsorbed on hydrogen mordenite catalyst: electron spin resonance study, 1282

sodium borohydride reduction of alkoxythallated compounds of, 517

strained and crowded, carbon-13 coupling constants and chemical shifts, 988

synthesis from sterically hindered alcohols by pyrolysis of

thiocarbonate O-esters, 1215
Tridentate unsaturated tertiary phosphine obtained by dehydrogenation of 2,2'-bis(diphenylphosphino)bibenzyl in the presence of rhodium complexes: X-ray crystal structure of the chelate olefin complex RhCl(o-Ph<sub>2</sub>P·C<sub>6</sub>H<sub>4</sub>·CH:CH:-C<sub>6</sub>H<sub>4</sub>·PPh<sub>2</sub>-o), CH<sub>2</sub>Cl<sub>2</sub>, 1011

Organometallic carbonyl compounds, shiftless relaxation reagent for carbon-13 magnetic resonance of, 456

sandwich complexes, novel, based on transition-metal chalcogenides, 301

Osmium and ruthenium pentammine dinitrogen salts, assignment of the metal-dinitrogen stretching frequency, 767

benzyne-, phenyl-, and related complexes: oxidative addition reactions of triphenylphosphine with dodecacarbonyl-triosmium(0), 87

cluster complexes containing C<sub>6</sub>H<sub>4</sub> as ligands, fluxional behaviour, 224

Osmium—continued

dioxygen complex, and an ethylene complex of ruthenium. Ru(CO)<sub>2</sub>(PPh<sub>3</sub>)<sub>3</sub> and Os(CO)<sub>2</sub>(PPh<sub>3</sub>)<sub>3</sub>, 60

Geometry of nitrosyl ligands. Preparation, reactions, and Xray structure determination of  $[Os(NO)(CO)_2(PPh_3)_2]^+$ , 119 Mode of olefin rotation in  $[Os(CO)NO(C_2H_4)(PPh_3)_2]PF_6$ ,

1312

molybdenum, and rhenium, novel routes to new organoimido (organonitrene) complexes, 549

oxide tetrafluoride, synthesis, mass spectrometric identification and crystallography, 1080

Orsellinic acid, 3-methyl-, (2,4-dihydroxy-3,6-dimethylbenzoic acid), isolation from a culture of Aspergillus terreus, 391

Oruwal, novel dihydroanthraquinone pigment from Morinda lucida Benth., 405

Oxa-adamantane, one step synthesis, novel rearrangement of 2-adamantyl "hypoiodite", 311

 $\Delta^2$ -1,3,4-Oxadiazolin-3-carboxylate, 5-bromo-2-oxo-, methyl, crystal structure, 1036

Oxalates, methyl aryl, new photo-Fries rearrangement, 668

cis-Oxalato complex of oxovanadium(IV); crystal structure of

the [VO(C<sub>2</sub>O<sub>4</sub>)<sub>2</sub>HO<sub>2</sub>)<sup>2-</sup> ion, 945

Oxalodihydrazide, copper(II) ions, and acetaldehyde, structure of oxygenated condensation product between, 1163

1,3,2-Oxathiazolylio-5-oxide, 4-phenyl-, detection of transients in low-temperature photochemistry of, by ultraviolet and electron-spin resonance spectrometry, 1125

Oxazepines. Novel reversible dimerisation of perhydropyrido[1,2-c][1,3]oxazepines; X-ra; membered macrocyclic dimer, 1307 X-ray analysis of a 14-

1,2-Oxazepines, dibenzo[c,f]-, synthesis of, as primary stable

photo-products in the photolyses of acridine 10-oxides, 1093

Oxazine, tetrahydro-1,2- and -1,3-,piperazines, hexahydropyrimidines, and tetrahydro-1,3-thiazine, conformation
of the NH-groups, 673

Oxazines, palladium-catalysed ring opening: a means of stereospecific isotopic labelling at benzylic carbon, 1152

 $\Delta^2$ -Oxazolines, formation by cyclization of N-acyl- $\beta$ -hydroxyamines on zinc acetate. Oxazoline complex of zinc acetate,

Oxazol-4(5H)-ones, conversion into substituted furans: cycloadditions with tautomeric systems, 1000

Oxetan formation, intersystem crossing, and emission: reactions of the exciplex from singlet-excited phenanthrene and dimethyl fumarate, 711

Oxetans and vinyl epoxides, rhodium(1) catalysed rearrangements, 491

steroid, ring expansion to acetals, 713

Oxidation catalyst; glass wool, 1030

Oximino-macrolides, synthesis, 1078

Oxindoles, 1-acetyl-, formation of, and preparation of Nhydroxyphenacetin, from keten and N-phenylhydroxylamines, 891

Oxiren, evidence against participation in mechanism of the Wolff rearrangement of α-diazohomoadamantanone, 694

Oxocarbene-oxiren equilibrium, 11

Oxo-complexes.  $Cr^{2+}$  reduction of  $\mu$ -superoxo- and  $\mu$ -peroxocomplexes, 1340

Oxoniabenzvalene intermediate in photohydrolysis of 2,4,6trimethylpyrylium perchlorate: formation by isomerisation,

Oxygen diradicals, thermal generated, conformational effects in their rearrangements, 103

molecular, reaction with triplet aryl nitrenes and azides, 964 O-H and N-H bonds in organic molecules, homogeneous catalytic activations by ruthenium, osmium, rhodium, and iridium complexes, 290

Reactions of singlet oxygen and the triphenyl phosphite-ozone adduct with germacrene, 424

reactions with some cobalt nitrosyl complexes, 670

singlet, addition to thioethylenes, 73

singlet, stereochemistry of addition to vinylene diethers, 490

 $(^1\Delta_{\mathfrak{g}})$  Oxygen, Quenching of singlet, by 2,2,6,6-tetramethylpiperidine derivatives, 1199

Oxygenation, photosensitized, of acyclic 1,3-dienes, 1332

Ozonolysis, applications to zwitterion trapping reactions in: base catalysed dehydration of α-alkoxybenzyl hydroperoxides, 1086

Palladium acetate as a catalyst in the oxidation of n-hexenes and a direct preparation of tri-hapto-hexenylpalladium complexes, 642 and platinum, <sup>19</sup>F nuclear magnetic resonance spectra of

fluoro-complexes, 1274

Convenient preparation of novel palladium-π-olefin complexes from bis(dibenzylideneacetone)palladium(0), 629

Crystal structure of bis-(2,2'-bipyridyl)palladium(11) nitrate monohydrate and the stereochemistry of palladium(II), 356 Dynamic equilibria involving 1,3-diaryltriazenido derivatives

of rhodium(1), palladium(11), and platinum(11), 184

The nature of the  $\alpha\beta$ -process in palladium-catalysed multiple exchange reaction of polycyclic hydrocarbons with deuterium: significance of bridgehead olefin stability, 1185 Reaction of alkoxythallium(III) compounds of olefins with

palladium(II) chloride. Evidence of Tl-Pd exchange in oxymetallates, 234

Steric effects in a distorted square planar bis-(2,2'-bipyridyl) metal complex: X-ray crystal structure of aquobis-(2,2'-bipyridyl)palladium(II) nitrate, 159

structure of bromobis(triphenylphosphine)-(1,2,3,4-tetrakis-methoxycarbonylbuta-1,3-dien-1-yl)palladium and evidence for a C-H... Pd interaction, 1273

synthesis and X-ray structure of carbon-bonded palladium(II) chelates of acetic anhydride and acetic acid, 910

zerovalent complexes, reactions with dimethyl acetylenedicarboxylate, ligand effects on the formation of palladiacyclopentadiene complexes, 629

Paracyclophane derivatives, rotation of benzene rings in, studied by nuclear magnetic resonance spectroscopy, 754

[8][10]Paracyclophane and doubly bridged [2,2]paracyclophane, optically active, syntheses, 433

[2,2]Paracyclophanes, optically active multilayered, with known absolute configurations, syntheses, 433

Peltogynols, and mopanols, immediate biogenetic precursors of,

Penicillanic acid, 6-phenylacetylhydrazono- and 6β-phenylacetylhydrazino, conversion of benzyl 6-diazopenicillanate into, 192

Penicillin, 6,6'-dimer, 1106

sulphoxides, reaction with vinyl ethers, 601

Penicillin sulphoxides, transformation into cephalosporins by

azo-compounds, 1304

Penicillin V, anhydro-, fungal metabolite of: phenoxyacetylthioglycyl- $(\pm)$ -valine, 478

Penicillins, 1,2-seco-, oxidation, 229

1,3,4,6,9b-Penta-azaphenalenes, synthesis, 1070

Pentaborane(9), long-range magnetic resonance coupling between the apical and basal hydrogens in, 351

Pentacyclo[4,4,0,02,10,03,5,04,8]decane [4,4,0,02,1004,8]decane, 3 and tetracyclo-

Pentafulvalenes, tetrabenzo-, disubstituted. substituentdependency of cis-trans-isomerisation, 732

Pent-2-(and -1-)-ene, thermal 'ene' addition of monothiobenzil

Pentanoic acid, 2,3-dihydroxy-3-methyl-, an intermediate in the biosynthesis of isoleucine, absolute configuration, 398

Pentan-2-ol, 2-methyl-, non-Saytzeff dehydration over γ-Al<sub>2</sub>O<sub>3</sub>, 1330

Pentoses. Structure of prumycin, a 2,5-diamino-2,5-dideoxypentose-containing antibiotic, 633

Peptide, dehydro-, cyclisation of a derivative: model for Cypridina luciferin biosynthesis, 894

mutant, of an abnormal haemoglobin, identification by mass

spectrometry, 114 synthesis, 2-isobutoxy-1-isobutoxycarbonyl-1,2-dihydroquinoline as a coupling reagent, 942

synthesis, solid-phase, a novel side-reaction; inter-chain aminolysis, 929

Peptides. 13C Nuclear magnetic resonance spectroscopy and cis/trans isomerism in dipeptides containing proline, 994

Cyclic tetrapeptides of glycine or alanine combined with sarcosine; co-existence of neutral and protonated species,

histidine, simplified synthesis, 276

N-methylation, 357

tryptophan-containing, solid-phase synthesis, 663

Perchloric and hydrochloric acid, moderately concentrated aqueous, relationship between HR and Ho in, 969

Perfluoroalkyl carbanions, reaction with benzenediazonium chloride, 618

Peroxalate, novel cyclic, synthesis, its thermolysis and photolysis, 174

Peroxides, 1,4-endo-, formation from the dye-sensitized photooxygenation of alkyl-naphthalenes, 253

