JOURNAL OF CATALYSIS **90**, 385–421 (1984)

Cumulative Subject Index[1]

Volumes 85–90

A

Acetaldehyde
  formation
    from CO + H_2 reaction over SiO_2-supported Rh catalysts, mechanism, **90,** 183
    from methyl ethyl ketone oxidation on V_2O_5–P_2O_5 catalysts, **89,** 413
  oxidation over silver, **90,** 24
Acetic acid
  esterification on mordenite, **85,** 519
  formation, **89,** 413
  in vinyl acetate synthesis, **86,** 328
Acetone
  conversion to propylene on MoO_3, **90,** 329
Acetylene
  hydrogenation
    over FeNiCrPB alloys, **90,** 178
    over palladium on alumina, **86,** 417
  in vinyl acetate synthesis, **86,** 328
Acid
  surfaces, characterization by 2,6-dimethylpyridine adsorption, **88,** 374
Acid–base
  pair sites, on alumina, **86,** 301
  properties, decationized zeolite, **90,** 1
Acidity
  on bifunctional zeolite catalysts, ethylbenzene disproportionation as test reaction, **88,** 249, 251
  Brønsted, mordenites, **86,** 454
  effects in butene isomerization on mixed tin–antimony oxides, **88,** 73
  surface, γ-alumina: modification, **89,** 531
  zeolites
    H-form, measurement by temperature-programmed desorption of ammonia, **85,** 362
    role in methanol conversion to hydrocarbons, **85,** 521
    and unit cell size, **85,** 466
Acrolein
  from propylene oxidation, over tellurium-based multicomponent oxide catalysts, **88,** 214
Actinides
  low valent, olefin hydrogenation, **85,** 536
Activation energy
  desorption, for hydrogen and thiophene forms in thiophene hydrodesulfurization reaction with Co–Mo–Al_2O_3 catalysts and components, **86,** 55
  hydroformylation and hydrogenation, propylene over rhodium on X and Y zeolites, comparison, **86,** 67
Active carbon, *see* Carbon, activated
Activity
  n-butane conversion by Pt–Mo supported on Y-zeolite, **85,** 244
  carbon monoxide hydrogenation over cobalt, effects of support and dispersion, **85,** 78
  magnesium oxide-supported rhodium, effect of impurities, **88,** 18
  nickel–copper–alumina for crotonaldehyde hydrogenation, **85,** 25
  nickel oxide with α-alumina or zirconia support, calcined at high temperatures, **88,** 54, 65
  platinum and platinum–rhenium catalysts during methylcyclohexane dehydrogenation, **88,** 150, 163
  specific, carbon dioxide hydrogenation on silica-supported Co, Fe, and Ru, **87,** 352
Activity parameter
  relating electronic structure to catalytic activity, transition metal sulfides, **86,** 400
Activity–structure, *see* Structure–activity
Addition–abstraction
  CH_x, mechanism: methylpentane aromatization on Ni and Co, **89,** 14
Additives
  effect on sulfided CoMo catalytic functionalities, **85,** 44
Adsorbed species
  diffuse reflectance Fourier transform infrared spectrometry, heatable-evacuable cell and optical system, **88,** 264
Adsorption
  benzene on iron oxide, ir spectra, **88,** 131
  carbon monoxide
    on alumina-supported platinum, electron transfer and ligand effects, **88,** 273
    and C_2 hydrocarbons, on Pd/SiO_2, **89,** 93
    on platinum alloys, **90,** 88
  Co–Mo–Al_2O_3 catalysts and components, thiophene hydrodesulfurization, **86,** 55
  2,6-dimethylpyridine, in acid surface, characterization, **88,** 374
  ethylene on iron oxide, ir spectra, **88,** 125
  hydrocarbons, on metal films, **88,** 300
  hydrogen and carbon monoxide on cobalt, stoi-

[1] Boldface numbers indicate appropriate volume; lightface numbers indicate pagination.

0021-9517/84 $3.00

chiometries: effects of support and preparation, **85,** 63
and mass transfer, effect on temperature-programmed desorption from porous catalysts, **85,** 143
methanol
and ammonia on molybdenum trioxide, infrared study, **86,** 215
and water on H-ZSM-5, **89,** 150
molecular, oxygen: on polycrystalline rhodium at low temperatures, **85,** 98
during olefin competitive isomerization over KC_{24}, **88,** 225
oxygen
on $LaCrO_3$, equilibrium and kinetics, **87,** 126
on $LaMnO_3$, kinetics, **89,** 209
nitric oxide, carbon dioxide, and carbon monoxide on magnetite, **89,** 314
on supported manganese oxides, infrared spectroscopy, **88,** 362
synthesis gas on zirconium dioxide
Fourier transform infrared spectroscopy, **87,** 381
temperature-programmed desorption, **87,** 238
Adsorption/desorption
hydrogen on nickel, effects of support, kinetics, **87,** 55
Adsorption isobars
oxygen chemisorption on vanadium pentoxide, **87,** 520
Adsorption isotherms
oxygen chemisorption on vanadium pentoxide, **87,** 520
Aging
accelerated, experiments: for information on catalyst life, **86,** 48
Alcohols
catalytic conversion, alkene products obtained with alumina, **88,** 542
dehydration over HY zeolite, role of basic and acid sites, **90,** 1
higher
methanol conversion to, **90,** 127
synthesis, chain growth scheme, **85,** 428
hydrodeoxygenation, on sulfided $NiO–MoO_3/\gamma$-Al_2O_3, **90,** 147
from hydrogen and carbon monoxide, **85,** 428
oxycarbonylation to dialkyl oxalates, heterogeneous catalyst development, **90,** 261
Aldehyde
hydrogenation, and metal–support interactions in titania-supported copper, **85,** 380
reaction with piperidine over alumina: 3-alkylpyridine synthesis, **87,** 478
Aldol condensation
benzaldehyde, over thoria, **89,** 489
Aliphatic amines
copper, nickel, and cobalt catalyst deactivation by interaction with, **88,** 81
Aliphatic esters
hydrogenolysis over copper, **88,** 203
Alkali metals
promoters in methanation and Fischer–Tropsch reaction, **89,** 392
Alkane
hydrogenolysis, over organometallic complexes on alumina, **86,** 301
Alkene
products obtained with alumina, effect of sodium, **88,** 542
n-1-Alkenes
polymerization with surface chromium(II) on silica gel at low temperatures and normal pressure, **88,** 424
Alkylation
toluene with ethylene, for *p*-ethyltoluene production over zeolites, **89,** 267
Alkyl intermediates
during Fischer–Tropsch synthesis, relation to hydrocarbon products, **86,** 239
Alkyl oxalates
synthesis from alcohols, heterogeneous catalyst development, **90,** 261
3-Alkylpyridines
synthesis: piperidine and aldehyde reactions over alumina, **87,** 478
Alkyl substituents
interactions with palladium, in cyclohexanone hydrogenation, **89,** 177
Alloys
catalysts
preparation with high surface area supported nickel, **85,** 267
silver-based, ethylene oxidation over, **88,** 409
FeNiCrPB, amorphous and crystalline: acetylene hydrogenation over, **90,** 178
formation in platinum–tin/alumina reforming catalysts, **90,** 96
iron–cobalt system, reaction and selectivity, **85,** 349
nickel and copper, effect on Fischer–Tropsch synthesis selectivity, **89,** 542
palladium–platinum: synthesis, structure, and effects of hydrogen absorption, **85,** 405
platinum, carbon monoxide adsorption on, infrared spectra, **90,** 88
single crystal, $Pt_{0.5}Ni_{0.5}(111)$: selective hydrogenation of 1,3-butadiene, comparison with pure Pt(111), **90,** 358
Allyl alcohols
substituted, isomerization over Raney nickel, **88,** 418
Allyl ether
isomerization over solid base catalyst, **85,** 457
Alumina
benzyl alcohol disproportionation over, **85,** 527
carbonyl sulfide hydrolysis over, kinetics and mechanism, **85,** 339

catalysts
alkene products obtained, **88,** 542
preparation, characterization, and properties, **89,** 560
effect on low-temperature CO shift reaction catalyst, **90,** 113
in ethanol–diethyl ether–water–alumina system, transient behavior, **87,** 452
organometallic complexes on, surface chemistry and catalytic activity, **86,** 301
piperidine and aldehyde reaction over: 3-alkylpyridine synthesis, **87,** 478
reactions of carboxylic acids with carbonyl compounds over, **87,** 93
support for
cobalt-molybdenum hydrodesulfurization catalysts, **87,** 497
Fe crystallite shape oscillations during heating in hydrogen, **90,** 241
MoO_3, molybdenum surface species, water effect, Raman spectroscopy, **90,** 314
nickel
carbon contamination, crystallite migration, **86,** 457
carbon monoxide methanation on, kinetics, **85,** 105
at low concentrations, infrared studies, **86,** 84
particle dispersion in oxygen and hydrogen, **87,** 108
nickel–copper, crotonaldehyde hydrogenation, **85,** 25
nickel–molybdenum, sulfided: hydrotreating activity and oxygen chemisorption, **90,** 10
nickel oxide, calcined at high temperatures, structure and activity, **88,** 54, 65
$Os_3(CO)_{12}$ clusters, EPR study of osmium species derived from, **86,** 223
osmium catalysts, CO hydrogenation, **86,** 95
palladium
interactions, **89,** 422
pretreatment, effect on acetylene hydrogenation over, **86,** 417
rhodium, nitric oxide reduction by methane over, **86,** 137
rhenium oxide metathesis catalysts, ESCA study, **90,** 362
triosmium clusters, hexene-1 isomerization, **85,** 176
zinc, surface characterization, **86,** 266
α-Alumina
support for nickel–molybdenum, hydroprocessing of organo-oxygen compounds in coal liquids, **85,** 256
γ-Alumina
acidity, **88,** 374
methylcyclohexenes and methylenecyclohexane double-bond shift isomerization over, **88,** 37
platinum redispersion on, **90,** 279
support for MoO_3, molybdena surface coverage, **90,** 323
surface acidity, modification, **89,** 531
in transition alumina films, high-resolution transmission electron microscopy, **89,** 182
Alumina/iron, *see* Iron/alumina
Alumina–molybdena, *see* Molybdena–alumina
Alumina–nickel, *see* Nickel–alumina
Alumina–silica, *see* Silica–alumina
Aluminum
content in zeolites, effect on hydration activity, **89,** 60
Cu–Zn–Al mixed oxides, preparation from hydrotalcite-like precursors for low-temperature methanol synthesis, **85,** 260
enrichment at surface of ultrastable zeolite-Y, **87,** 524
reinsertion in framework of dealuminated Y zeolites, **88,** 513
Amines
addition to conjugated dienes over solid base catalysts, **85,** 509
in zeolite synthesis, **85,** 135
Ammonia
activation, NH species formation, **87,** 363
adsorption on molybdenum trioxide, infrared study, **86,** 215
interactions with 12-tungstophosphoric acid, **88,** 177
temperature-programmed desorption, measurement of zeolite acidity, **85,** 362
Ammoxidation
propylene, over heterogeneous molybdate and antimonate, surface intermediates, **87,** 363
Anatase/rutile
phase transformation, **87,** 265
Antimonate
catalysts, propylene oxidation and ammoxidation over: surface intermediates, **87,** 363
Antimony–tin, *see* Tin–antimony
Antimony–vanadium, *see* Vanadium–antimony
Aqueous solution
platinum catalyst in, propene hydrogenation, **86,** 129
Aromatic hydrocarbons
from propane conversion on Pt/H-ZSM-5 catalysts, **90,** 366
selective steam reforming on supported Rh catalysts, **90,** 292
synthesis from synthesis gas, **87,** 136
Aromatic products
from methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 150, 163
Aromatization
n-hexane, over platinum single crystal surfaces, **85,** 206
hexanes on platinum–tin reforming catalysts, **85,** 197
hydrocarbons on mixed valence intermetallic compound $CePd_3$, **89,** 1

methylpentanes on nickel and cobalt, CH_x addition–abstraction mechanism, **89,** 14
Auger electron spectroscopy
thorium–nickel alloys, surface characterization, **88,** 26
Auger/vibrational spectroscopy
TiO_x on nickel, **90,** 75
Automobile exhaust
ceria catalysts, and oxygen storage, **86,** 254