Petroporphyrin homologues, origin: transalkylation of vanadyl

octa-alkylporphyrins, 562

Phenacetin, N-hydroxy-, preparation, and formation of lacetyloxindoles from keten and N-phenylhydroxylamines,

Phenanthrene, singlet-excited, and dimethyl fumarate, reactions of the exciplex from: oxetan formation, intersystem crossing, and emission, 711

1,10-Phenanthroline. Labile product in the photoreduction of tetrakis-(1,10-phenanthroline)diaquo- $\mu$ -oxo-di-iron(III), 1151 X-ray crystal structure of the 1:1 adduct with trichloromethylmercury chloride, 1119

Phenazine N-oxide, photochemical synthesis, 693

Phenazine-1-carboxylic acid, 6-hydroxy-, incorporation into iodinin, 355

**Phenol** and diethylaniline, electron-rich aromatic compounds, photochemical reaction with chloroform, 812

Phenolic compounds, selective ortho-substitution of some, 214 constituent, C<sub>17</sub>-, from Athrotaxis selaginoides Don., athrotaxin, 246

hydroxy- and thiol groups protected as their 4-picolyl ethers, cleaved by electrolytic reduction, 1123

Phenols, para-substituted, torsional barriers in, from ab initio molecular orbital theory and far infrared spectroscopy, 308

Phenoxide ions, intramolecular alkylation, 770
Phenoxyacetylthioglycyl-(±)-valine, fungal metabolite of anhydropenicillin V, 478

Phenyl allyl ethers, ortho-Claisen rearrangement in trifluoroacetic acid, 645

β-aminovinyl ketones, photochemical reactions, 775

Phenyl, lanthanide, σ-bonded, preparation and molecular structure, 1225

quinolin-3-yl ketone, photolytic reduction to 3-benzylquinoline, 527

vinyl ether, photosensitized cyclodimerisation, 2

Phenylalanine, stereospecific exchange reaction at the  $\beta$ -CH<sub>2</sub> of, competing with gliotoxin biosynthesis, 100 tyrosine, and 3-(3-carboxyphenyl)alanine, steric course and

rearrangements in their biosynthesis from shikimic acid in higher plants, 842

Phenylboronates, cyclic, of diols and polyols; mass spectro-

metry, 1051

Phenylcarbenes, nitro-. Generation and reactions with cisbutene, 512

Phenylcyclopropylcarbene, generation from 2,3-biscyclopropylstilbene oxide, 1002

**N-Phenylhydroxylamines** and keten, preparation of N-hydroxyphenacetin and formation of 1-acetyloxindoles from, 891

Phenyliminyl radical, 2-fluoro-, through-space coupling, 721

Pheromones, sex. cis-Dec-5-en-1-yl 3-methylbutanoate as the pheromone from the Pine Emperor moth (Nudaurelia cytherea cytherea Fabr.), 686

Phosphacyclopropenes: synthesis of triphenylphosphiren oxide, 1085

Phosphamides. Crystal and molecular structure of cyclophosphamide hydrate, 1163

Phosphate, a-glycero-; an X-ray study of disodium DL-aglycerophosphate hexahydrate, 465 p-nitrophenyl, decomposition in aqueous solutions at 73 °C,

effect of polyethyleneimine, 1013

Phosphates, 3-deoxy-3-fluoro-D-glucose 1- and 6-, synthesis and their interaction with phosphoglucomutase and UDPGpyrophosphorylase, 691

X-Ray crystal and molecular structure of triethylammonium tris-(o-phenylenedioxy)phosphate, 676

Phosphazenes, cyclic, intra-ring bonding in, 464

Stereochemistry of cobalt(II) in a complex of cobalt(II) chloride with dodeca (dimethylamino) cyclohexaphosphazene, 23

Synthesis of tricarbonylhexachlorocyclotriphosphazenechromium, 407

Phosphetans, 19F nuclear magnetic resonance of hexafluoroacetone adducts. Relative apicophilicities of groups, 554 Phosphido-group, co-ordinated, some reactions, 612

Phosphine complexes, tertiary, or tertiary arsine complexes of transition metals, use of  $^{13}$ C nuclear magnetic resonance spectroscopy in determining their stereochemistry, 151

tridentate unsaturated tertiary, obtained by dehydrogenation of 2,2'-bis(diphenylphosphino)bibenzyl in the presence of rhodium complexes; X-ray crystal structure of the chelate olefin complex  $RhCl(o-Ph_2P\cdot C_6H_4\cdot CH: CH\cdot C_6H_4\cdot PPh_2-o)$ , CH<sub>2</sub>Cl<sub>2</sub>, 1011

triphenyl-, deoxygenation of malonyl peroxides by, a novel route to malonyl anhydrides, 797

triphenyl-, oxidative addition reactions with dodecacarbonyltriosmium(0): benzyne-, phenyl-, and related complexes of osmium, 87

triphenyl-, paramagnetic 1:1 adduct with bis(diethyldithiophosphato)nickel(II), 499

triphenyl-, reactions in carbon tetrachloride with enolisable ketones, 443

tri-tertiary, complex of manganese(1) and chromium(0), crystal structure, 799

Phosphines. Ab initio molecular orbital calculations on H<sub>2</sub>NPH<sub>2</sub>. Stereochemistry at nitrogen, 1147

Barrier to pyramidal inversion in isopropylphenyltrimethoxysilylphosphine, 185

Complex-forming reactions of an arylcopper(I) cluster compound with organophosphines. Unexpected C(alkyl)-P bond cleavage in 1,2-bis(diphenylphosphino)ethane, 452

co-ordinated, reaction: arylation of olefins by palladium(II) acetate and triarylphosphine, 695

Crystal and molecular structure of the trimethyltin chloride complex of triphenylphosphine-acetylmethylene, 1104

Cyclic, stereospecificity of two-bond carbon-13 coupling with phosphorus-31 in some, 357 NN-dimethylamino-, angular dependence of two-bond coup-

ling constant <sup>2</sup>J<sub>PNC</sub>, 1204

dimethylhydroxylaminohalogeno-, restricted P-N rotation in, 662

four-membered cyclic, dihedral dependence of the  $^2J_{\rm PCC}$  spin coupling in:  $^{13}{\rm C}$  nuclear magnetic resonance of organophosphorus compounds, 367

Heterocyclic bisphosphine (CF<sub>3</sub>PCF<sub>2</sub>)<sub>2</sub>, 763 Structure of bromobis(triphenylphosphine)-(1,2,3,4-tetrakismethoxycarbonylbuta-1,3-dien-1-yl)palladium and evidence for a C-H . . . Pd interaction, 1273

Three-co-ordinated complexes of cobalt(II) and nickel(I) containing bistrimethylsilylamino- and triphenylphosphineligands, 872

Phosphinioacetonide, lithiotriphenyl-, a new type of 1,3dianion, 876

Phosphinyl substituent, sulphonium ylides containing, 952

Phosphites. Metallation and rearrangement reactions in ruthenium-triphenyl phosphite complexes: crystal structure of  $HRu_2(CO)_3[P(OC_6H_4)(OPh)_2]_2[OP(OPh)_2]$ , 1041 Reactions of singlet oxygen and the triphenyl phosphite-ozone

adduct with germacrene, 424

Phosphoglucomutase and UDPG-pyrophosphorylase, synthesis of 3-deoxy-3-fluoro-D-glucose 1- and 6-phosphates and their interaction with, 691

Phosphole aromaticity and kinetics of retro-cyanoethylation of phosphonium salts, 469

Phospholimine, formation, and novel preparation of benzofurazans by thermolytic rearrangements of N-(o-nitroaryl)-1,2,5-triphenylphospholimines, 1242

Phosphonitriles, exocyclic co-ordination: crystal and molecular structure of N<sub>4</sub>P<sub>4</sub>(NMe<sub>2</sub>)<sub>8</sub>, W(CO)<sub>4</sub>, 875

Phosphonium salts, kinetics of retro-cyanoethylation, and the

question of phosphole aromaticity, 469

Phosphonothioate, phenyl-, menthyl S-methyl, stereochemistry of methanolysis of, 120

Phosphorane, aminotetrafluoro-, synthesis and stereochemistry, 560

and ylide formation angular dependence, 1270

Phosphoranes, alkyl. Instability of an alkyl hexaco-ordinate

phosphate and an alkyl phosphorus(v) hydride, 404 and related compounds, formation in trialkyl phosphite deoxygenations of 2,6-dimethylaryl 2-nitrophenyl ethers and 2,6-dimethylaryl-2-nitrophenylmethane, 520

fluoro-, a new synthesis. Diequatorial four-membered ring in a difluorophosphorane, 272

monoalkoxyfluoro-, stable, 1127

novel sulphur containing, preparation, 395

Phosphoranes—continued

polymeric, insoluble, preparation and application: Wittig resins, 134

**Phosphorescence** quenching by diffusion in an isopentane glass,

Phosphorimides, thio-, new, 1050

Phosphorinan-2-one, cis-2,5-di-t-butyl-1,3,2-dioxa-, non-chair conformation: conformations of saturated six-membered ring phosphorus heterocycles, 169

Phosphorus. Carbon-13 nuclear magnetic resonance of 1,3,2-

dioxaphosphorinan-2-ones, 406Characterisation of the ions  $[PCl_nBr_{4-n}]^+$   $(0 \le n \le 4)$  by means of solid state <sup>31</sup>P nuclear magnetic resonance, 348

-containing compounds, high-resolution X-ray emissions study of central atom-ligand bonding, 934

Determination of chemical shifts by heteronuclear magnetic triple resonance: nature of the phosphorus-selenium bond in organophosphorus selenides, 902

Intermolecular association of biphosphines, 1189

Photoelectron (ESCA), X-ray, and X-ray emission spectroscopies, a comparison of, determination of co-ordination number in some compounds of magnesium and aluminium,

Photo-Fries rearrangement of methyl aryl oxalates, new, 668 **Photoreduction** of aromatic hydrocarbons by lithium aluminium hydride and sodium borohydride, 1195

Phototendering vat dyes, two, primary photochemical processes

Phthalate, trans-1,2-dihydro-, dimethyl, isoalloxazine (flavin) dehydrogenation, 847

Phthalimide, N-methylsulphonyl-, formation of sulphene by its thermolysis, 412

Phthalimidonitrene adducts, mild thermal route to; aziridine dissociation, 884

Phytoecdysone, new: structure of muristerone A, 1060

Phytoecdysones, biosynthesis and interconversion in Sesuvium Portulacastrum L., 692

Phytoene, stereochemistry, 996

4-Picolyl ethers, protection of thiol and phenolic hydroxygroups as, cleaved by electrolytic reduction, 1123