B

Barium
catalytic gasification of graphite, **87,** 255
Benzaldehyde
conversion to phenyl alkyl ketones, **89,** 489
reaction over thoria and mixed oxides of thoria, **89,** 489
Benzene
adsorption on iron oxide, ir spectra, **88,** 131
dialkyl- and monoalkyl-, steam conversion and hydroconversion on supported Rh catalysts, **90,** 292
hydrogenation
over iron, kinetics and reaction model, **86,** 235
nickel catalysts, effect of support, **85,** 16
selective, over polyamide-supported platinum–gold, **86,** 210
Benzene–toluene
competitive hydrogenation, on sulfided Pt/Al_2O_3, **89,** 52
Benzofuran
hydrodeoxygenation
interactions with dibenzothiophene hydrodesulfurization, **87,** 332
on presulfided $CoMo/\gamma Al_2O_3$, **87,** 325
Benzyl alcohol
disproportionation over alumina, effect of substitution, **85,** 527
Benzylaryl ethers
cleavage in presence of zinc halides, **87,** 210
Biacetyl, *see* Diacetyl
β-Bismuth molybdate
electron microscopy, **89,** 545
Bond
carbon–carbon, fission, **89,** 413
Book reviews
Energy Resources through Photochemistry and Catalysts. M. Grätzel (Ed.), **87,** 536
Survey of Progress in Chemistry, Vol. 10. G. G. Wubbels (Ed.), **86,** 481
Boride
FeNiCrPB alloys, amorphous and crystalline: acetylene hydrogenation over, **90,** 178
Brønsted acidity
mordenites, **86,** 454
Butadiene
dimethylamine, ethylamine, and piperidine addition over solid base catalysts, **85,** 509
1,3-Butadiene
selective hydrogenation
over $LaCoO_3$ perovskite, **89,** 362
on pure Pt(111) and $Pt_{0.5}Ni_{0.5}$(111) single-crystal alloy, comparison, **90,** 358
Butane
cracking catalyzed by zeolite H-ZSM-5, **88,** 240
hydrogenolysis over nickel, kinetics, **88,** 8
oxidation on composite heteropoly compound, **85,** 324
n-Butane
conversion by Pt–Mo supported on Y-zeolite, activity and selectivity, **85,** 244
hydrogenolysis and isomerization on silica-supported Rh–Pt bimetallic catalysts, **87,** 389
oxidation to maleic anhydride
over vanadium phosphate-based catalysts, **88,** 43
over vanadium–phosphorus oxides, mechanism, **89,** 44
Butene
deuterated, isomerization over magnesium oxide, effect of drying and reaction temperature, **89,** 69
isomerization on mixed tin–antimony oxides, effects of acidity, **88,** 73
oxidation on iron oxide, **89,** 172
oxidative dehydrogenation, multicomponent oxide catalyst for, **88,** 119
n-Butene
hydration over zeolites, effect of aluminum content on activity, **89,** 60
hydroisomerization over $LaCoO_3$ perovskite, **89,** 362
isomerization and metathesis, on reduced molybdena–alumina, **88,** 317
1-Butene
chemisorption and hydrogenation on platinum, temperature-programmed desorption, **87,** 144
oxidation to methyl ethyl ketone over carbon-supported palladium–vanadyl sulfate–sulfuric acid, **85,** 284
tert-Butyl chloride
dehydrochlorination, on first-row transition metal chlorides, **89,** 553

C

Cab-O-Sil
support for $Fe_3(CO)_{12}$, spectroscopy, **87,** 163, 179
Cadmium
-doped α-Fe_2O_3, carbon monoxide oxidation: kinetics and mechanism, **86,** 219
Cadmium oxide–lanthanum sesquioxide
system, carbon monoxide oxidation over: kinetics and mechanism, **88,** 283
Calcium
content in silver–zeolite catalyst, effect on olefin oxidation, **87,** 319

Calcium oxide
allyl ether isomerization, **85,** 457
amine addition to conjugated dienes, **85,** 509
Calorimetry
hydrocarbon adsorption on metal films, **88,** 300
Carbides
formation, iron/titania from carbon monoxide/hydrogen reaction, **89,** 285
iron, and supported iron Fischer–Tropsch synthesis catalysts: Mössbauer spectroscopy, **87,** 36
transition metal, carbon oxidation, **85,** 154
Carbon
activated, support for zinc acetate: vinyl acetate synthesis from acetic acid and acetylene, **86,** 328
adsorbed on Ru/SiO_2 during Fischer–Tropsch synthesis, quantitation by transient response techniques, **86,** 158
^{13}C, tracing of methanation over nickel catalyst [*erratum* to **84,** 156 (1983)], **89,** 564
^{14}C, tracer for secondary reactions, **89,** 442
chain growth, mechanism, **85,** 428
deposition from methane and carbon monoxide on Ni/SiO_2, **88,** 1
diffusion mechanism for coke deposition on molybdenite thin single-crystal film surface, **90,** 194
filamentous, from α-iron in H_2, CH_4, H_2O, CO_2, and CO gas mixtures, **85,** 224
gasification, turnover frequencies: transition metal carbides and oxides catalysts, **85,** 154
on Fischer–Tropsch iron catalysts, **89,** 116
formation in methanol synthesis over Cu/ThO_2, **89,** 131
layers, role in selectivity: hydrocarbon reactions over iridium, **87,** 468
oxidation by transition metal carbides and oxides, **85,** 154
role in methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 150, 163
support for palladium–vanadyl sulfate–sulfuric acid system for heterogeneous Wacker reactions, **85,** 284
β-Carbon
graphitic carbon, **89,** 159
hydrogenation on nickel(111) surface, X-ray photoelectron spectroscopy, **89,** 159
Carbonaceous deposits
formation in catalyst deactivation by interaction with aliphatic amines, **88,** 81
Carbonaceous matter
in reforming catalyst poisoning, **89,** 256
Carbonaceous species
deposited by ethylene on supported ruthenium, **88,** 457
Carbonate
catalysis, isotope study, **90,** 65
Carbon black
carbon dioxide gasification of, **90,** 65
Carbon–carbon
bond, fission: in methyl ethyl ketone oxidation on V_2O_5–P_2O_5, **89,** 413
Carbon dioxide
adsorption on
magnetite, **89,** 314
zirconium dioxide, Fourier transform infrared spectroscopy, **87,** 381
catalytic gasification of graphite by barium, **87,** 255
effect on hydrogen/carbon monoxide conversion to methanol over copper–chromia, **88,** 523
gasification of carbon black, **90,** 65
hydrogenation
on copper–zinc oxide, **90,** 139
on Group VII metals, **87,** 352
by supported osmium clusters, **86,** 342
reduction by hydrogen and water vapor over metal oxides assisted by visible light, **90,** 173
and surface intermediates on zirconium dioxide, **87,** 238
Carbon dioxide/hydrogen
on zirconium dioxide, surface reactions, **90,** 17
Carbon monoxide
adsorption on
alumina-supported platinum, electron transfer and ligand effects in ir spectra, **88,** 273
magnetite, **89,** 314
Ni/Al_2O_3, as molecular probe, infrared studies, **86,** 84
Pd/SiO_2, **89,** 93
platinum alloys, infrared spectra, **90,** 88
Ru/SiO_2 during Fischer–Tropsch synthesis, quantitation by transient response techniques, **86,** 158
sulfided Pt/Al_2O_3, ir frequency shift, **89,** 52
zirconium dioxide, Fourier transform infrared spectroscopy, **87,** 381
catalytic reduction over iron surfaces, **87,** 66
chemisorption
effect of TiO_x segregation on nickel, **90,** 75
on iron/alumina, **89,** 533
on $KNiMo/Al_2O_3$, **87,** 482
on Rh^I sites, **89,** 79
on ruthenium–silica, effect of coadsorbates, **90,** 119
by supported osmium clusters, **86,** 333
disproportionation on nickel/silica, effects of carbon deposition on nickel surface structure, **88,** 1
dissociation reaction on iron, effect of hydrogen, **86,** 433
in Fischer–Tropsch synthesis, reaction mechanism, **86,** 239
and hydrogen
adsorption on cobalt, **85,** 63
chemisorption on
Pd/SiO_2 and Pd/La_2O_3, effects of metal–support interactions, **89,** 498
polycrystalline Pt_3Ti surface, ligand effects, **85,** 272