Piperazines, hexahydropyrimidines, tetrahydro-1,2- and 1,3oxazine, and tetrahydro-1,3-thiazine, conformation of the NH-groups, 673

Piperidine, 2,2,6,6-tetramethyl-derivatives, singlet  $(^{1}\Delta_{g})$  oxygen by, 1199

**Piperidines,** steric course of N-benzylation, kinetic and X-ray crystallographic studies: quaternization by preferential equatorial attack, 455

Plastoquinone-1 [2,3-dimethyl-5-(3-methylbut-2-enyl)-1,4benzoquinone], molecular structure of a unique photoproduct of, 743

Platinum. μ-(Carbonyltriphenylphosphineplatinio)octacarbonyldi-iron: an unusual platinum-iron cluster complex, 200

Dynamic equilibria involving 1,3-diaryltriazenido derivatives

of rhodium(I), palladium(II), and platinum(II), 184 Electron delocalization in metal chain complexes. Evidence for extrinsic conductivity in Pt(NH<sub>3</sub>)<sub>4</sub>PtCl<sub>4</sub>, 302

Insertion of carbon disulphide into a metal-fluorine bond: crystal structure of  $[Pt(S_2CF)(PPh_3)_2][HF_2]$ , 72

Ligand exchange in solutions of complex hydrides of platinium-(II), 17

Mechanism of formation of propional dehyde and  $\pi$ -allyl platinum (II) complexes from allyl alcohol and diallyl ether with cationic platinum(II) hydrides, 150

Metal \(\pi\)-complexes of dienes with crossed double bonds: dichloro-(5-methylenecycloheptene)platinum(II), 459

metals, carboxylato(triphenylphosphine) complexes, 1047 Molecular structure of cyclo-[bis-(\mu-acetato-\mu-nitrosyl)-bis-(di-\mu-acetatodiplatinum)] and some aspects of the preparation of diacetatoplatinum(11), 1039

Novel dimeric platinum(I) complex, 467 and palladium, <sup>19</sup>F nuclear magnetic resonance spectra of fluoro-complexes, 1274

Platinum(0) complexes of short-lived cyclic allenes, 178

Preparation and X-ray crystallographic determination of the structure of the platinacyclobutenone [(C6H5)3P]2Pt[OC3- $(C_6H_5)_2], 672$ 

Production of platinum(III) by flash photolysis of PtCl<sub>6</sub><sup>2-</sup>, 132

Platinum—continued

Proton injection in the highly conducting mixed valence square planar platinum complex;  $K_{1\cdot 64}Pt(\bar{C}_2O_4)_2.xH_2O$ ; new solid state proton galvanic cell, 75

Rigid conformers of an isoquinoline-platinum(II) complex,

Stereochemistry of cleavage of silicon-platinum bonds in optically active silicon-platinum compounds, 1223

tetrachloride, crystal structure, 270

Thermal and field-induced anomalies in the one-dimensional conductor K<sub>2</sub>Pt(CN)<sub>4</sub>Br<sub>0·3</sub>2·3H<sub>2</sub>O, 322

Three-fragment oxidative addition of chloroform-iminium or -amidinium chlorides to RhI or PtII substrates; complexes of the secondary carbene CHNMe<sub>2</sub>, 851

trans-Influence of trimethylsilylmethylide  $_{
m the}$ ligand

Polarization of

(Me<sub>5</sub>SiGH<sub>2</sub>-) in platinum(II) complexes and the crystal structure of a platinum(II) alkyl, 613 arization of  $^{19}$ F-nuclei, chemically induced dynamic: dimerization of  $\alpha$ -fluorobenzyl radicals, mechanistic evidence, 1324

of  $^{1}\mathrm{H}$  and  $^{19}\mathrm{F}$  nuclei in products of insertion of diarylmethylenes into benzyl fluoride, differential effects of radical g-factors,

Poly-(γ-benzyl L-glutamate), helix-coil transition using <sup>13</sup>C resonance spectroscopy, 335

Polyether, cyclic, preparation and crystal structure of a binuclear complex of potassium with one molecule of: bis(potassium thiocyanate)dibenzo-24-crown-8, 66

Polyether complex, stable OH<sub>8</sub>+-cyclic, characterised by infrared spectroscopy, 1308

**Polyethyleneimine**, effect on the decomposition of p-nitrophenyl phosphate in aqueous solutions at 73 °C, 1013

Polyfluoroalkane-sulphonic acids and methyl polyfluoroalkyl sulphides, synthesis, 249

Polymer cross-linking, and polymer chemistry, use of per-fluoro-2,5-diazahexane-2,5-dioxyl, 833

2,8-Polymethylene-benzohomotropylium cations, preparation, 472

Polyphenyls and trans-stilbenes, new and simple synthesis. Activation of Grignard reagents by transition-metal complexes, 144

Polonovski reaction, modified: application to the total synthesis of some indole alkaloids, 930

Porphin model compounds, potential, four orbital predictions in some, 213

Porphyrin biosynthesis by <sup>13</sup>C-nuclear magnetic resonance; synthesis of [13C]porphobilinogen and its incorporation into protoporphyrin-IX, 920

 $\beta$ -keto-esters and their cyclisation to phaeoporphyrins, 844 molecules, general mechanism for metal ion incorporation, 13 ring, distorted, an example. Crystal structure of 5-benzoyloxyoctaethylporphyrin, 449

Porphyrin IX, 2- and 4-monoacetyldeutero-, synthetic, 413

Porphyrins, metallo-, unusual. Structure of the product from the reaction of dodecacarbonylruthenium with mesotetraphenylporphine: 'dicarbonyltetraphenylporphinatoruthenium(II)', 584

octa-alkyl-, vanadyl, transalkylation: origin of petroporphyrin homologues, 562

Potassium, catalytic activity of the electron donor-acceptor complex of polynaphthoguinone with, 1051

Catalytic hydrogenation of benzene by lamellar compounds  $C_8K$  and  $C_{24}K$ , 928

Hydrogen-deuterium equilibration reaction catalysed by graphite-potassium compounds, 39

Methane deuterium exchange on graphite-potassium lamellar compounds, 177

Preparation and crystal structure of a binuclear complex with one molecule of cyclic polyether: bis(potassium thiocyanate)dibenzo-24-crown-8, 66

Proton injection in the highly conducting mixed valence square planar platinum complex;  $K_{1\cdot 64}Pt(C_2O_4)_2.xH_2O$ ; new solid state proton galvanic cell, 75

Prephytoene alcohol, synthesis, 1045

Proline, <sup>13</sup>C nuclear magnetic resonance spectroscopy and cisl trans isomerism in dipeptides containing, 994

Crystal and molecular structures of bis-(N-benzylprolinato)copper(2+) complexes, 1328

**Prolines,** N-acyl, and related compounds, correlation of crystal and solution conformations using nuclear magnetic resonance, 788

Propane, hydroformylation under mild conditions using Rh.  $(CO)_{12}, 709$ 

oxidative dimerisation to a hexa-2,4-diene derivative and related reactions; arene molybdenum chemistry, 987

Propane-1,2-dione, 1-(o-α-methylbenzyl)phenyl-, photocyclisation and photoracemisation, 470

[4,2,2]-Propellane (tricyclo[4,2,2,01,6]decane) derivative, synthesis. Acyloin condensation, 96

2-Prop-2-enylcyclopent-2-enone, 'free-rotor', triplet di-m-

methane rearrangement, 864
Propentdyopent adducts as major products in photo-oxidation of bilirubin in hydroxylic solvents, 596

**Propionaldehyde** and  $\pi$ -allylplatinum(II) complexes, mechanism of formation from allyl alcohol and diallyl ether with cationic platinum(II) hydrides, 150

n-Propylamine, reaction with 2,5-di-t-butyl-1,4-benzoquinone,

Propylidenemalonate, dimethyl 2-bromo-2-methyl-, formation of cyclopropanes from. Nucleophilic substitution reactions of allylic halides carrying electron-withdrawing substituents

in the γ-position, 375

Propyne, 1-diethylamino-, and benzyne, cycloadditions with 3,4-diazanorcaradienes, 1171

Propynyl-allyl ammonium cations, base-catalysed rearrangement and a novel synthetic route to substituted biphenyls,

-allyl ammonium cations, base-catalysed rearrangement in protic media, 557

Prop-2-ynyl sulphoxides, aryl, unusual ortho-Claisen rearrangements, 83

Prostaglandin synthesis, design, 1235

Prostaglandin E<sub>1</sub> and its optical antipodes, new stereoselective total synthesis, 304

 $(\pm)$ -15-deoxy-, total synthesis, 240 **Prostaglandins,** allenyl, synthesis, 904

general method for conversion of F into E, 1120  $10\alpha$ -hydroxy-, synthesis, 1126

Prostanoid synthon, stereo-controlled synthesis by oxidative cleavage of substituted norbornene derivatives, 609

Protodemetallation reactions, influence of  $\sigma-\pi$  conjugation on rate, 237

reactions, influence of  $\sigma - \pi$  conjugation on rate: a comment, 1255

Proton exchange kinetics, proton magnetic resonance study in molten ammonium hydrogen sulphate, 889

Proton magnetic resonance signals, decoupling, located under the H<sub>2</sub>O peak, 1055

Protoporphyrin-IX biosynthesis from coproporphyrinogen-III,

coproporphyrin-III from, 1347

dimethyl ester iron(III), binuclear oxy-bridged, exchange coupling in, 263

mechanism of biosynthesis of the vinyl groups, 1265

Prumycin, a 2,5-diamino-2,5-dideoxypentose-containing antibiotic, 633

Pseudoclovene-B, structure, 385

Puberulonic and puberulic acids. Biosynthesis of the fungal tropolones, 655

Purine derivatives, 8-amino-, disubstituted, new synthesis, 606 Pyran-3-one, 2-benzo-, photodecarboxylation of adducts and photoreactions of the derived o-quinodimethanes, 1038

Pyran-4-one, 3-acetyl-2-hydroxy-6-methyl-, reaction with an enamine, new synthetic route to  $\beta$ -triketone derivatives, 890

Pyranosides, hex-3-eno-, ready route to, 31

Pyran-2-ylidene carbene complexes, 420 Pyrazines, 1,4-dialkyl-1,4-dihydro-, stable, 829

Pyrazole chemistry, degenerate acyl migrations in. Degenerate group movements, 709

Pyrazolidinones, photochemical oxidation, 682

Δ1-Pyrazoline, cis- and trans-3,4-dimethyl-, photolysis: evidence for the formation of triplet 1,3-biradicals, 273

Pyrazolylborate complex of molybdenum, purported sixteen electron, attainment of an eighteen-electron configuration by means of hydrogen bridging; structure of (3,5-dimethylpyrazolylborato)dicarbonyl-trihapto-cycloheptatrienyl)molybdenum, 777

Pyrenes, 1,2,3,3a,4,5-hexahydro-, iodine-induced transformation of [2,2]metacyclophanes to: a highly selective cycloisomerization reaction involving intermolecular hydrogen transfer, 163

 $(\pm)$ -Pyrenophorin, a macrolide antibiotic, total synthesis, 1031 Pyrethrins, absolute configuration. Configuration and structure of (+)-allethronyl (+)-trans-chrysanthemate 6-bromo-2,4dinitrophenylhydrazone by X-ray methods, 1275

**Pyridazine** N-oxides, photolysis; formation of cyclopropenyl

ketones, 550

Pyridine dinucleotides, use of fast Fourier transform <sup>1</sup>H nuclear magnetic resonance spectroscopy to determine the helical sense of, 977

hydrochloride, C-demethylation and methyl group migration during O-demethylation with, 914

mononucleotides, oxidized and reduced, complete analysis of the fast Fourier transformed 100 MHz <sup>1</sup>H nuclear magnetic resonance spectra, 974

pentachloro-, and pentachloropyridine 1-oxide, photolysis, 505 Stereochemistry of the octakis(pyridine N-oxide)lanthanum-(III) ion, 516

Pyridines, 1,4-dihydro-, nuclear synthesis by rearrangement of aziridinobicyclo[2,2,1]pyridazine carboxylates, 1260

disubstituted, reductive cyclization, and intramolecular aldolization of unsymmetrical diketones, 374

3-heteroaryl-, photochemical synthesis, 594

4-hydroxy-, direct evidence for the existence of both tautomeric forms in the solid state, 573

polyhalogeno-, substituted, photochemical cyclisation, 949

and thiophens, addition reactions of cyclopentadienylidene-methylene. Bicyclic heterocycles and hetero-ylides, 1257 Pyrimidines, dihydro-, formation of carbonium ions from dihydropyrimidyl radicals in  $\gamma$ -radiolysis of aqueous solu-

tions of, 1082 hexahydro-, piperazines, tetrahydro-1,2- and 1,3-oxazine, and tetrahydro-1,3-thiazine, conformation of the NH-groups,

mesoionic, new, preparation, 999

Rearrangement of v-triazolo[4,5-d]pyrimidines, 52

Pyrimidin-2-one, a chloromethyl-1,2,3,4-tetrahydro-, expansion, 97

**Pyrimidin-2(1H)-one,** its N-methyl and NN'-dimethyl derivatives, mechanism of their bromination, 1032

Pyrochlores, some new, electrical properties, 723

x-Pyrones, new synthesis, 863

Pyrophosphate, farnesyl, new homologues, enzymatic synthesis,

Pyrrole, 2,5-dimethyl-, unusual products. Pyrrole photooxidation, 116

3-methyl-, photosensitized oxygenation involving a dioxetan intermediate, 625

Pyrroles and indole, new acylation of preparation and photolysis of acyloins, 77

Pyrrolidine ring of nicotine, relevance of lead tetra-acetate oxidation of NN-dimethylglycine, 1022

**Pyrrolidinum** perchlorate, N-methyl-N-tosyl-, tosylating reagent; synthesis and reaction, 1148

Pyrrolo[2,3-b]indole and Nb-(4-cyanobutadienyl)tryptamine, formation. Photoinduced oxidation of tryptamine derivatives, 603

Pyrrolo-pyrimidine, new ring expansion to a pyrimidopyrimidine, 402

Pyrrolyl, thienyl, and furyl ketones, reactivity of excited states

Pyryllum perchlorate, 2,4,6-trimethyl-, photohydrolysis: evidence for isomerisation to an oxoniabenzvalene intermediate, 1240

**Pysultone** ring, buta-1,3-diene-1,4-sultone, a non-aromatic  $6\pi$ electron system: X-ray structural determination, 264

Quenching of singlet  $(^1\Delta_g)$  oxygen by 2,2,6,6-tetramethylpiperidine derivatives, 1199

o-Quinodimethanes, photodecarboxylation of 2-benzopyran-3-

one adducts and photoreactions of derived, 1038

p-Quinol acetate, synthesis of (±)-kreysigine via, 740 Quinoline alkaloids, aromatic hydroxylation. Biosynthesis of skimmianine from dictamine, and a convenient synthesis of furanoquinoline alkaloids, 1029

3-benzyl-, from photolytic reduction of phenyl quinolin-3-yl ketone, 527

Quinoline—continued

2-isobutoxy-1-isobutoxycarbonyl-1,2-dihydro-, as a coupling reagent in peptide synthesis, 942 series, new rearrangement, 865

Quinolines and organolithium compounds, 1,2- or 1,4-addition in their interaction, 259

Quinolone synthesis, new, and structure of PhN: NC<sub>8</sub>H<sub>4</sub>C(CF<sub>8</sub>):-C(CF<sub>3</sub>)COCo(CO)<sub>2</sub>: reactions of azobenzene-cobalt carbonyl complexes with C<sub>2</sub>(CF<sub>3</sub>)<sub>2</sub>, 1228

Quinone epoxide, light-induced isomerisation, 1332 imine N-oxides, nitrenes by photolysis of, 483

systems, addition of  $\alpha\beta$ -unsaturated aldehydes: new annelation reaction, 955

 $\textbf{o-Quinone} \ \text{dimethide, hydroxy-, cycloaddition reactions, } 30$ dimethide, benzocyclobutene to; stereoselectivity of the electrocyclic process, 1034

oxime benzenesulphonate, revised structure for the product from the decomposition of, 242

Quinones, terpenoid, new group from Cordia spp: cordiachromes,

363

Quinoxalin-3(4H)-one 1-N-oxides, dipolar cycloaddition reactions, 218

Radical cations, mechanism of formation by u.v. irradiation of six-membered aromatic diazo-compounds in methanol acidified with hydrochloric acid: formation of semiquinone radicals by u.v. irradiation of six-membered aromatic azacompounds in neutral methanol, 1207

new class radical cations of 1,4-diphosphoniacyclohexa-2,5-

diene salts, 1130

σ\*Radicals, electron spin resonance spectra and structures, 507 Raman scattering, anisotropic, measurement of molecular orientation within bulk polymeric samples using, 1187

Rare-gas atoms, dissociation of excited HT by collision with,

Redox series, novel cross-reaction relation for, 225

Relaxation times, longitudinal, of carbohydrate derivatives, configuration dependence, 1319

Reticuline, biosynthesis of magnoflorine from by direct oxidative coupling, 1269

synthesis of the hasubanan ring system from the alkaloid, 288 **Rhenium.**  $\sigma$ - and  $\pi$ -Bonded dinitrile complexes of Mn<sup>I</sup> and Re<sup>I</sup> carbonyl halides, 513

Methyleneamido-complexes of rhenium(III), 1243

molybdenum, and osmium, novel routes to new organimido (organonitrene) complexes, 549

Rhizobitoxine, an antimetabolic enol-ether amino-acid from Rhizobium japonicum, structure, 714

dihydro-, a new ether amino-acid from Rhizobium japonicum,

Rhodamine dyes, unimolecular decay of their excited states,

Abstraction of an acetyl group from NN-dimethylacetamide by a rhodium-porphyrin complex, 1261 Bis-(µ-diphenylphosphido-µ'-carbonyl-π-methylcyclopenta-

dienylcarbonyliron)rhodium hexafluorophosphate: a nonclosed trinuclear rhodium-iron complex, 990

complex catalysed hydrosilylation of carbonyl compounds, 938 Dynamic equilibria involving 1,3-diaryltriazenido derivatives of rhodium(1), palladium(11), and platinum(11), 184
Five-co-ordinate rhodium(0) dimer: crystal and molecular

structure of tetrakis(triphenylphosphine)di- $\mu$ -carbonyldi-rhodium(0)-bisdichloromethane solvate, 586

Homo-Diels-Alder addition of hexafluorobut-2-yne to a norbornadiene rhodium(1) complex: crystal structure of the adduct [RhCl(norbornadiene)  $(C_4F_8)$ ]<sub>4</sub>, 509 Hydroformylation of propene under mild conditions using

Rh<sub>4</sub>(CO)<sub>12</sub>, 709

Kinetically controlled displacement reactions of conjugated dienes with rhodium(1) and iron(0) complexes, 745

novel carbene complexes, 993

Novel rhodium(I) dimer having dibenzoyldi-imide as a bridging ligand, 3

Protonation of (cyclohexadiene)(cyclopentadienyl)rhodium(1). Evidence for endo-proton addition, 235

Redirection of the course of a Cope rearrangement by coordination; the thermolysis of endo-6-vinylbicyclo[3,1,0]hex-2-enerhodium(t) acetylacetonate, 1206 Rhodium(t)-catalysed dismutation of electron-rich olefins:

rhodium(1) carbene complexes as intermediates, 927

Thermodynamic confirmation for the high stability of gaseous TiRh as predicted by the Brewer-Engel metallic theory and the dissociation energy of diatomic rhodium, 536

Three-fragment oxidative addition of chloroform-iminium or -amidinum chlorides to RhI or PtII substrates; complexes of

the secondary carbene CHNMe<sub>2</sub>, 851

Three-fragment oxidative addition reaction as a route to transition-metal carbene complexes: imidoyl halides and rhodium(I) compounds as precursors for rhodium(III) carbenes, 274

Tridentate unsaturated tertiary phosphine obtained by dehydrogenation of 2,2'-bis(diphenylphosphino)bibenzyl in the presence of rhodium complexes: X-ray crystal structure of the chelate olefin complex RhCl(o-Ph2P.C8H4·CH:CH:- $C_6H_4$ ·PPh<sub>2</sub>-o), $CH_2Cl_2$ , 1011

**D-**Ribofluranosylethyne, 2,3,5-tri-O-benzyl- $\alpha$ - (and synthesis; potential intermediates for the synthesis of C-

nucleosides, 346

Ring current probe, convenient: 4-methyl-2,6,7-trioxabicyclo-2,2,2]octane, 1101

 $6\pi$ -Ring system, four-membered, new: dimethyl  $\Delta^3$ -1,2-diazetine-1,2-dicarboxylate, 818

Rosamicin, a new macrolide from Micromonospara rosaria, structure, 1270

Roxburghine B and E, indole alkaloids, nuclear magnetic resonance evidence for their stereochemistry, 785

Rubrenolide and rubyrnolide: an alkene-alkyne pair from Nectandra rubra, constitutions, 514