gas mixtures, kinetics over supported iron Fischer–Tropsch synthesis catalysts, **87,** 36
surface reactions on zirconium dioxide
Fourier transform infrared spectroscopy, **87,** 381
temperature-programmed desorption and decomposition, **87,** 238
hydrogenation
alumina-supported osmium catalysts, **86,** 95
on cobalt, effects of support and dispersion on activity/selectivity properties, **85,** 78
on copper–zinc oxide, **90,** 139
over mixed catalyst (methanol synthesis catalyst and zeolites), **87,** 136
over niobia-supported nickel, strong metal–support interaction, **86,** 315
over Pd/SiO_2 and Pd/La_2O_3, metal–support interaction effects, **90,** 205
over Ru/zeolite, effects of support, **85,** 499
over silica-supported ruthenium–copper bimetallic catalysts, **90,** 337
over SiO_2-supported Rh catalysts, formation mechanism of acetaldehyde and ethanol, **90,** 183
on supported molybdenum catalysts, reduced and sulfided, **89,** 536
by supported osmium clusters, **86,** 342
over TaC, TiC, and Mo_2C, kinetics, **89,** 168
and hydrogen reaction
enhanced activity of Pd/TiO_2, **86,** 384
over nickel–alumina, transient response method, **86,** 245
nickel catalysts, effect of support, **85,** 16
methanation
on alumina-supported nickel, kinetics, **85,** 105
on low-weight loading Ni/Al_2O_3, **89,** 380
nitric oxide reduction over silica-supported rhodium, Rh–NCO and Si–NCO species formation, **85,** 389
oxidation
on Cd-doped α-Fe_2O_3, kinetics and mechanism, **86,** 219
over cadmium oxide–lanthanum sesquioxide system, kinetics and mechanism, **88,** 283
over noble metals, **87,** 152
on platinum
catalyst films deposited on stabilized zirconia solid electrolyte, emf: comment, **90,** 371; reply, **90,** 374
local current and emf, **87,** 1
relation of surface adsorption states and emf in solid electrolyte concentration cell, **86,** 437
–silica, surface reaction dynamics, **89,** 348
thin films, critical temperature measurement, **86,** 373
over supported Pt and Pt–Pd, oscillations during, **88,** 333, 345
shift reaction, low-temperature
effects of alumina and reaction conditions, **90,** 113
on unreduced copper–zinc system, **90,** 106
Carbon monoxide/hydrogen
reaction on iron/titania
effect of temperature, **89,** 285
intermediates, **89,** 327
Carbon number
distribution, Flory: Fischer–Tropsch products formed on iron in slurry reactor, **85,** 370
Carbonylation
methanol, over zeolite-supported rhodium, **87,** 414
Carbonyls
reaction with carboxylic acids on alumina, **87,** 93
surface, carbon monoxide chemisorption on Rh^I sites, **89,** 79
Carbonyl sulfide
ethylbenzene vapor-phase catalytic oxidative dehydrogenation with, **86,** 205
hydrolysis over alumina, kinetics and mechanism, **85,** 339
Carboxylic acids
from aqueous methanol conversion over H-ZSM-5 zeolite, **88,** 499
reaction with carbonyl compounds on alumina, **87,** 93
Carburization
fused iron, effect on catalytic behavior, **86,** 201
Catalysis
deNO_x, theoretical characterization, **89,** 250
by metal clusters, **86,** 333, 342
Catalysts
alumina: preparation, characterization, and properties, **89,** 560
bimetallic
copper–ruthenium, silica-supported, carbon monoxide hydrogenation over, **90,** 337
Pt–Mo supported on Y-zeolite, *n*-butane conversion, activity and selectivity, **85,** 244
rhodium–platinum, silica support: *n*-butane and 2,2-dimethylpropane reactions on, **87,** 389
characterization techniques, **90,** 32
cracking, active site characterization during 1-hexene isomerization, **90,** 270
deactivation
by carbon, in methanol synthesis over Cu/ThO_2, **89,** 131
and constant-conversion rising-temperature policy, **86,** 48
by site poisoning and pore blockage, **88,** 188
design
for ethylene oxide synthesis, optimization technique, **87,** 116
nonuniform active component distribution, **87,** 116
fouling, model, **88,** 400
heterogenized homogeneous, basic copper(II) complex, **89,** 511
heterogenous, for alcohol oxycarbonylation to dialkyl oxalates, **90,** 261
mixed (methanol synthesis catalyst and zeolites): ar-

omatic hydrocarbon synthesis from synthesis gas, **87,** 136
performance, effect of zeolite unit cell size, **85,** 466
poisoning, sulfate as precursor, **87,** 276
pore structure, and intraparticle diffusion of gas, **86,** 427
porous, temperature-programmed desorption from, effect of adsorption and mass transfer effects, **85,** 143
pretreatment, effect on selective hydrogenation of acetylene over palladium on alumina, **86,** 417
reforming
platinum–tin, methylcyclopentane conversion, **85,** 197
platinum–tin/alumina, state of tin, **90,** 96
poisoning carbonaceous matter, nature and localization, **89,** 256
Pt/Al_2O_3, fouling accompanying methylcyclohexane dehydrogenation, **86,** 75
shape-selective, platinum/ZSM-5: hydrogenation over, **89,** 520
size, effect on deactivation by site poisoning and pore blockage, **88,** 188
solid base
amine addition to conjugated dienes, **85,** 509
isomerization of allyl ether, **85,** 457
sulfided: $NiO–MoO_3/\gamma\text{-}Al_2O_3$, **90,** 147
Catalytic activity
effect of
pretreatment, ethylbenzene dehydrogenation over $TiO_2–ZrO_2$, **87,** 98
thermal phase changes, titanium–zirconium phosphates, **85,** 398
pentasil zeolites, external and intracrystalline surface, **88,** 538
vibrational resonance in, **88,** 509
ZSM-type zeolites in methanol transformation, stability and selectivity, **85,** 287
Catalytic mechanisms
nitrous oxide decomposition over iron-exchanged mordenite, **86,** 392
Catalytic precursor complexes
gasification, **90,** 65
Catalytic properties
$Co–Mo–Al_2O_3$ catalysts and components, thiophene hydrodesulfurization, **86,** 55
rhodium, effect of particle size and support, **87,** 27
and structure, relationship: TMA–offretite, **86,** 24
Cation exchange
zeolite modification, acidity measurement, **85,** 362
Cell
heatable-evacuable, for diffuse reflectance Fourier transform infrared spectroscopy of adsorbed species, **88,** 264
solid electrolyte concentration, emf and surface adsorption state relation during CO oxidation on Pt, **86,** 437
Ceria
in automotive exhaust catalysts, and oxygen storage, **86,** 254
support for manganese oxides, manganese carbonyl formation on, **88,** 516
Ceria/alumina
support for noble metals, effect of dispersion on hydrocarbon oxidation kinetics, **87,** 152
Cerium
valence fluctuations in $CePd_3$, **89,** 1
Cerium palladium
$CePd_3$, mixed valence intermetallic compound: skeletal rearrangement of hydrocarbons on, **89,** 1
Cesium
salt of 12-molybdophosphoric acid and vanadium promoter, butane oxidation, **85,** 324
Cesium nitrate–rhenium heptoxide–alumina
metathesis of α,ω-dienes over, **89,** 452
Chain growth
kinetics, Flory: over H-ZSM-5, **88,** 478
probabilities on iron in Fischer–Tropsch synthesis, **85,** 370
scheme, higher alcohol synthesis, **85,** 428
Charge transfer
effect on N_2O decomposition on $Sn_{(1-x)}V_xO_2$ and $Ti_{(1-x)}V_xO_2$ catalysts, **90,** 305
localized, in strong metal–support interactions, cluster models, **88,** 519
Chelating solvents
hydrocarbonylation of methanol, in ethanol two-stage synthesis, **88,** 535
Chemical reactivity
carbonaceous species deposited by ethylene on supported ruthenium, **88,** 457
Chemical state
copper during methanol synthesis, **90,** 165
tin in platinum–tin–alumina, **89,** 371
Chemisorption
1-butene on platinum, temperature-programmed desorption, **87,** 144
carbon monoxide
effect of TiO_x segregation on nickel, **90,** 75
and hydrogen on polycrystalline Pt_3Ti surface, ligand effects, **85,** 272
on iron/alumina, **89,** 533
and oxygen by supported osmium clusters, **86,** 333
on Rh^I sites, **89,** 79
on ruthenium–silica, effect of coadsorbates, **90,** 119
hydrogen
and carbon monoxide on Pd/SiO_2 and Pd/La_2O_3, effects of metal–support interactions, **89,** 498
on magnesium oxide-supported rhodium, effects of impurities, **88,** 18
–oxygen, in platinum/rhenium/alumina surface area measurement, **85,** 1
and oxygen, and state of tin in platinum–tin/alumina reforming catalysts, **90,** 96

methods, palladium–nickel/alumina surface composition, **88,** 228
nitric oxide on reduced MoO_3/Al_2O_3 catalyst: transition-metal complex model catalyst preparation, **90,** 368
oxygen
relationship to hydrotreating activity of alumina-supported Ni–Mo, **90,** 10
on silver catalysts, and selectivity of ethylene oxidation reactions, **86,** 465
supported molybdenum catalysts, reduced and sulfided: characterization, **89,** 274
on unsupported and supported MoS_2, **89,** 111
on vanadium pentoxide, adsorption isotherms and isobars, **87,** 520
site-selective, NO on sulfided molybdena–alumina, **85,** 277
on sulfided nickel–molybdenum/alumina, **87,** 283
Chlorinated hydrocarbons
photocatalyzed degradation, **88,** 89
Chloroacetic acids
conversions by heterogeneous photocatalysis, **88,** 89
Chlorobenzene
conversion by heterogeneous photocatalysis, **88,** 89
hydrolysis, Cu-promoted hydroxyapatite reactivation during, **85,** 538
Chloromethane, *see* Methyl chloride
Chlorotriosmium
supported clusters, olefin isomerization over, **89,** 100
Chromia
support for rhodium, activity and structure for toluene steam dealkylation, **85,** 169
Chromia–copper, *see* Copper–chromia
Chromium
FeNiCrPB alloys, amorphous and crystalline: acetylene hydrogenation over, **90,** 178
$LaCrO_3$, *see* Lanthanum, $LaCrO_3$
Chromium(II)
surface, on silica gel: polymerization of *n*-1-alkenes, **88,** 424
Clay
delaminated, gas oil cracking selectivity, **90,** 256
Cleavage
benzylaryl ethers, in presence of zinc halides, **87,** 210
diarylmethanes, in presence of zinc halides, **87,** 196
dibenzyl ether, in presence of zinc halides, **87,** 226
Clusters
dichlorotriosmium, supported: olefin isomerization over, **89,** 100
metal, chemisorption and catalysis, **86,** 333, 342
models
localized charge transfer in strong metal–support interactions, **88,** 519
platinum–titania vacancy interaction, **88,** 549
osmium carbonyl on alumina: EPR study of osmium species derived from, **86,** 223
triosmium, alumina support: hexene-1 isomerization, **85,** 176
Cluster–support
interaction, **86,** 333, 342
Coadsorbates
effect on carbon monoxide chemisorption on ruthenium–silica, **90,** 119
Coal
liquids, organo-oxygen compounds: hydroprocessing by sulfided Ni–Mo/α-Al_2O_3, **85,** 256
Cobalt
carbon monoxide hydrogenation activity/selectivity, effect of support and dispersion, **85,** 78
catalysts, deactivation by interaction with aliphatic amines, **88,** 81
$CoAl_2O_4$, $CoMoO_4$, CoO, and Co_3O_4: Mössbauer emission spectra, **87,** 497
hydrogen and carbon monoxide adsorption, stoichiometries: effects of support and preparation, **85,** 63
methylpentane aromatization, **89,** 14
silica support, carbon dioxide hydrogenation, specific activity and selectivity, **87,** 352
Cobalt(II) chiral diphosphine
complexes, asymmetric hydrogenation of prochiral unsaturated esters, **87,** 517
Cobalt–iron, *see* Iron–cobalt
Cobalt molybdate
hydrodesulfurizaion catalysts, sulfiding: Raman spectroscopy, **85,** 488
supported catalysts, structure and sulfiding temperature, **85,** 295
Cobalt–molybdenum
benzofuran and *o*-ethylphenol hydrodeoxygenation, **87,** 325
sulfided catalysts
quinoline hydrodenitrogenation kinetics, **85,** 117
unsupported, electrophoretic characterization, **88,** 222
sulfided, hydrogenolysis, hydrogenation, and hydrocracking activities: effect of support and additives, **85,** 44
Cobalt-molybdenum/alumina
catalysts
calcined, cobalt precursors, Mössbauer emission spectroscopy, **87,** 497
and components, adsorption and catalytic properties: thiophene hydrodesulfurization, **86,** 55
surface characterization, **89,** 334
structure determination by extended X-ray absorption-edge fine structure spectra, **89,** 226
Cobalt–molybdenum–sulfur
phase, precursors, **87,** 497
Cobalt orthosilicate
nonmetallic electrode, electrocatalytic activity, **86,** 9
Cobalt oxide
number of active oxygen atoms, **88,** 526

Coke
deposition on surface of molybdenite thin single-crystal film, mechanism, **90,** 194
formation during methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 150, 163
Compensation effect
in nitrous oxide decomposition on rare earth cuprates, **86,** 121
Computer simulation
mercury porosimetry, effect of network structure, **89,** 217
Concentration-programmed reaction
carbon monoxide oxidation on Pt/SiO_2, surface reaction dynamics, **89,** 348
Constant-conversion rising-temperature policy, *see* Conversion
Conversion
aqueous methanol over H-ZSM-5 zeolite, **88,** 499
benzaldehyde, to phenyl alkyl ketones, **89,** 489
n-butane, by Pt–Mo supported on Y-zeolite, activity and selectivity, **85,** 244
catalytic, alcohols, **88,** 542
constant, rising-temperature policy: in catalyst deactivation, **86,** 48
dimethyl ether to ethylene, methyl group interchange, **87,** 528
hydrogen/carbon monoxide to methanol over copper–chromia, carbon dioxide effect, **88,** 523
methanol
to hydrocarbons
over H-ZSM-5 zeolite, **88,** 478
role of acid property of zeolites, **85,** 521
over H-ZSM-5, surface sites and reactivity sequences, **88,** 137
over ZSM-5
effect of temperature and zeolite SiO_2/Al_2O_3, **86,** 289
olefin distribution, **86,** 297
methylcyclopentane on platinum–tin reforming catalysts, **85,** 197
propane to aromatic hydrocarbons on Pt/H-ZSM-5 catalysts, **90,** 366
Copper
catalysts
deactivation by interaction with aliphatic amines, **88,** 81
structure and reactivity, effects in aliphatic ester hydrogenolysis, **88,** 203
chemical state during methanol synthesis, **90,** 165
clusters Cu_3 and Cu_5, reaction with molecular oxygen in rotating cryostat, **90,** 156
particles on magnesium oxide, wetting and spreading, **85,** 187
-promoted hydroxyapatites, reactivation during chlorobenzene hydrolysis, **85,** 538
surface area in Cu–ZnO, evaluation by microcalorimetry, **87,** 443
titania support, metal–support interactions, **85,** 380
Copper(II)
complex, basic
heterogenized homogeneous catalyst, **89,** 511
with potassium hydroxide, sodium hydroxide, and sodium methoxide, **89,** 511
Copper–chromia
hydrogen/carbon monoxide conversion to methanol over, carbon dioxide effect, **88,** 523
Copper–nickel–alumina, *see* Nickel–copper–alumina
Copper–ruthenium
bimetallic catalysts, silica-supported: activity during carbon monoxide absorption, disproportionation, and hydrogenation, **90,** 337
Copper/thorium dioxide
methanol synthesis over, **89,** 131
Copper–zinc
unreduced system, low-temperature carbon monoxide shift reaction, **90,** 106
Copper–zinc–aluminum
mixed oxides, preparation from hydrotalcite-like precursors: for low-temperature methanol synthesis, **85,** 260
Copper–zinc oxide
catalyst, copper surface area evaluation by microcalorimetry, **87,** 443
methanol production, rate dependence on feed composition, **90,** 139
Coupling
C–O and/or C–C, **89,** 511
oxidative, 2,6-dimethylphenol over basic copper(II) complexes, **89,** 511
Cracking
butane, catalyzed by H-ZSM-5, **88,** 240
catalyst behavior, prediction by zeolite unit cell size model, **85,** 466
catalytic, *n*-hexadecane, secondary reactions, **89,** 442
delaminated clay catalyst, gas oil selectivity, **90,** 256
Crotonaldehyde
hydrogenation over nickel–copper–alumina, mechanism, **85,** 25
Crotyl alcohol
formation from crotonaldehyde hydrogenation over $Ni–Cu–Al_2O_3$, **85,** 25
Cryostat
rotating, at 77 K: copper clusters (Cu_3 and Cu_5) reaction with molecular oxygen, **90,** 156
Crystallinity
of titania, and Au/TiO_2 dispersion, **87,** 265
Crystallites
iron, shape oscillations during heating in hydrogen on alumina catalysts, **90,** 241
Crystallite thermometry
magnetic, during ethane hydrogenolysis over Ni/SiO_2, **86,** 450
nickel, during ethane hydrogenolysis, **90,** 40
Crystallization
behavior, zirconium oxide gels, **86,** 473

Cumene
disproportionation
on commercial hydrocracking catalyst, reaction and deactivation kinetics, **85,** 415
kinetics, **87,** 530
Current
local
measurement: emf in solid electrolyte concentration cell during CO oxidation on Pt, **86,** 437
solid electrolyte concentration cell: CO oxidation on Pt, **87,** 1
Cyclohexane
conversion, on platinum–tin, **88,** 466
dehydrogenation
on bimetallic Au–Pt(111) single-crystal surfaces, **89,** 35
and hydrogenolysis, effects of intermetallic compound formation on supported Ni activity, **85,** 267
over Pt/Al_2O_3 catalyst, ensembling and monolayer parameters, **90,** 351
Cyclohexanol
dehydration by titanium–zirconium phosphates, **85,** 398
Cyclohexanone
hydrogenation over palladium, **89,** 177
Cyclohexene
hydrogenation over $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, effect of intraparticle mass transfer on reaction rate, **86,** 32
oxidation on silver supported on zeolite, **87,** 319
Cyclohexene oxide
from cyclohexene oxidation on silver supported on zeolite, **87,** 319
Cyclooctene
hydrogenation over $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, effect of intraparticle mass transfer on reaction rate, **86,** 32
Cyclopropane
hydrogenolysis
on Mo/Al_2O_3, **88,** 388
over organometallic complexes on alumina, **86,** 301

D

Deactivation
catalyst
by carbon, methanol synthesis over Cu/ThO_2, **89,** 131
by site poisoning and pore blockage, **88,** 188
copper, nickel, and cobalt catalysts: by interaction with aliphatic amines, **88,** 81
and cumene disproportionation on hydrocracking catalyst, **85,** 415
kinetics, and constant-conversion rising-temperature policy, **86,** 48
platinum and platinum–rhenium catalysts during methylcyclohexane dehydrogenation, **88,** 150, 163
Pt/Al_2O_3 reforming catalyst, during methylcyclohexane dehydrogenation: kinetics, **86,** 75
Dealkylation
steam, toluene: Rh/Cr_2O_3 activity and structure, **85,** 169
Dealumination
zeolite modification, acidity measurement, **85,** 362
zeolite Y, aluminum reinsertion into framework, **88,** 513
Decahydroquinoline
in quinoline denitrogenation, **85,** 117
Decomposition
catalytic, formic acid over glassy or crystalline germanium dioxide, **88,** 237
formic acid on copper, nickel, and copper–nickel alloys, **88,** 325
iron carbonyl on Cab-O-Sil, **87,** 163
methane on tungsten, **89,** 527
methanol over zinc oxide, kinetics and mechanism, **87,** 305
nitric oxide on Pt(410), **85,** 127
nitrous oxide
over iron-exchanged mordenite, **86,** 392
on polycrystalline platinum, **88,** 244
on $Sn_{(1-x)}V_xO_2$ and $Ti_{(1-x)}V_xO_2$ catalysts, charge transfer effects, **90,** 305
ruthenium carbonyl on Cab-O-Sil, mechanism, **87,** 179
temperature-programmed
bulk nickel formate on nickel powder, **88,** 325
methanol, formaldehyde, and formic acid on ZnO surfaces, **85,** 437
Dehydration
bimolecular, alcohols over HY zeolite: role of basic and acid sites, **90,** 1
cyclohexanol by titanium–zirconium phosphates, **85,** 398
Dehydrochlorination
tert-butyl chloride, on first-row transition metal chlorides, **89,** 553
Dehydrocyclization
n-hexane by platinum in zeolite Y, **86,** 16
hydrocarbons on mixed valence intermetallic compound $CePd_3$, **89,** 1
Dehydrogenation
cyclohexane
on bimetallic Au–Pt(111) single-crystal surfaces, **89,** 35
over Pt/Al_2O_3 catalyst, ensembling and monolayer parameters, **90,** 351
methylcyclohexane, and fouling of Pt/Al_2O_3 reforming catalyst, **86,** 75
methylcyclopentane on platinum–tin reforming catalysts, **85,** 197
nonoxidative, ethylbenzene over TiO_2–ZrO_2, **87,** 98