Ruthenium. Cationic complexes in ruthenium(II), 371

dioxygen complex, oxidation of alcohol to co-ordinated carboxylate with. Examples of reversible hydrogen transfer

to an isocyanide ligand, 458 ethylene complex, and a dioxygen complex of osmium. (Ru)CO)<sub>2</sub>(PPh<sub>3</sub>)<sub>3</sub> and Os(CO)<sub>2</sub>(PPh<sub>3</sub>)<sub>3</sub>, 60

ethylidyne complex, synthesis of H<sub>3</sub>Ru<sub>3</sub>(CO)<sub>9</sub>CCH<sub>3</sub>, 1331

<sup>1</sup>H and <sup>13</sup>C nuclear magnetic resonance spectra and X-ray crystal structure of [1-methyl-3-ethyl- $(\sigma-1,3-h^2,\pi-1,2,3-h^3)$ -allyl]nonacarbonyltriruthenium: allyl group as a fiveelectron donor, 545

Metallation and rearrangement reactions in rutheniumtriphenyl phosphite complexes: crystal structure of HRu2-

(CO)<sub>s</sub>[P(OC<sub>6</sub>H<sub>4</sub>)(OPh)<sub>2</sub>]<sub>2</sub>[OP(OPh)<sub>2</sub>], 1041 and osmium pentammine dinitrogen salts, assignment of the

metal-dinitrogen stretching frequency, 767 osmium, rhodium, and iridium complexes, homogeneous catalytic activation of O—H and N—H bonds in organic molecules by, 290

Ring contraction of trans, trans, trans-cyclododeca-1,5,9triene by reaction with cis-bis(trimethylgermyl)tetracarbonylruthenium, 1227

tetroxide, oxidation of naphthols by, 428

Unusual metalloporphyrins. Structure of the product from the reaction of dodecacarbonylruthenium with meso-tetraphenylporphine: ium(II),' 584 'dicarbonyltetraphenylporphinatoruthen-

Ruthenocene, decachloro-, crystal structure. Noncoplanarity of carbon and chlorine atoms arising from valence forces, 5

Sandwich complexes, novel organometallic, based on transition-metal chalcogenides, 301

α-Santonin, transformation into the germacranolide dihydronovanin, 698

Sarcosine combined with glycine or alanine in cyclic tetrapeptides; co-existence of neutral and protonated species, 255

Scandium. Nature of scandium-carbon bond. Crystal and

molecular structure of  $[(C_6H_8)_2ScCl]_2$ , 593 Schiff bases of S-methyl dithiocarbazate, ferromagnetic and antiferromagnetic interactions of their copper(II) complexes, 909

Secondary carbon atoms, and tertiary, internal metallation, 65 Selenadiazoles and 1,2,3-thiadiazoles, symmetrical intermediate in the synthesis of carbene-metal complexes from,

Selenides, organophosphorus, nature of the phosphorus-selenium bond; determination of chemical shifts by heteronuclear magnetic triple resonance, 902

Selenium. New selenium-triethylamine catalysed synthesis of arylureas from carbon monoxide and aromatic amines, 307 Semiquinone radicals, mechanism of formation by u.v. irradiation of six-membered aromatic aza-compounds in neutral methanol, and of radical cations by u.v. irradiation of six-membered aromatic diaza-compounds in methanol acidified with hydrochloric acid, 1207

Serpentinine, X-ray crystallographic determination of the structure of the alkaloid, 871

Sesquiterpenes, germacranolide, proposed conventions for description, 142

Sesquiterpenoid, novel, melampodin: X-ray determination of the structure and absolute configuration, 140

Sesquiterpenoids, novel tricyclic, from Gymnomitrion obtusum (Lindb) Pears (Hepaticae): gymnomitrol, 1320 Sewarine  $N^4$ -methodide, crystal structure, 416

**Sex-pheromones.** cis-Dec-5-en-1-yl 3-methylbutanoate as the pheromone from the Pine Emperor moth (Nudaurelia cytherea cytherea Fabr.), 686

Shift reagent system, lanthanide, direct observation of free and complexed substrate in, 312

work, method for compensating for experimental errors, 172 Shikimic acid, steric course and rearrangements in the biosyn-

thesis of phenylalanine, tyrosine, and 3-(3-carboxyphenyl)alanine from, in higher plants, 842

Siccanochromene-A, enzymic formation, a key intermediate in the biosynthesis of siccanin, 1166

[3,3]Sigmatropic rearrangement, effects of transition-state geometry on rates, 646

1-Silacyclopentadiene, 1,1-dimethyl-2,5-diphenyl-, and diphenylacetylene, novel solid-state molecular complex, 690

Silane, phenylpentamethyl-,  $\sigma$ - $\pi$  mixing in, 28

Silanes, trimethyl- and dimethyl-, rearrangement ions in their mass spectra, 336

Silanol, trimethyl-, specificity of elimination in the mass spectra of the trimethylsilyl derivatives of di- and tri-hydroxysteroids, 765

Silanols, reaction with tellurium hexafluoride, 1113

4-Silaspiro[3,3]heptane: unexpectedly low reactivity for spirosilanes, 1068

Silicon. 2,2-Dimethyl-1,1,1,1-tetracarbonyl-1-ferra-2-silacyclopentane: insertion of [Fe(CO)<sub>4</sub>] into a strained organosilicon ring, 445

Formation and selectivity of tetrasila-adamantyl siliconcentred radical, 1249

-nickel complexes, new: bis(substituted silyl)bipyridylnickel(II)

Preparation of difluoro(trifluorosilyl)borane, 295

Spectroscopic evidence for a silicon-carbon double-bond, 861 stereochemistry and kinetics of a chloride exchange at, 1195 Stereochemistry of cleavage of silicon-platinum bonds in

optically active silicon-platinum compounds, 1223
Thermal expansion behaviour of SiO<sub>2</sub>-H<sub>2</sub>O and SiO<sub>2</sub>-NaOH-H<sub>2</sub>O, 20

Three-co-ordinated complexes of cobalt(II) and nickel(I) containing bistrimethylsilylamino- and triphenylphosphine: ligands, 872

trans-Influence of the ligand trimethylsilylmethylide (Me<sub>3</sub>-SiCH<sub>2</sub>-) in platinum(II) complexes and the crystal structure of a platinum(II) alkyl, 613

Silver. Evidence of tetragonally distorted silver(II) in complex fluorides, 291

Fragmentation reactions catalysed by Fétizon's reagent (silver carbonate on Celite), 468

X-Ray crystal structure of a dimeric silver(I) complex containing short metal-metal separations, 91

Silver oxide, hydrolysis of thioacetals with, 1323

Silybin, structure: synthetic studies, 195

Silyl alkenyl ethers as the synthetic equivalent of enols. New synthesis of  $\alpha\beta$ -unsaturated ketones, 741

alkenyl ethers as the synthetic equivalent of enols. New syntheses of  $\beta$ -keto-sulphides and 1,3-diketones, 946

Silylation, reductive, of aromatic acids, anomalous product, 1338

Silyl-1,3-dithians. Wittig-type reactions of 2-lithio-2-trimethylsilyl-1,3-dithian: improved and extended synthesis of alkylidenedithians for 1-carbon homologation, 526

Silylphosphine, isopropylphenyltrimethoxy-, barrier to pyramidal inversion in, 185

Sitosterol biosynthesis in Larix decidua, mechanism of alkylation during, 1295

β-Sitosterol, conversion to cholesterol in the silkworm; fucosterol-24,28-epoxide as a probable intermediate, 1275

Skimmianine, biosynthesis from dictammine, and a convenient syntheses of furanoquinoline alkaloids. Aromatic hydroxylation in quinoline alkaloids, 1029

Sodium fluoride, free energies of transfer from water to hydrogen peroxide-water mixtures using ion-selective electrodes, 1234 /droxide, reactions with 1-acetamidoadamantane and

hydroxide, reactions with 1-acetamido-4-phenylbicyclo[2,2,2]octane in ethylene glycol or diethylene glycol, 188

sensitive test for, in presence of lithium and potassium; detection of alkali-metal ions via optical rotatory dispersion,

Thermal expansion behaviour of SiO2-H2O and SiO2-NaOH-H<sub>2</sub>O, 20

Solid-state proton galvanic cell, new, proton injection in the highly conducting mixed valence square planar platinum complex;  $K_{1.64}$  Pt( $C_2O_4$ )<sub>2.</sub>xH<sub>2</sub>O, 75

Solvent isotope effects, measurement with cation selective glass electrodes, 989

Solvent structure, effect on the transport of water in methanolwater-alkali-metal halide systems, 1336

Solvolysis reactions, enthalpies of activation, 425

 $(\pm)$ -Sophorol and  $(\pm)$ -mucronulatol, synthesis: direct conversion of 2'-hydroxychalcones into isoflavones using thallium(III) nitrate, 825

Spectinomycin, the antibiotic, stereochemistry and absolute configuration: X-ray diffraction study, 494

Spectra. First-order from alicyclic and aliphatic hydrocarbons, <sup>1</sup>H nuclear magnetic resonance at unnatural abundance, 542 nuclear magnetic resonance, contact effects with lanthanide shift reagents, 535

nuclear magnetic resonance, <sup>1</sup>H; interpretation of lanthanideinduced shifts in, 127

Spectroscopy, nuclear magnetic resonance, 19F; shifts induced by tris(dipivalomethanato)lanthanides, 619

Spirobenzylisoquinoline alkaloids, absolute configuration, 310 Spirocoumaranone, natural: crombenin, synthesis and structure. 392

Spirophosphoranes, alkyl. Instability of an alkyl hexacoordinate phosphate and an alkyl phosphorus(v) hydride, 404

Squalene, cyclization, mechanism of, the chival origin of the C-22 hydrogen atoms of fusidic acid, 1191

Stearyltrimethylammonium bromide as catalyst in the reaction between long chain alkanethiols and p-nitrophenyl acetate, 1131

Stereochemical non-rigidity of tricarbonyl(cyclo-octatetraene)iron as shown by Fourier transform carbon-13 nuclear magnetic resonance, 1165

Stereochemistry and kinetics of a chloride exchange at silicon, 1195

Stereopopulation control: apparent stabilization of a lactone to ring opening, 403

Steroid toad venom constituent bufotoxin, structure, 45

Steroidal allenyl ketones, synthesis, 241

22-enes, some: synthesis of (a) steroidal 22,24(28)-dienes and (b) ergosta-5,7,22,24(28)-tetraen-3 $\beta$ -ol, 167

 $\beta\gamma$ -epoxy-ketones, photolysis, 1122

lactone, new natural, with a 17\a-side-chain; crystal and molecular structure of withanolide E, 877

Steroids. Constitution of four novel methyl steroid relatives (ring-D aromatic) from the insect repellant plant Nicandra physaloides, X-ray analysis of Nic-10, 1250