oxidative
butene, multicomponent oxide catalyst for, **88,** 119
ethylbenzene, kinetics, **85,** 477
vapor-phase
catalytic, ethylbenzene with carbonyl sulfide, **86,** 205
isobutyric acid over 12-heteropolymolybdates, **86,** 173; **89,** 196
Denitrogenation, *see also* Hydrodenitrogenation
kinetics, quinoline, **85,** 117
Deposition
Ni, V, Fe, S, and C on resid demetallation catalyst during demetallation process, **86,** 147
Design parameters
in temperature-programmed desorption from packed bed, **90,** 32
Desorption
activation energy, for hydrogen and thiophene forms in thiophene hydrodesulfurization reaction with Co–Mo–Al_2O_3 catalysts and components, **86,** 55
temperature-programmed
adsorption of methanol and water on H-ZSM-5, **89,** 150
ammonia, zeolite acidity measurement, **85,** 362
1-butene on platinum, **87,** 144
deactivated copper, nickel, and cobalt catalysts, **88,** 81
hydrogen from nickel, effects of support, **87,** 55
magnetite, **89,** 314
nitric oxide from Pt(410), **85,** 127
oxidized titanium species, diffusion into bulk platinum, **90,** 59
from packed bed, design parameters, **90,** 32
from porous catalysts, effect of adsorption and mass transfer, **85,** 143
synthesis gas adsorption on zirconium dioxide, **87,** 238
water and pyridine, heteropoly compounds, **88,** 253
Desorption/adsorption, *see* Adsorption/desorption
Deuteration
propene, **86,** 129
Deuterium
exchange, in 1,3-butadiene selective hydrogenation over $LaCoO_3$ perovskite, **89,** 362
in intermediates on iron/titania during carbon monoxide/hydrogen reaction, **89,** 327
tracing of methanation over nickel catalyst [*erratum* to **84,** 156 (1983)], **89,** 564
Deuterium–hydrogen, *see* Hydrogen–deuterium
Dewaxing
activity, catalytic: TMA–offretite, **86,** 24
Diacetyl
catalytic synthesis from methyl ethyl ketone, **90,** 232
formation from methyl ethyl ketone oxidation on V_2O_5–P_2O_5, **89,** 413
Diarylmethanes
cleavage in presence of zinc halides, **87,** 196
Dibenzothiophene
hydrodesulfurization, interactions with benzofuran hydrodeoxygenation, **87,** 332
Dibenzyl ether
cleavage in presence of zinc halides, **87,** 226
Dichloroethane
conversion by heterogeneous photocatalysis, **88,** 89
Dichlorotriosmium
supported clusters, olefin isomerization over, **89,** 100
Dienes
conjugated
addition of amines over solid base catalysts, **85,** 509
transfer hydrogenation over oxide catalysts, **90,** 160
α,ω-Dienes
reaction behavior and relative reactivity, **89,** 452
six to ten carbon atoms, metathesis over $CsNO_3$–Re_2O_7–Al_2O_3, **89,** 452
Diethyl ether
in ethanol–diethyl ether–water–alumina system, transient behavior, **87,** 452
Diffuse reflectance Fourier transform infrared spectrometry
adsorbed species, heatable-evacuable cell and optical system for, **88,** 264
Diffusion
gases over zeolites, frequency response technique, **88,** 530
intraparticle, of gas: effect of catalyst pore structure, **86,** 427
limitations, in temperature-programmed desorption from packed bed, **90,** 32
oxidized titanium species into bulk platinum, **90,** 59
and reaction modeling, hydrogenation of cyclohexene and cyclooctene over $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, **86,** 32
1,3-Diketone
cleavage, over thoria and mixed oxides of thoria, **89,** 489
Dimensionless groups
in temperature-programmed desorption from packed bed, **90,** 32
Dimerization
ethylene over NiCaY zeolite, role of Ni^+ ions, **89,** 470
Dimethylamine
addition to butadienes over solid base catalysts, **85,** 509
Dimethyl ether
conversion to ethylene, methyl group interchange, **87,** 528
2,6-Dimethylphenol, *see* Xylenol
2,2-Dimethylpropane, *see* Neopentane
2,6-Dimethylpyridine, *see* 2,6-Lutidine

Diolefin
hydrogenation, mechanism, **89,** 362
Diphenoquinone
C–C coupling product, **89,** 511
Dispersion, *see also* Redispersion
effects on activity/selectivity of cobalt in CO hydrogenation, **85,** 78
gold on titania, stability, **87,** 265
nickel particles on alumina and silica in oxygen and hydrogen, **87,** 108
noble metal on ceria/alumina, effect on hydrocarbon oxidation kinetics, **87,** 152
Disproportionation
cumene
on commercial hydrocracking catalyst, reaction and deactivation kinetics, **85,** 415
kinetics, **87,** 530
ethylbenzene, as test reaction for acidity on bifunctional zeolite catalysts, **88,** 249, 251
methylamine and dimethylamine, and copper, nickel, and cobalt catalyst deactivation by interaction with aliphatic amines, **88,** 81
Dissociation
reaction, carbon monoxide on iron, effect of hydrogen, **86,** 433
uranium antimonates, **88,** 448
Double bond
migration of 2-propenyl ethers to 1-propenyl ethers over solid base catalysts, **85,** 457
Drying
effect on isomerization of deuterated butenes over magnesium oxide, **89,** 69

E

Electrical conductivity
platinum, rhodium, and nickel catalysts deposited on titania, **89,** 404
Electrocatalysis
transition metal orthosilicates, **86,** 9
Electrocatalyst
platinum, ethylbenzene oxidative dehydrogenation: kinetics, **85,** 477
Electrode
nonmetallic, transition metal orthosilicates, **86,** 9
Electrolyte, *see* Solid electrolyte concentration cell
Electromotive force
solid electrolyte concentration cell, CO oxidation on Pt
comment, **90,** 371; reply, **90,** 374
local current and emf measurements, **87,** 1
relation with surface adsorption states, **86,** 437
Electronegativity
and Brønsted acidity of mordenites, **86,** 454
Electronic effect
in metal–support interactions on titania deposited metal catalysts, **89,** 404
Electronic modification
platinum, by tin, **85,** 197
Electronic properties
platinum/alumina, **89,** 462
platinum/silica, **89,** 462
Electronic trends
calculated, relation with hydrodesulfurization activity, **86,** 400
Electron microscopy
β-bismuth molybdate microstructures, **89,** 545
palladium supported on alumina and titanium oxide, **89,** 422
supported rhodium, **89,** 550
Electron paramagnetic resonance, *see also* Electron spin resonance
Ni^+ complexes, in NiCaY zeolite for ethylene dimerization, **89,** 470
osmium species derived from $Os_3(CO)_{12}$ clusters on alumina, **86,** 223
Electron spectroscopy for chemical analysis, *see* X-ray photoelectron spectroscopy
Electron spin echo modulation
Rh–Y-zeolite, hydration of paramagnetic rhodium centers, **86,** 413
Electron spin resonance, *see also* Electron paramagnetic resonance
copper cluster reaction with molecular oxygen in rotating cryostat, **90,** 156
paramagnetic rhodium species, identification on rhodium/polyphosphine catalysts, **88,** 313
as probes of amorphous MoS_3, **89,** 244
Electron transfer
in ir spectra of adsorbed CO, **88,** 273
Electrophoresis
cobalt–molybdenum sulfided unsupported catalysts, characterization, **88,** 222
emf, *see* Electromotive force
Ensemble, *see also* Site
active center parameters for cyclohexane dehydrogenation over Pt/Al_2O_3, **90,** 351
control by sulfur, carbon-free steam reforming of methane on sulfur-passivated nickel, **85,** 31
EPR, *see* Electron paramagnetic resonance
ESCA, *see* X-ray photoelectron spectroscopy
Esterification
acetic acid on mordenite, **85,** 519
Esters
from aqueous methanol conversion over H-ZSM-5 zeolite, **88,** 499
unsaturated, prochiral: asymmetric hydrogenation by cobalt(II) and nickel(II) chiral diphosphine complexes, **87,** 517
Ethane
hydrogenolysis
nickel crystallite thermometry, **90,** 40
over nickel, kinetics, **88,** 8
over niobia-supported nickel, strong metal–support interaction, **86,** 315
over Ni/SiO_2, magnetic crystallite thermometry, **86,** 450

on rhodium, effect of impurities in MgO support, **88,** 18
by supported osmium clusters, **86,** 342
from syngas conversion over metal–zeolite, **90,** 84
Ethanol
formation from CO + H_2 reaction over SiO_2-supported Rh catalysts, mechanism, **90,** 183
two-stage synthesis, by hydrocarbonylation of methanol in chelating solvents, **88,** 535
Ethanol–diethyl ether–water–alumina
system, transient behavior, **87,** 452
Ethene, *see* Ethylene
Ethylamine
addition to butadienes over solid base catalysts, **85,** 509
Ethylbenzene
disproportionation, as test reaction for acidity on bifunctional zeolite catalysts, **88,** 249, 251
nonoxidative dehydrogenation over TiO_2–ZrO_2, **87,** 98
vapor-phase
catalytic oxidative dehydrogenation, with carbonyl sulfide, **86,** 205
electrochemical oxidative dehydrogenation, kinetics, **85,** 477
Ethylene
adsorption on iron oxide, ir spectra, **88,** 125
alkylation with toluene for *p*-ethyltoluene production over zeolites, **89,** 267
dimerization, over NiCaY zeolite, role of Ni^+ ions, **89,** 470
dimethyl ether conversion to, methyl group interchange, **87,** 528
hydroformylation over rhodium–Y zeolite, atmospheric pressure: comparison with propylene, **85,** 89
hydrogenation
by hydrogen vanadium oxide bronzes, **87,** 339
by supported osmium clusters, **86,** 342
and vibrational resonance, **88,** 509
interaction with supported ruthenium, **88,** 457
oxidation
on iron oxide, **88,** 125
reactions, selectivity characterization: and oxygen chemisorption on silver catalysts, **86,** 465
over silver, long induction period, **90,** 24
over silver–palladium alloys, **88,** 409
polymerization, over organometallic complexes on alumina, **86,** 301
primary product from methanol, over H-ZSM-5, **88,** 478
Ethylene oxide
synthesis, catalyst design for selectivity optimization, **87,** 116
Ethylenic hydrocarbons
isomerization over magnesium oxide, **89,** 69
o-Ethylphenol, *see* Phlorol
p-Ethyltoluene
production, by alkylation of toluene with ethylene over zeolites, **89,** 267
EXAFS, *see* Extended X-ray absorption fine structure
Exhaust
automobile, ceria catalysts and oxygen storage, **86,** 254
gas: catalysis, nitrous oxide decomposition over iron-exchanged mordenite, **86,** 392
Extended X-ray absorption fine structure
Co/Mo/Al_2O_3 structure, **89,** 226
supported cobalt molybdate structure, **85,** 295
zeolite-supported rhodium for methanol carbonylation, **87,** 414

F

Faujasite
support for sulfided cobalt–molybdenum catalysts, quinoline hydrodenitrogenation, kinetics, **85,** 117
Fault, *see* Stacking fault
Feed
composition, and methanol production on copper–zinc oxide, **90,** 139
Ferric oxide, *see* Iron oxide
Ferromagnetic resonance
nickel on titanium oxide, **86,** 359
Films
thin, platinum, carbon monoxide oxidation on: critical temperature measurement, **86,** 373
Fischer–Tropsch reactions
alkali metal promoter role, **89,** 392
carbon monoxide dissociation on iron, effect of hydrogen, **86,** 433
surface science investigation, **87,** 66
Fischer–Tropsch synthesis
alkyl intermediates during, relation to hydrocarbon products, **86,** 239
catalysts, supported iron, Mössbauer spectroscopy, **87,** 36
chain growth probabilities on iron, **85,** 370
on cobalt catalysts, effects of support and dispersion on activity/selectivity properties, **85,** 78
hydrocarbons, reactions of chloromethanes with hydrogen, mechanism, **88,** 382
iron catalyst
effect of carburization, **86,** 201
nitrous oxide as surface probe, **89,** 116
and iron-containing zeolites, **89,** 20
over molybdenum hexacarbonyl, supported, **87,** 514
over ruthenium, carbon monoxide and carbon deposition, **86,** 158
selectivity
effect of alloying, **89,** 542
iron–cobalt system, **85,** 349
wax fraction (heavy) from, molecular weight distribution, **86,** 477