4,4-dimethyl- $6\beta$ -hydroxy-, photolysis of their nitrite esters, 637

4,4-dimethyl-6-oxo-, improved synthesis, 539 di- and tri-hydroxy-, specificity of trimethylsilanol elimination in the mass spectra of their trimethylsilyl derivatives, 765 Nitration of  $\Delta^5$ -steroids, 537

Photo-bromination of 4,4-dimethyl-Δ5-steroids, 350

Ring expansions of steroid oxetans to acetals, 713

stereochemical assignments in, by 13C nuclear magnetic resonance spectroscopy: configuration of the A/B ring junction, 979

Stereochemistry of the D-seco-steroid doisynolic acid, 1110

Stereoselective synthesis of  $19(10 \rightarrow 9\beta)abeo-10\alpha$ -testosterone,

Synthesis of the ABC ring system of the steroid batrachotoxin,

Steroids—continued

Terpenoid constituents of the insect repellant plant Nicandra physaloides; X-ray structure of a methyl steroid (Nic-3) acetate, 1108

two cyclopropane containing marine, crystal structure and absolute configuration, 215

**Sterols.** Ergosterol peroxide from *Rhizoctonia repens*: composition, conformation, and origin, 1217

Fate of the C-25 hydrogen of 28-isofucosterol during conversion into cholesterol in the insect *Tenebrio molitar*, 1296

Fucosterol-24,28-epoxide, as a probable intermediate in the conversion of β-sitosterol to cholesterol in the silkworm, 1275 Isolation and biosynthesis of ergosta-5,7,9(11),22-tetraen-

 $3\beta$ -ol from *Mucor rouxii*, 882 Mechanism of alkylation during sitosterol biosynthesis in Larix decidua, 1295

Unusual synthesis of ergosterol acetate peroxide, 447 Stilbene, photocycloaddition to phenyl isocyanate, 362

trans-Stilbene-2-carbaldehyde tosylhydrazone, cyclisation, 823

Stilbenes and diphenylacetylene, novel photochemical reactions

in amines, 313 Photo-oxidation of disodium 4,4'-diacetamidostilbene-2,2'disulphonate, 209

trans-Stilbenes and polyphenyls, new and simple synthesis. Activation of Grignard reagents by transition-metal complexes, 144

Streptolidine, guanidine-containing amino-acid, crystal structure, 652

**Strontium.** Kinetics of the gas-phase reactions  $MOH^+ + e^- \rightleftharpoons$ M + OH or MO + H (M=Ca or Sr), 422

Styrene,  $3,\alpha$ -dimethyl-, crystal structure of a bis(tricarbonyliron) complex, 1077

 $\beta$ -Styryl isocyanates, photo-induced decarbonylation, 439

Succinic anhydride, diphenyldiaza-, preparation and photolysis, 169

esters, reductive cleavage. A method for the introduction of acetic acid fragments, 1214

Succinimide, N-bromo-, reactions with cephalosporins, 941

Sucrose, reaction with sulphuryl chloride, 1097

Sugar, amino-, novel branched chain, from the antibiotic vancomycin. Vancosamine, 361

Sugars, partially protected, route to. Photochemical rearrangement of some o-nitrobenzylidene carbohydrate derivatives, 532

uncharged, calcium ion binding to: crystal structures of calcium bromide complexes of lactose, galactose, and inositol, 727

Sulphate, ammonium hydrogen, molten, proton magnetic resonance study of proton exchange kinetics in, 889 methyl p-nitrophenyl, bond scission processes in methanolysis, 918

Sulphene, formation by thermolysis of N-methylsulphonylphthalimide, 412

Sulphene-tertiary amine zwitterions: intermediates in the multiexchange of hydrogen in a sulphene reaction, 1313 thermal retro-Diels-Alder extrusion from a formal sulphene-

arene adduct, 700 Sulphenimines. New synthesis and barriers of stereomutation,

Sulphide, allyl methyl, evidence against the significance of C-S hyperconjugation in determining conformation, 824

Sulphides. Desulphurization of alkyl chlorocarbonyl disulphides—a method for replacement of -SH by -Cl, 773

β-keto-, and 1,3-diketones, new syntheses. Silyl alkenyl ethers as the synthetic equivalent of enols, 946

methyl polyfluoroalkyl, and polyfluoroalkane-sulphonic acids, synthesis, 249

Reactions of carbenes bearing sulphide linkages at the  $\delta$ position, 860

vinylic, photosensitized oxygenation, 477

Sulphinamides, halogeno-, halogen-exchange reactions and barriers to torsion around N-S bonds, 1154 oxidation with 1-chlorobenzotriazole, 151

Sulphine isomerisation, 1305

Sulphinylamines, aryl-, thermal reaction with aryl azides, 702 **Sulphones.** Asymmetric destruction of  $(\pm)$ -2,3-bis(phenylsulphonyl)butane, 874

Sulphonic acids, polyfluoroalkane-, and methyl polyfluoroalkyl sulphides, 249

**Sulphonium** methylide, dimethyloxo-, reaction with  $\beta$ -diketones

salts, mechanism of reactions with organolithium reagents, 1079

ylides with a phosphinyl substituent, 952

Sulphonyl carbene, intramolecular aromatic cyclisation, 893 Sulphonyl-fluoro-ethanes, syn-stereospecificity in an ElcB elimination from, 250

Sulphoxides aryl prop-2-ynyl, unusual ortho-Claisen rearrangements, 83

chiral, novel asymmetric synthesis, 61

 $\alpha$ -halogeno-, kinetics of nucleophilic substitution, 734

penicillin, reaction with vinyl ethers, 601

and sulphenates, allylic, interconversion of, stereospecific trisubstituted olefin synthesis via, 702

Unprecedented nucleophilic displacement by bicarbonate anion and its implications in the oxidation of alkyl toluene-psulphonates with dimethyl sulphoxide-sodium bicarbonate,  $25\overline{7}$ 

phur. Carbon-sulphur bond [Mo(SCNPr<sub>2</sub>)(S<sub>2</sub>CNPr<sub>2</sub>)]<sub>2</sub>S<sub>2</sub>, 906 Sulphur. cleavage. Structure of

-containing protecting groups, two, for alcoholic hydroxyfunctions, 766

Crystal structure of N<sub>3</sub>S<sub>3</sub>F<sub>3</sub>, 548

heterocycles, reaction of some with methyl fluorosulphonate,

Preparation of novel sulphur containing phosphoranes, 395 spectrophotometric study of electrochemical reduction in organic media, 293

-sulphur bonding, effect of methyl and phenyl substituents; CNDO/2 calculations on 6a-thiathiophthens, 222

Sulphur dioxide as an unsupported bridging ligand: synthesis and X-ray crystallographic characterization of  $\mu$ -(sulphur dioxide)-bis( $\pi$ -cyclopentadienyldicarbonyliron), 981 interaction with tetraphenylporphyrincobalt(II), electron spin

resonance study,  $77\overline{6}$ 

Sulphuryl chloride, reaction with sucrose, 1097

1,4-Sultone, buta-1,3-diene-, (pysultone) ring, a non-aromatic  $6\pi$ -electron system: X-ray structural determination, 264

Tantalum. Novel redox systems of hexamethylbenzene metal cluster compounds of niobium and tantalum, 1072

Nuclear quadrupole resonance spectra of tantalum-181 in tantalum(v) halides, Ta<sub>2</sub>X<sub>10</sub>, 845

Tellurium hexafluoride, reaction with silanols, 1113

Terpenes. Condrachromes: a new group of terpenoid quinones from Crodia spp., 363
Exhaustive Baeyer-Villiger oxidation of the allo-betulone

triterpenoid, 755

Lipiferolide, a cytotoxic germacranolide, and γ-liriodenolide, two new sesquiterpene lactones from Liriodendron tulipifera, 1137

elampodin, a new germacranolide from Melampodium leucanthum Torr. and Gray var. lecuanthum (Compositae), 137 Melampodin, New synthesis of a crucial intermediate for ring B bridged diterpene alkaloids, 883

Proposed conventions for describing germacranolide sesquiterpenes, 142

structure of calodendrolide, a novel terpenoid from Calodendrum caperse Thumb., 86

Structure of the tetranortriterpene bussein, 1253

Terpenoid constituents of the insect repellant plant Nicandra physaloides; X-ray structure of a methyl steroid (Nic-3) acetate, 1108

Total synthesis of the sesquiterpene (-)-daucene, 606
Total synthesis of the sesquiterpenes (+)-daucene, (-)-carotol, and (-)-daucol, 855

X-Ray crystallographic determination of the structure of the antibiotic aphidicolin: a tetracyclic diterpenoid containing a new ring system, 1027

X-Ray determination of the structure and absolute configuration of a novel sesquiterpenoid, melampodin, 140

Tertiary carbon atoms, and secondary, internal metallation, 65 **Testosterone**,  $19(10 \rightarrow 9\beta)abeo-10\alpha$ , stereoselective synthesis, 921

1,4,8,11-Tetra-azacyclotetradecane, complexes with lithium salts, 1303

Tetra-azafulvalene (Bipyrazol-4-ylidene), new derivatives, 961 Tetrabenzocyclo-octatetraene derivatives, resolution and optical stability of, 1345

Tetrabenzopentafulvalenes, disubstituted, substituent-dependency of cis-trans-isomerization, 732

Tetrachloroethylene, liquid, electric-field induced vibrational spectrum, 435

**Tetracyclo**[ $4,4,0,0^{2,10},0^{4,8}$ ]**decane**, and pentacyclo[ $4,4,0,0^{2,10}$ ,-0,3,5,04,8]decane, 3

endo-Tetracyclo[5,4,0,0 $^{2,4}$ ,0 $^{3,6}$ ]undeca-1(7),8,10-trien-5-yl pnitrobenzoate, pronounced solvolytic reactivity of, compared with the exo-epimer, 1066

Tetrahydrofuran and related ethers, reductive opening by the triethylborane induced reaction of lithium tri-t-butoxyaluminohydride, lithium triethylborohydride and monomeric aluminium t-butoxide, as the active intermediates, 868

Tetraphenylhydrazine, protonation and benzidine rearrangement, 440

s-Tetrazines, 3-monosubstituted, synthesis, and their reactions with monosubstituted acetylenes, 950

Tetrazole photochemistry: question of ring-transportation, 781 Tetrazole[1,5-b]pyridazines; formation of cyanocyclopropenes 1059