Fission
carbon–carbon bond, **89,** 413
Fluorine
on fluorinated silica, NMR spectra, **85,** 311
Formaldehyde
decomposition on ZnO surfaces, **85,** 437
Formate
decomposition on TiO_2, **87,** 461
formation from formaldehyde on TiO_2, **87,** 461
Formic acid
catalytic decomposition over glassy or crystalline germanium dioxide, **88,** 237
decomposition
on nickel powder, **88,** 325
on ZnO surfaces, **85,** 437
Fouling
catalyst, model: variable reaction order, **88,** 400
Pt/Al_2O_3 reforming catalyst during methylcyclohexane dehydrogenation, mechanism, general correlation, **86,** 75
Fourier transform-infrared spectroscopy
benzene adsorption on Fe_2O_3, **88,** 131
ethylene adsorption on Fe_2O_3, **88,** 125
H-ZSM-5 surface sites and reactivity sequences in methanol conversion, **88,** 137
synthesis gas adsorption on zirconium dioxide, **87,** 381
transient, carbon monoxide oxidation on Pt/SiO_2: surface reaction dynamics, **89,** 348
Framework
dealuminated Y zeolites, aluminum reinsertion in, **88,** 513
Frequency response technique
zeolite diffusion of gases, **88,** 530
Functionality
catalytic, supported sulfides: effect of support and additives on CoMo catalyst, **85,** 44
on Mo dispersion, **85,** 53

G

Gas
consumption during high-temperature treatments, strong metal–support interaction state in Pt/TiO_2 system, **85,** 253
diffusion, zeolites: frequency response technique, **88,** 530
intraparticle diffusion, effect of catalyst pore structure, **86,** 427
mixtures (H_2, CH_4, H_2O, CO_2, and CO), filamentous carbon from α-iron, **85,** 224
Gasification
carbon black, by carbon dioxide, **90,** 65
catalytic, of graphite by barium in steam, carbon dioxide, oxygen, and hydrogen, **87,** 255
potassium-catalyzed, graphite in oxygen and steam, **88,** 97
Germanium dioxide
glassy and crystalline, differences for catalytic decomposition of formic acid, **88,** 237
Gold
dispersion on titania, stability, **87,** 265
Gold–platinum, *see* Platinum–gold
Gold–titania
interactions, **87,** 265
Gradientless recycle reactor, *see* Reactor
Graphite
catalytic gasification by barium in steam, carbon dioxide, oxygen, and hydrogen, **87,** 255
gasification, potassium-catalyzed, in oxygen and steam, **88,** 97
KC_{24}, olefin competitive isomerization over, adsorption measurements, **88,** 225
Graphite–potassium, *see* Potassium–graphite
Growth
filamentous carbon, from α-iron in H_2, CH_4, H_2O, CO_2, and CO gas mixtures, **85,** 224

H

Halogenated hydrocarbons
precious metal supported catalysts
deactivation by, **86,** 187
preferential adsorption on active sites, **86,** 187
Heat of adsorption
hydrocarbons on Pt, **88,** 300
Heat transport
interphase, and nickel crystallite thermometry, **90,** 40
Heteropoly compounds
characterization by photoacoustic spectroscopy, **88,** 177
composite, oxidation of butane, **85,** 324
and 12-tungstophosphoric acid interactions with pyridine, **89,** 185
water and pyridine desorption, **88,** 253
Heteropolymolybdates
isobutyric acid vapor-phase oxidative dehydrogenation over, effect of Group Ib, IIb, IIIb, and VIII metal salts, **86,** 173
12-Heteropolymolybdates
isobutyric acid oxidative dehydrogenation, **89,** 196
n-Hexadecane
catalytic cracking, secondary reactions, **89,** 442
Hexamethyldisiloxane
precious metal supported catalysts
deactivation by, **86,**187
penetration into precious metal with blocking of active sites, **86,** 187
Hexane
hydrogenolysis
nickel catalysts, effect of support, **85,** 16
on rhodium, effect of particle size and support, **87,** 27
skeletal reactions on iridium, **87,** 468

n-Hexane
dehydrocyclization by platinum in zeolite Y, **86,** 16
skeletal rearrangement reactions over platinum single crystal surfaces, surface structure and temperature dependence, **85,** 206
Hexane-1,6-diamine
in zeolite synthesis, **85,** 135
1-Hexene
isomerization
by alumina-supported triosmium clusters, **85,** 176
on cracking catalysts, active site characterization, **90,** 270
over oxide-supported osmium complexes, support effects, **88,** 355
oxidation over noble metals, **87,** 152
High-resolution electron energy loss spectroscopy
nickel on titanium dioxide, **90,** 75
High-resolution electron microscopy (HREM)
tin–antimony oxide catalyst structure, **88,** 107
Hydration
n-butenes over zeolites, effect of aluminum content, **89,** 60
paramagnetic rhodium centers in Rh–Y-zeolite, electron spin echo modulation studies, **86,** 413
Hydride
transfer reactions, benzyl alcohol disproportionation over alumina, **85,** 527
Hydrocarbons, *see also* Aromatic, Chlorinated, Ethylenic, and Halogenated Hydrocarbons
adsorption on metal films, calorimetry, **88,** 300
C_2, adsorption on Pd/SiO_2, **89,** 93
C_6, reactions over iridium: selectivity, role of carbonaceous layers and particle size, **87,** 468
from methanol conversion
over H-ZSM-5 zeolite, **88,** 478
role of acid property of zeolites, **85,** 521
oxidation over supported precious metal, inhibition by halogenated hydrocarbons and organosiloxanes, **86,** 187
products, Fischer–Tropsch synthesis: relation of alkyl intermediates, **86,** 239
saturated, hydrogenolysis over nickel: kinetics, **88,** 8
skeletal rearrangements and aromatization over $CePd_3$, **89,** 1
unsaturated and aromatic, adsorption on surface of Fe_2O_3, Fourier transform-infrared spectroscopy, **88,** 125, 131
Hydrocarbonylation
methanol in chelating solvents, in ethanol two-stage synthesis, **88,** 535
Hydroconversion
dialkyl- and monoalkyl-benzenes on supported Rh catalysts, **90,** 292
Hydrocracking
commercial catalyst, cumene disproportionation, kinetics, **85,** 415
in methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 150, 163
Hydrodenitrogenation
activity, sulfided alumina-supported Ni–Mo: relationship with oxygen chemisorption, **90,** 10
quinoline over sulfided cobalt–molybdenum catalysts, non-first-order kinetics, **85,** 117
Hydrodeoxygenation
catalytic
benzofuran
and *o*-ethylphenol on presulfided $CoMo/\gamma Al_2O_3$, **87,** 325
interactions with dibenzothiophene hydrodesulfurization, **87,** 332
heterogeneous, ketones and alcohols on sulfided $NiO–MoO_3/\gamma\text{-}Al_2O_3$, **90,** 147
Hydrodesulfurization
catalysts
$Co/Mo/Al_2O_3$ structure determination by extended X-ray absorption-edge fine structure spectra, **89,** 226
sulfided nickel–molybdenum/alumina, **87,** 292
sulfiding, Raman spectroscopy, **85,** 488
cobalt–molybdenum/alumina catalysts, **87,** 497
dibenzothiophene, interactions with benzofuran hydrodeoxygenation, **87,** 332
periodic trends, relation of transition metal sulfide synergic systems, **86,** 226
thiophene
$Co–Mo–Al_2O_3$ catalysts and components, adsorption and catalytic properties, **86,** 55
on Mo(100) crystal surface, **88,** 546
rhodium(III) zeolites 13X and ZSM-5, **86,** 108
transition metal sulfide catalytic activity
periodic trends, **86,** 400
relation with electronic structure, **86,** 400
Hydroformylation
ethylene and propylene over rhodium–Y zeolite, atmospheric pressure, **85,** 89
propylene, vapor phase, over X and Y zeolite-supported rhodium, comparison, **86,** 67
Hydrogen
absorption, effects on supported Pd/Pt alloy catalysts, **85,** 405
adsorption
–desorption kinetics of nickel, effects of support, **87,** 55
on titania-supported silver, **87,** 424
in carbon dioxide photoassisted reduction over metal oxides, **90,** 173
and carbon monoxide
adsorption on cobalt, **85,** 63
chemisorption on
Pd/SiO_2 and Pd/La_2O_3, effects of metal–support interactions, **89,** 498
polycrystalline Pt_3Ti surface, ligand effects, **85,** 272

mixtures, nitric oxide reduction over silica-supported rhodium **88,** 289
reaction, alkali metal promoter role, **89,** 392
surface reactions on zirconium dioxide, **90,** 17
catalytic gasification of graphite by barium in, **87,** 255
chemisorption on magnesium oxide-supported rhodium, effects of impurities, **88,** 18
effect on
carbon monoxide dissociation reaction on iron, **86,** 433
platinum black catalyst sintering, kinetics, **89,** 164
gas-phase, inhibition of ethylbenzene electrochemical oxidation dehydrogenation, **85,** 477
and oxygen, nickel dispersion on alumina and silica in, **87,** 108
reactions of chloromethanes with, relation to Fischer–Tropsch synthesis of hydrocarbons, **88,** 382
spillover, and sintering of platinum supported on γ-alumina, **86,** 446
titration of adsorbed oxygen on titania-supported silver, **87,** 424
treatment, effect on platinum and platinum–rhenium catalysts for methylcyclohexane dehydrogenation, **88,** 150, 163
Hydrogenation
acetylene, over FeNiCrPB alloys, **90,** 178
aldehyde, and metal–support interactions in titania-supported copper, **85,** 380
asymmetric, of prochiral unsaturated esters by cobalt(II) and nickel(II) chiral diphosphine complexes, **87,** 517
benzene
over iron, kinetics and reaction model, **86,** 235
nickel catalysts, effect of support, **85,** 16
1-butene on platinum, temperature-programmed desorption, **87,** 144
carbon on nickel(111) surface, **89,** 159
carbon dioxide on Group VIII metals, **87,** 352
carbon monoxide
alumina-supported osmium catalysts, **86,** 95
over niobia-supported nickel, strong metal–support interaction, **86,** 315
over Pd/SiO_2 and Pd/La_2O_3, metal–support interaction effects, **90,** 205
over Ru/zeolite, effects of support, **85,** 499
over silica-supported ruthenium–copper bimetallic catalysts, **90,** 337
over SiO_2-supported Rh catalysts, formation mechanism of acetaldehyde and ethanol, **90,** 183
on supported molybdenum catalysts, reduced and sulfided, **89,** 536
over TaC, TiC, and Mo_2C, kinetics, **89,** 168
crotonaldehyde, over nickel–copper–alumina, mechanism, **85,** 25
cyclohexanones over palladium, **89,** 177
cyclohexene and cyclooctene, over $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, effect of intraparticle mass transfer on reaction rate, **86,** 32
ethene
and carbon monoxide and carbon dioxide by supported osmium clusters, **86,** 342
and propene, and vibrational resonance, **88,** 509
ethylene by hydrogen vanadium oxide bronzes, **87,** 339
olefin over low valent actinides, **85,** 536
propene on platinum catalyst in aqueous solution, **86,** 129
propylene
on Mo/Al_2O_3, **88,** 388
over organometallic complexes on alumina, **86,** 301
selective
acetylene over palladium on alumina: effect of catalyst pretreatment and deuterium vs hydrogen, **86,** 417
1,3-butadiene
over $LaCoO_3$ perovskite, **89,** 362
on pure Pt(111) and $Pt_{0.5}Ni_{0.5}$(111) single-crystal alloy, comparison, **90,** 358
over shape-selective catalysts: platinum/ZSM-5, **89,** 520
transfer, conjugated dienes over oxide catalysts, **90,** 160
Hydrogen/carbon monoxide
conversion to methanol over copper–chromia, effect of carbon dioxide, **88,** 523
Hydrogen–deuterium
equilibration on potassium–graphite intercalation compounds, mechanism, **86,** 280
Hydrogenolysis
aliphatic esters over copper, **88,** 203
alkanes over organometallic complexes on alumina, **86,** 301
n-butane and 2,2-dimethylpropane, on silica-supported Rh–Pt bimetallic catalysts, mechanism, **87,** 389
cyclohexanediones and hydroxycyclohexanones, over Pd, Pt, Ir, and Rh catalysts, comparison, **90,** 221
cyclopropane
on Mo/Al_2O_3, **88,** 388
over organometallic complexes on alumina, **86,** 301
ethane
nickel crystallite thermometry during, **90,** 40
over niobia-supported nickel, strong metal–support interactions, **86,** 315
over Ni/SiO_2, magnetic crystallite, thermometry during, **86,** 450
propane, butane, and isobutane over nickel: kinetics, **88,** 8

on rhodium, effect of impurities in MgO support, **88,** 18
by supported osmium clusters, **86,** 342
hexane
and *methylcyclopentane on rhodium,* effect of particle size and support, **87,** 27
nickel catalysts, effect of support, **85,** 16
hydrocarbons on mixed valence intermetallic compound $CePd_3$, **89,** 1
methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 150, 163
methylcyclopentane
on platinum–tin reforming catalysts, **85,** 197
on Pt/SiO_2, effect of particle size, **85,** 530
thiophene, by Co–Mo/Al, **86,** 55
Hydrogen–oxygen
chemisorptions and titrations, stoichiometry, platinum/rhenium/alumina surface area measurement, **85,** 1
titrations on Pt and Rh catalysts, thermodesorption analysis of water produced, **86,** 441
Hydrogen sulfide
adsorption, platinum aggregate atomic structure modification, **87,** 86
in methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 163
Hydrogen vanadium oxide bronzes
$H_xV_2O_5$, ethylene hydrogenation, **87,** 339
Hydroisomerization
n-butenes over $LaCoO_3$ perovskite, **89,** 362
nickel-substituted mica montmorillonite activity, **86,** 1
Hydrolysis
carbonyl sulfide over alumina, kinetics and mechanism, **85,** 339
chlorobenzene, Cu-promoted hydroxyapatite reactivation during, **85,** 538
surface, rhodium in zeolites, **88,** 431
Hydroprocessing
organo-oxygen compounds in coal liquids by sulfided Ni–Mo/α-Al_2O_3, **85,** 256
Hydrotalcite
-like precursors, Cu–Zn–Al mixed oxide preparation for low-temperature methanol synthesis, **85,** 260
Hydroxyapatites
copper-promoted, reactivation during chlorobenzene hydrolysis, **85,** 538
Hydroxyl group
on fluorinated silica, NMR spectra, **85,** 311

I

Impurities
effect on chemisorption and activity of MgO-supported Rh, **88,** 18
Induction period
long, ethylene oxidation over Ag, **90,** 24
Infrared spectra
adsorbed
carbon monoxide, electron transfer and ligand effects, **88,** 273
species, **88,** 264
carbon monoxide adsorption on platinum alloys, **90,** 88
isocyanate species (Rh–NCO and Si–NCO), **85,** 389
nickel on alumina supports, CO and NO on, **86,** 84
nitric oxide reduction by H_2–CO mixtures over silica-supported rhodium, **88,** 289
transition metal chlorides, *tert*-butyl dehydrochlorination on, **89,** 553
Infrared spectroscopy, *see also* Diffuse reflectance Fourier transform infrared spectrometry; Fourier transform-infrared spectroscopy
adsorption of methanol and water on H-ZSM-5, **89,** 150
H-ZSM-5 modification for *p*-xylene selectivity, **87,** 77
interconversion of chemisorbed surface species: $Rh^I(CO)_2 + CO \rightarrow Rh^I(CO)_3$, **89,** 79
iron carbonyl on Cab-O-Sil, **87,** 163
manganese oxides, supported: oxygen adsorption and surface reactions, **88,** 362
methanol and ammonia adsorption on molybdenum trioxide, **86,** 215
rhodium carbonyls, on X and Y zeolites after hydroformylation, **86,** 67
ruthenium carbonyl and iron carbonyl mixture, **87,** 179
sulfur–platinum interaction, on sulfided Pt/Al_2O_3, **89,** 52
surface species, in methanol oxidation over TiO_2, **87,** 461
12-tungstophosphoric acid
characterization, **88,** 177
interactions with pyridine, **89,** 185
Interaction
adsorbed molecules, effects on selectivity, **87,** 10
Intercalation compounds
potassium–graphite, mechanism of H_2–D_2 equilibration on, **86,** 280
Interconversion
chemisorbed surface species: $Rh^I(CO)_2 + CO \rightarrow Rh^I(CO)_3$, **89,** 79
Interface
new active sites, palladium/titania: for CO/H_2 reaction, **86,** 384
Intermediate
Fischer–Tropsch synthesis, **88,** 382
phenol–O_2–Cu(II), **89,** 511
reaction, on iron/titania during CO/H_2 reaction, **89,** 327
surface, in propylene oxidation and ammoxidation over heterogeneous molybdate and antimonate, **87,** 363

Intermetallic compounds
mixed valence $CePd_3$, skeletal rearrangement of hydrocarbons on, **89,** 1
supported catalyst preparation with high surface area nickel, **85,** 267
thorium–nickel, surface characterization, **88,** 26
Interphase heat transport
and nickel crystallite thermometry, **90,** 40
Intraparticle mass transfer, *see* Mass transfer
Intrinsic activity
$RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, dependent on polymer crosslink density and functionalized swelling ratio, **86,** 32
Ion scattering spectroscopy
cobalt–molybdenum/alumina, **89,** 334
thorium–nickel alloys, surface characterization, **88,** 26
zinc ions and γ-alumina, interactions, **86,** 266
Iridium
hydrocarbon reactions, selectivity: role of carbonaceous layers and particle size, **87,** 468
Iron
alkyl species on surface, during Fischer–Tropsch synthesis, **86,** 239
alloy Fischer–Tropsch catalysts, reaction and selectivity of FeCo system, **85,** 349
benzene hydrogenation over, kinetics and reaction model, **86,** 236
carbon monoxide dissociation reaction on, effect of hydrogen, **86,** 433
catalysts for Fischer–Tropsch synthesis
molecular weight distribution of heavy wax fraction, **86,** 477
nitrous oxide as surface probe, **89,** 116
chain growth probabilities on, in Fischer–Tropsch synthesis, **85,** 370
-containing zeolites: synthesis, characterization, and Fischer–Tropsch studies, **89,** 20
crystallite shape oscillations during heating in hydrogen on alumina catalysts, **90,** 241
-exchanged mordenite, nitrous oxide decomposition over, **86,** 392
FeNiCrPB alloys, amorphous and crystalline: acetylene hydrogenation over, **90,** 178
α-Fe_2O_3, Cd-doped: carbon monoxide oxidation, kinetics and mechanism, **86,** 219
fused, catalytic behavior, effect of carburization, **86,** 201
metallic substrates, oxidation to magnetite, **89,** 303
silica support, carbon dioxide hydrogenation, specific activity and selectivity, **87,** 352
supported, Fischer–Tropsch synthesis catalysts: Mössbauer spectroscopy, **87,** 36
surfaces, carbon monoxide reduction over, **87,** 66
α-Iron
in H_2, CH_4, H_2O, CO_2, and CO gas mixtures: filamentous carbon initiation and growth from, **85,** 224
Iron/alumina
carbon monoxide chemisorption, **89,** 533
Iron carbide
formation during Fischer–Tropsch synthesis over iron catalysts, **89,** 116
X-ray photoelectron spectroscopy, **87,** 66
Iron carbonyl
$Fe_3(CO)_{12}$ clusters
impregnation and decomposition on Cab-O-Sil, mechanism of interaction, **87,** 163
interaction with Cab-O-Sil and alumina, **87,** 163
Mössbauer and infrared spectroscopy, **87,** 163
and ruthenium carbonyl mixture, Mössbauer and infrared spectroscopy, **87,** 179
Iron–cobalt
system, reaction and selectivity, **85,** 349
Iron dinitrogen dioxide
complex, in deNO_x catalysis, **89,** 250
Iron dinitrosyl
complex, in deNO_x catalysis, **89,** 250
Iron hyponitrite
complex, in deNO_x catalysis, **89,** 250
Iron oxide
benzene adsorption on, Fourier transform–infrared spectroscopy, **88,** 131
butene selective oxidation on, effect of oxide structure, **89,** 172
ethylene oxidation on, Fourier transform–infrared spectroscopy, **88,** 125
Iron rhodium
$FeRh/SiO_2$ bimetallic catalysts, surface phases: characterization by *in situ* Mössbauer spectroscopy at cryogenic temperatures, **89,** 138
Iron–ruthenium, *see* Ruthenium–iron
Iron/titania
carbon monoxide/hydrogen reaction over, effect of temperature, **89,** 285
reaction intermediates during carbon monoxide/hydrogen reaction, **89,** 327
Isobutane
hydrogenolysis over nickel, kinetics, **88,** 8
Isobutyl alcohol
formation from methanol conversion in presence of metal acetylides, **90,** 127
synthesis, **85,** 428
Isobutyric acid
oxidative dehydrogenation on 12-heteropolymolybdates, **89,** 196
vapor-phase oxidative dehydrogenation over 12-molybdophosphates, effect of Group Ib, IIb, IIIb, and VIII metal salts, **86,** 173
Isocyanate
species (Rh–NCO and Si–NCO) formation during NO reduction by CO over silica-supported rhodium, **85,** 389
Isomerization
allyl alcohols over Raney nickel, **88,** 418
n-butane and 2,2-dimethylpropane, on silica-supported Rh–Pt bimetallic catalysts, **87,** 389

butenes
over magnesium oxide, mechanism, **89,** 69
on mixed tin–antimony oxides, effects of acidity, **88,** 73
n-butenes, on reduced molybdena–alumina, **88,** 317
competitive, olefins over KC_{24}: adsorption measurements, **88,** 225
double-bond shift, methylcyclohexenes and methylenecyclohexane over γ-alumina, **88,** 37
hexene-1
by alumina-supported triosmium clusters, **85,** 176
on cracking catalysts, active site characterization, **90,** 270
over oxide-supported osmium complexes, support effects, **88,** 355
hydrocarbons on mixed valence intermetallic compound $CePd_3$, **89,** 1
olefin over supported dichlorotriosmium clusters, **89,** 100
p-xylene on H-ZSM-5 zeolite, poisoned with quinolines, **88,** 505
Isosynthesis
mechanism, **90,** 127
Isotope
effect, kinetic
deuterium, in nitric oxide reduction by methane over Rh/Al_2O_3, **86,** 137
in methanol oxidation, **87,** 461
exchange, oxygen on polycrystalline rhodium at low temperatures, **85,** 98
multiple, tracing of methanation over nickel catalyst, completion of ^{13}C and D tracing [*erratum* to **84,** 156 (1983)], **89,** 564
study of carbonate catalysis, **90,** 65