Thallium. Methoxythallation of acyclic allenes, 1129

Reaction of alkoxythallium(III) compounds of olefins with palladium(II) chloride. Evidence of Tl-Pd exchange in oxymetallates, 234

salt of the antibiotic grisorixin, crystal structure, 175

Sodium borohydride reduction of alkoxythallated compounds of olefins, 517

Sulphur-oxygen coupling by thallium(III) trifluoroacetate: synthesis of 1,6-dioxa-6a-thiapentalenes, 1283

Thebainone, N-formyl-1-methylnordihydro-, high yield synthesis, 918

Thermal 'ene' addition of monothiobenzil to 2-methylpent-2-(and-1-)-ene, 1167

9-Thiabarbaralene (9-Thiatricyclo[3,3,1,0<sup>2,8</sup>]nona-3,6-diene), 276

3-Thiabicyclo[3,2,0]hepta-1,4-diene, 1014

1,2,3-Thiadiazoles and selenadiazoles, symmetrical intermediates in the synthesis of carbene-metal complexes from, 418

1,3,4-Thiadiazoles, mesoionic, new reaction. cycloaddition with dimethyl acetylenedicarboxylate, 1300

6a-Thiathiophthens (1,6,6a-trithiapentalenes) from rearrangement of 2-thioacylmethylene-1,3-dithiols, mechanism, 540 Thiazine 1-oxides, 3,4-dihydro-3-hydroxymethyl-6-methoxy-carbonyl-1,4-2H-, unusual Pummerer reactions, 959

1,3-Thiazine, tetrahydro-, piperazines, hexahydropyrimidines, tetrahydro-1,2- and 1,3-oxazine, conformation of the NHgroups, 673

2-Thiazolines, photoisomerization to N-alkenylthioamides, 896 Thienyl, pyrrolyl, and furyl ketones, reactivity of excited states of, 155

Thiepins, monocyclic, synthesis, 1233

Synthesis of benzo[b]thiepins, a class of  $12\pi$ -electron heterocycles, 1232

Thiiren 1,1-dioxides, transition-metal complexes, 178

Thioacetal. Dethioacetalisation with cerium ammonium nitrate,

Thioacetals, aldehydes and ketones from, 382 hydrolysis with silver oxide, 1323

Thioacetates, S-methoxymethyl, and derivatives, thermolysis: novel  $\beta$ -elimination reaction in the vapour phase, 848

Thioalkylcarbenes,  $\alpha$ - and  $\beta$ -allyl-, intramolecular reactions, 62 Thioalkyl diazoalkanes,  $\alpha$ - and  $\beta$ -allyl-, intramolecular cycloadditions, 63

Thiobenzoic acid O-ester photolysis, mechanism, 632

Thioboranes their use in the synthesis of borazines, 79

O-Thiocarbamoylated hydroxamic acids, thermal rearrangement: a 1,3 radical shift, 935

Thiocarbonate O-esters, synthesis of olefins from sterically hindered alcohols by pyrolysis of, 1215

Thiocarbonyl flash photolysis, detection of transients in, 233 Thiodiboranes,  $\mu$ -alkyl, formation and properties of bis-(borane)alkanethiolate salts and their conversion into, 1090

Thioethylenes, addition of singlet oxygen, 73
Thioindoles. Oxidation of 2-ethylthioindoles with hydrogen peroxide. Oxidative migration of ethylsulphonyl group, 473

Thiol ester aminolysis, concerted push-pull catalysis in, 171 and phenolic hydroxy-groups, protection as their 4-picolyl ethers cleaned by electrolytic reduction, 1123

2,4,6-tri-t-butylbenzene-, displacement of a nitro-group from 2,2-diphenyl-1-picrylhydrazyl group in its reaction with, 482

- Thiols, alkyl, slow quenching of triplet ketones by, 167 long-chain alkane, catalysis by stearyltrimethylammonium bromide of reaction with p-nitrophenyl acetate, 1131
- Thione, diphenylcyclopropene-, X-ray structure, 528
- **Thio-nitriles**,  $\alpha$  and  $\beta$ -ethyl-, interactions between cyano-group and sulphur atom, 236
- Thiophen, dinitro-, and trinitrobenzene derivatives, inverted relationship between stability and rate of formation of Meisenheimer-type adducts, 1143
  - 1,1-dioxide -tricarbonyliron complexes, photochemical preparation, 501
  - and furan-2-carbaldehydes, alkyl furan-2-carboxylates, and 2furoyl chloride, causes of the multiple carbonyl bands, 742
  - 2-nitro-, reaction with secondary aliphatic amines, 1060 series, novel debromination, 615
- Thiophens and pyridines, addition reactions of cyclopenta-dienylidenemethylene. Bicyclic heterocycles and heteroylides, 1257
  - Steric course of formation of benzocyclobutene by thermal desulphonylation of 1,3-dihydrobenzo[c]thiophen dioxide, 541
- Thiophosphorimides, new, 1050
- Thiophthens, 3-amino-6a-thia-, synthesis, and the X-ray crystal structure of the 2-methylthio-5-phenyl derivative, 836
- 6-thia-, CNDO/2 calculations on; effect of methyl and phenyl substituents on the sulphur-sulphur bonding, 222
- Thiosulphates. Iodine oxidation of unsaturated Bunte salts,
- β-Thiovinyl cation and thiirenium ion, theoretical study on their relative stability, 8
- Tigogenin biosynthesis in Digitalis lanata, stereospecific introduction of a 24-pro-R-hydrogen, 1309
- Tin. Crystal and molecular structure of the trimethyltin chloride complex of triphenylphosphine-acetylmethylene, 1104
  - Crystal and molecular structure of triphenyltin N-benzoyl-Nphenylhydroxamate, 815
  - Dichlorobis(triorganostannyl)bis(triphenylphosphine)nickel(IV) complexes, 881
  - and germanium carbonyls, infrared spectroscopic evidence for,

  - Inorganic tin(II) derivatives, 544
    Metathesis of unsaturated fatty acid esters by a homogeneous tungsten hexachloride-tetramethyltin catalyst, 1221 Mössbauer studies of matrix-isolated SnO molecules, 730
  - Novel cationic tin(II) fluoride network in the crystal structure of tritin(II) bromide pentafluoride, 289
  - 119mSn Mössbauer parameters and crystal structure of the SnCl<sub>8</sub> ion in two forms of chlorobis[bis-(1,2-diphenylphosphino)ethane]cobalt(II) trichlorostannate(II), 630
  - <sup>1</sup>H Nuclear magnetic resonance spectrum of the stannyl ion, 1150
- Tirucall-7-ene, rearrangement to apotirucall-14-ene initiated by bromine, 1212
- Titanium. Isolation of a new intermediate complex in the nitrogen-fixing system  $(\pi - C_5H_5)$ TiCl + MeMgI +  $N_2$ , 1178 Oxidative additions to dicarbonylbiscyclopentadienyltitanium-
  - (11), 790Spectrum of Ti2+ ions isolated in a sodium chloride crystal, 1121 Supposedly five-co-ordinate titanium(IV) complexes. Crystal and molecular structure of Cl<sub>3</sub>Ti(C<sub>5</sub>H<sub>7</sub>O<sub>2</sub>), 217
- Thermal decomposition and carbonylation of bis(cyclopentadienyl)titanium(IV) and bis(cyclopentadienyl)zirconium(IV) derivatives, 654
- Thermodynamic confirmation for the high stability of gaseous TiRh as predicted by the Brewer-Engel metallic theory and the dissociation energy of diatomic rhodium, 536
- Titanocene and related species, involvement in reduction of dinitrogen and olefins, 481
- Toad venom constituent bufotoxin steroid, structure, 45
- Toluene-p-sulphonate esters, stereochemistry of hydrolysis and elimination reactions on alumina, 281
- Toluene-p-sulphonates, alkyl, oxidation with dimethyl sulphoxide-sodium bicarbonate, implications of an unprecedented nucleophilic displacement by bicarbonate anion, 257
- Toluene-p-sulphonic acid, abnormal reaction with 8,12dimethyl- and 8-methyltricyclo[6,4,0,02,7]tri-2,4,6-en-1-ols. of some Properties anti-2,7-benzobicyclo[3,2,1]octene Synthesis derivatives. of derivatives of tricyclo[6,n,-0,02,7]tri-2,4,6-enes, 1238

- Tosylating reagent, selective: synthesis and reaction of Nmethyl-N-tosylpyrrolidinium perchlorate, 1148
- Transition metal carbene complexes, three-fragment oxidative addition reaction as a route to: imidoyl halides and rhodium-(1) compounds as precursors for rhodium(III) carbenes, 274
  - -carbon bond dissociation, influence of metal electronic configuration on activation energy for, 165
- -carbon bond, insertion of chlorosulphonyl isocyanate, 1088
- -carbon bond lability and electronic configuration: a comment,
- carbonyl derivatives of magnesium, syntheses, 972
- chalcogenides, novel organometallic sandwich complexes based on. 301
- complexes, activation of Grignard reagents by. New and simple synthesis of trans-stilbenes and polyphenyls, 144 complexes of thiiren 1,1-dioxides, 178
- Transition-metals, use of 13C nuclear magnetic resonance
- spectroscopy in determining the stereochemistry of their tertiary phosphine or tertiary arsine complexes, 151
- Transition states, Jahn-Teller theorem applies to, 1044
- Transport of water in methanol-water-alkali-metal halide systems, effect of solvent structure, 1336
- Trapped electrons, matrix, detrapping excitation spectra and optical absorption, 759
- transient photobleaching, 1064
- 1,2,3-Triazepine. Dibenzo[1,2,3-df]triazepine, 982 1,2,4-Triazine-3,5(2H)-dione, 2,4-dimethyl-, (1,3-dimethyl-6azuracil), photochemical reactivity, 1144
- 1,2,4-Triazoles, N-nitro-, rearrangement into 3-nitro-1,2,4triazoles, 37
- 1,2,4-Triazol-3-ones, 1,4-diaryl-, mesoionic, photolysis, 498
- v-Triazolo[4,5-d]pyrimidine ring system, molecular-sieve catalysed  $N \rightarrow N$  glycosyl migration in, 1279
- v-Triazolo[4,5-d]pyrimidines, rearrangement, 52
- 5H-Tribenzo[a,d,g]cyclononene, 10,15-dihydro-, and its analogues, 579
- Tricyclo[4,3,1,01.6]decane, 10,10-dibromo-, solvolysis. Eviintermediate bicyclo[4,3,1]dec-1(10)-ene dence for an derivative, 1231
- cis, anti, cis-Tricyclo[3,1,0,02,4]hexane, thermal decomposition: hot molecule effects, 1284
- Tricyclo[6,1,0,04,9]nona-2,6-diene (Homosemibullvalene). Wolff-Kishner reduction of bicyclo[4,2,1]nona-2,4,7-trien-9one, 861
- endo-Tricyclo[3,2,1,02,4]octane derivatives, preparation and reactions. Action of methyl-lithum on 8,8-dibromobicyclo-[5,1,0]oct-3-ene, 523
- Tricyclo[6,n,0,02.7]tri-2,4,6-enes, properties of derivatives. Abnormal reaction of toluene-p-sulphonic acid with 8,12-dimethyl- and 8-methyl-tricyclo[6,4,0,0<sup>8,7</sup>]tri-2,4,6-en-1-ols. Synthesis anti-2,7-benzobicyclo[3,2,1]octene some derivatives, 1238
- Trienes, cyclic, reaction with chlorosulphonyl isocyanate. Stepwise conjugate addition, 1246
- Trifluoromethyliodine(v) tetrafluoride, 839
- Triglochinin, cyanogenic glucoside, revision of structure, 572 1,2,4-Trioxepans: synthesis and mass spectral behaviour, 798 Triphenylamine, photoionization, 1203
- Triple bonds, stereochemistry of the electrophilic additions to triple bonds via, 857
- Triptycenes, chloromethyl-, hindered rotation around the C(9)-CH<sub>2</sub>Cl bonds, 368
- Triterponoid, allo-betulone, exhaustive Baeyer-Villiger oxidation, 755
- **1,3,5-Trithian** oxides, charge delocalization in, studied by X-ray induced electron spectroscopy, 450
- 1,6,6a-Trithiapentalene, 2,5-dianilino-3,4-diaza-, crystal structure, 543
- Tritium. Dissociation of excited HT by collision with rare-gas atoms, 1285
- Five-centre transition complex involving  $\cdot N_2T$ , 585
- Tropolones, fungal, biosynthesis. Puberulonic and puberulic acids, 655
  - fungal, biosynthesis; evidence for a mono-oxygenase mechanism, 1075
- Tropone, 3-azido-, crystal and molecular structure, 101
- 5-chloro-2,3-benzo- and 5,7-dibromo-2,3-benzo-, X-ray determination of conformations, 339
- hexafluoro-, and octofluorocyclohepta-1,3,5-triene, 803

Tropone, molecular structure from its <sup>1</sup>H nuclear magnetic resonance spectrum in a nematic solvent, 1262

Tryptamine derivatives, photoinduced oxidation. Formation of pyrrolo[2,3-b]indole and  $N^{b}$ -(4-cyanobutadienyl)tryptamine 603

Tryptophan-containing peptides, solid-phase synthesis, 663 (+)-Tubocurarine chloride, a monoquaternary curare alkaloid.

molecular conformation, 1174 Tungsten. Crystal and molecular structure of di-μ-(tricarbonyl-

π-cyclopentadienyltungsten-OO')bisdimethylaluminium, 650 Crystal structure of a complex containing tungsten(VI) sulphide oxide dichloride, 462

Crystal structure of tetraethylammonium tetracarbonyltribromotungstate(II), 457
Direct deoxygenation of vicinal diols with tungsten(IV). New

olefin synthesis, 370

Exocyclic co-ordination of phosphonitriles: crystal and molecular structure of N<sub>4</sub>P<sub>4</sub>(NMe<sub>2</sub>)<sub>8</sub>,W(CO)<sub>4</sub>, 875

hexamethyl-, 318

-hydrogen bond, insertion of dichlorocarbene into, 295

Insertion of nitric oxide into tungsten-alkyl bonds: X-ray structure of the eight-co-ordinate complex tetramethylbis-(N-methyl-N-nitroso-hydroxylaminato)tungsten(vi), 922

Metathesis of unsaturated fatty acid esters by a homogeneous tungsten hexachloride-tetramethyltin catalyst, 1221 Structure of tris(methyl vinyl ketone)tungsten, 1242

Photo-induced insertion of bis- $\pi$ -cyclopentadienyltungsten into aromatic carbon-hydrogen bonds, 1114

Versatile synthesis of cyclic molybdenum- and tungsten-carbon σ-bonded complexes, 571

Tutin, biological conversion of copaborneol into, 598 biosynthesis from (4R)-[4-3H<sub>1</sub>] mevalonic acid, 600

Tyrosine, phenylalanine, and 3-(3-carboxyphenyl)alanine, steric course and rearrangements in their biosynthesis from shikimic acid in higher plants, 842

Uliginosin A and dihydrouliginosin B, antibiotics, synthesis, 123 Undeca-1,3,5-trienes in Dictyopteris, possible precursors;
(-)-bis-(3-acetoxyundec-5-enyl) disulphide and S-(-)-3acetoxyundec-5-enyl thioacetate, 326

Unimolecular radical reactions, new technique for their study. Kinetics of cis-trans-isomerisation of the 1-methylallyl radical, 783

Uracil, 1,3-dimethyl-6-aza-, 2,4-dimethyl-1,2,4-triazine-2,5(2H)diene, photochemical reactivity, 1144

Uranium. Oxouranium(v)-a novel free radical forming reaction, 380

Preparation, properties, and molecular structure of aquo-glyoxalbis-(2-hydroxyanil)dioxouranium, 344

Uranium oxide tetrafluoride, preparation, 1241 Ureas, aryl, new selenium-triethylamine catalysed synthesis from carbon monoxide and aromatic amines, 307 protonation equilibria, 653

Uridine and 2'-deoxyuridine, 5-thiocyanato, one step synthesis; easy access of 5-mercaptopyrimidine nucleosides, 1025

Validamycin A, antibiotic, structure, 747

Validamycins, new antibiotics, unsaturated cyclitol part, 746 **Vanadium.** Crystal structure of the  $[VO(C_2O_4)_2HO_2]^{\bar{z}}$  ion; cisoxalato complex of oxovanadium(iv), 945

Dioxodifluoro- and dioxodichloro-vanadate(v) ions, 378 Fluorinated alkoxides of chromium(v) and vanadium(iv), 944 Origin of petroporphyrin homologues transalkylation of vanadyl octa-alkylporphyrins, 562 oxide trifluoride, identification of dimers in vapour, 719

Vancosamine. Novel branched chain amino-sugar from the antibiotic vancomycin, 361

Vibrational circular dichroism, infrared, 1084

Victoxinine, structure, 1342 Villalstonine, the bisindole alkaloid, biomimetic synthesis, 678 Vinyl cations, linear, stereochemistry of the electrophilic additions to triple bonds via, 857

epoxides and oxetans, rhodium(1) catalysed rearrangements, 491

ethers, reaction with penicillin sulphoxides, 601 group formation in haem biosynthesis, mechanism and stereochemistry, 1263

groups of protoporphyrin-IX, mechanism of biosynthesis, 1265

Vinylallenes, new synthesis, 866

endo-6-Vinylbicyclo[3,1,0]hex-2-ene. Redirection of the course of a Cope rearrangement by co-ordination; the thermolysis of endo-6-vinylbicyclo[3,1,0]hex-2-enerhodium-(I) acetylacetonate, 1206

N-Vinylcarbazole, kinetics of the benzoyl peroxide and azobisisobutyronitrile initiated thermal polymerizations of, in solution, 22

Vinylcyclopropane, an activated, stereochemistry of the ringopening of, 821

2-Vinylcyclopropane-1,1-dicarboxylate, diethyl ring-opening

Vinylene diethers, stereochemistry of the addition of singlet oxygen, 490

Vinylic sulphides, photosensitized oxygenation, 477

Vinylketen, stabilised, and a novel carbonylation. 3-Methoxybuta-1,3-dienone(tricarbonyl)iron, 574

Vinylnitrene, equilibration of 2H-azirine with, 565

Viomycin, a tuberculostatic antibiotic, crystal structure, 660 Vitamin B<sub>12</sub>, self-exchange reactions of cobalt complexes and

implications concerning redox reactivity of, 495 Vitamin K, new synthesis, 953

von Auwers' boiling point rule. A new approach, 42

Wallach rearrangement, an unusual product. Acid-catalysed transformation of hexamethylazoxybenzene, 1259

Water, entropies of transfer of tetra-alkylammonium ions from, to methanol, dimethylformamide, and acetonitrile, 888

Free energies of transfer of sodium fluoride from water to hydrogen peroxide-water mixtures using ion-selective electrodes, 1234

transport in methanol-water-alkali-metal halide systems, effect of solvent structure, 1336

Withanolide E, a new natural steroidal lactone with a 17α-sidechain, crystal and molecular structure, 877

Wittig olefin synthesis in alcoholic solution, stereochemistry, 191 reaction involving a novel rearrangement: confirmation by Xray crystallography, 497

resins: preparation and application of insoluble polymeric phosphoranes, 134

Wortmannin and wortmannin p-bromobenzoate, crystal structure and absolute configuration, 1061 a fungal product, absolute stereochemistry, 1063

Xanthates, tertiary alkyl, aminolysis: new route to dithiourethanes, 638

Xanthenones, 3,4-dihydro-1(2H)-, synthesis. Condensation of cyclohexane-1,3-diones with o-hydroxybenzyl alcohol, 839

1-hydroxy-3-(3-methylbut-2-enyl)oxyxanthones, Xanthones, Claisen rearrangement, 1026

Xenon monolayers on metal surfaces, structure, 506

Preparation of XeOF<sub>8</sub>+Sb<sub>2</sub>F<sub>11</sub>-. <sup>19</sup>F nuclear magnetic resonance
and Raman spectra of XeOF<sub>8</sub>+ and XeO<sub>2</sub>F+, 607

(±)-Xylopinine, the isoquinoline alkaloid, total synthesis by
thermolysis, 675

Ylide and phosphorane, angular dependence of formation, 1270 skeletal rearrangements in the negative ion mass spectrum of an,

Ylides, sulphonium, with a phosphinyl substituent, 952

Ziegler-type systems as catalysts for hydrosilylation: linear dimerisation with terminal acetylenes, 1272

Zeolites, location of cations in, by infrared and Raman spectroscopy, 733

**Zinc** acetate, oxazoline complex. Formation of  $\Delta^2$ -oxazolines by cyclization of N-acyl- $\beta$ -hydroxy-amines on zinc acetate, 639 and cadmium complexes, five-co-ordinate, formed by metalion-induced ligand reactions: helical co-ordination, 683

Crystal and molecular structure of the bis-piperidine adduct of bis(pentamethylenethiocarbamato)zinc(II), 960

Single crystal infrared electronic spectrum of Ni²+/Cs<sub>2</sub>ZnCl<sub>4</sub> and Ni²+/Cs<sub>2</sub>ZnBr<sub>4</sub>, 1290

Zirconium. Thermal decomposition and carbonylation of bis-

(cyclopentadienyl)titanium(IV) and bis(cyclopentadienyl)zirconium(IV) derivatives. 654