K

K edge
molybdenum in oxidized state, structure, **89,** 226
Ketones
from aqueous methanol conversion over H-ZSM-5 zeolite, **88,** 499
hydrodeoxygenation, on sulfided $NiO–MoO_3/\gamma$-Al_2O_3, **90,** 147
Kinetics
benzene hydrogenation over iron, reaction model, **86,** 236
carbon monoxide
hydrogenation over TaC, TiC, and Mo_2C, **89,** 168
–hydrogen reaction over iron/titania, **89,** 285
methanation on alumina-supported nickel, **85,** 105
deactivated resid demetallation catalyst, **86,** 147
deactivation, and constant-conversion rising-temperature policy, **86,** 48
ethylbenzene dehydrogenation over platinum, **85,** 477
first order in 2,6-dimethylphenol and O_2, zero and one-half-order in basic copper(II) catalyst, **89,** 511
hydrogen adsorption/desorption of nickel, effects of support, **87,** 55
intrinsic, $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, **86,** 32
and mechanism, CO oxidation on Cd-doped α-Fe_2O_3, **86,** 219
methanol decomposition over zinc oxide, **87,** 305
oxygen adsorption on
$LaCrO_3$, **87,** 126
$LaMnO_3$, **89,** 209
platinum black catalyst sintering in different atmospheres, **89,** 164
quinoline hydrodenitrogenation (non-first-order), **85,** 117

L

L adsorption edges
platinum in platinum/alumina and platinum/silica catalysts, **89,** 462
Lanthanum
$LaCoO_3$ perovskite
1,3-butadiene selective hydrogenation over, **89,** 362
hydrogenation active sites on, **89,** 362
$LaCrO_3$
oxygen adsorption, equilibrium and kinetics, **87,** 126
reduction, kinetics, **87,** 126
surface hydroxyls, **87,** 126
surface properties, **87,** 126
$LaMnO_3$
physicochemical properties, **89,** 209
reducibility and kinetics of O_2 adsorption, **89,** 209
Lanthanum oxide
allyl ether isomerization, **85,** 457
amine addition to conjugated dienes, **85,** 509
support for palladium, metal–support interactions, **87,** 398
Lanthanum sesquioxide–cadmium oxide, *see* Cadmium oxide–lanthanum sesquioxide
Laser Raman spectroscopy
characterization of palladium/silica and palladium/lanthanum oxide, **89,** 433
Lead–platinum, *see* Platinum–lead
Ligand
effects on
CO and H_2 chemisorption on polycrystalline Pt_3Ti surface, **85,** 272
ir spectra of adsorbed CO, **88,** 273
Light
visible, carbon dioxide reduction assistance, **90,** 173
Low-temperature CO shift reaction
effects of alumina and reaction conditions, **90,** 113
unreduced copper–zinc system, **90,** 106
2,6-Lutidine
probe molecule for acid surfaces, **88,** 374

M

Magnesia, *see* Magnesium oxide
Magnesium oxide
allyl ether isomerization, **85,** 457
amine addition to conjugated dienes, **85,** 509
butene isomerization over, effect of drying and reaction temperature, **89,** 69
copper particle wetting and spreading on, direct observation of morphology, **85,** 187
support for rhodium, effect of impurities on chemisorption and activity, **88,** 18
Magnesium oxide–thorium oxide
phenyl alkyl ketone production, **89,** 489
Magnetic crystallite thermometry
during ethane hydrogenolysis over Ni/SiO_2, **86,** 450
Magnetic defects
in transition metal sulfides, **89,** 244
Magnetic species
in amorphous MoS_3, **89,** 244
Magnetic susceptibility
carbon monoxide and C_2 hydrocarbon adsorption on Pd/SiO_2, **89,** 93
probes of amorphous MoS_3, **89,** 244
Magnetite
surfaces
adsorptive properties, **89,** 314
preparation and characterization on metallic iron substrates, **89,** 303
Maleic anhydride
from *n*-butane oxidation over vanadium–phosphorus oxides, mechanism, **89,** 44
formation from butane, **85,** 324
Manganese carbonyls
stable, formation on ceria-supported manganese oxides, **88,** 516
Manganese oxides
ceria support, manganese carbonyl formation on, **88,** 516
supported, adsorption and surface reactions of oxygen, infrared spectroscopy, **88,** 362
Mass spectroscopy
gas species in methanol oxidation over TiO_2, **87,** 461
Mass transfer, *see also* Transport
effect on temperature-programmed desorption from porous catalysts, **85,** 143
intraparticle, effect on
gel-form polymer-bound transition metal catalyst activity, **86,** 32
hydrogenation rate of cyclohexene and cyclooctene over $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, mathematical model, **86,** 32
Metal
alkali, promoters in methanation and Fischer–Tropsch reaction, **89,** 392
catalysts, hydrogen/oxygen titrations on, thermodesorption analysis of water produced, **86,** 441
clusters, chemisorption and catalysis, **86,** 333, 342
films, hydrocarbon adsorption on, calorimetry, **88,** 300
Group VIII, silica support: carbon dioxide hydrogenation on, specific activities and selectivities, **87,** 352
ion (Group Ib, IIb, IIIb, and VIII), role as electron reservoir, **86,** 173
noble, *see* Noble metals
paramagnetic species, on rhodium/polyphosphine catalysts, **88,** 313
redispersion, in calcined samples of NiO/ZrO_2 reduced in hydrogen, **88,** 54
supported
migration during preparation for electron microscopy, **89,** 550
oscillations during CO oxidation over, **88,** 333, 345
transition, *see* Transition metals
Metal acetylides
higher alcohol formation from methanol in presence of, **90,** 127
Metal carbonyl
clusters on Cab-O-Sil, spectroscopy, **87,** 163, 179
Metal nitride
formation in catalyst deactivation by interaction with aliphatic amines, **88,** 81
Metal oxides
carbon dioxide photoassisted reduction by hydrogen and water vapor over, **90,** 173
Metal sulfides
deposition on resid demetallation catalyst, **86,** 147
Metal–support interactions
cobalt with alumina, silica, titania, magnesia, and carbon: effects on CO hydrogenation activity/selectivity properties, **85,** 78
effects on
CO hydrogenation over Pd/SiO_2 and Pd/La_2O_3, **90,** 205
hydrogen adsorption on nickel, **87,** 55
hydrogen and carbon monoxide chemisorption on Pd/SiO_2 and Pd/La_2O_3, **89,** 498
nickel catalysts, **85,** 16
nickel oxide on α-alumina or zirconia, calcined at high temperatures, **88,** 54
oxidized titanium species, diffusion into bulk platinum, **90,** 59
palladium with alumina and titanium oxide, **89,** 422
in Pd/SiO_2 and Pd/La_2O_3, X-ray photoelectron spectroscopy, **87,** 398
reduction and reoxidation of ZnO-supported Pd, **88,** 246
strong
absence in gold dispersion stability on titania, **87,** 265
absence, Pd/TiO_2 enhanced activity for CO/H_2 reaction, **86,** 384

cluster models of localized charge transfer, **88,** 519
iron/titania, **89,** 285
in nickel/titanium dioxide, **90,** 75
nickel–titanium oxide, **86,** 359
niobia-supported nickel, ranking hierarchy, **86,** 315
Ni/TiO_2, mechanism, **85,** 237
in Pt/TiO_2 system, gas consumption measurements during high-temperature treatments, **85,** 253
rhodium/magnesium oxide system, effect of sulfate impurity in support, **88,** 18
in rhodium/titania model catalysts, oxide migration, **87,** 279
on titania-deposited metal catalysts, electronic effects, **89,** 404
titania-supported copper, **85,** 380
Metal–zeolite
catalysts, syngas conversion to ethane, **90,** 84
Metathesis
n-butenes on reduced molybdena–alumina, **88,** 317
α,ω-dienes over cesium nitrate–rhenium heptoxide–alumina, **89,** 452
rhenium oxide catalysts, alumina- and silica-supported, ESCA study, **90,** 362
Methacrylic acid
from isobutyric acid oxidative dehydrogenation on 12-heteropolymolybdates, **89,** 196
Methanation
carbon monoxide
on alumina-supported nickel, kinetics, **85,** 105
on low-weight loading Ni/Al_2O_3, **89,** 380
over nickel–alumina, transient kinetics, **86,** 245
over nickel catalyst, multiple isotope tracing, completion of ^{13}C and D tracing [*erratum* to **84,** 156 (1983)], **89,** 564
reaction, alkali metal promoter role, **89,** 392
Methane
carbon-free steam reforming, on sulfur-passivated nickel catalysts, **85,** 31
decomposition
on nickel/silica, effects of carbon deposition on nickel surface structure, **88,** 1
on tungsten, **89,** 527
interactions with tungsten, molybdenum, and platinum, **89,** 527
nitric oxide reduction over Rh/Al_2O_3, **86,** 137
oxidation
on nickel oxide with α-alumina or zirconia support, **88,** 65
on polycrystalline silver, **88,** 490
Methanol
adsorption on molybdenum trioxide, infrared study, **86,** 215
aqueous, conversion over H-ZSM-5 zeolite, **88,** 499
carbonylation over zeolite-supported rhodium, **87,** 414
conversion
to hydrocarbons, role of acid property of zeolites, **85,** 521
H-ZSM-5 surface sites and reactivity sequences, **88,** 137
to olefins over ZSM-5
effect of temperature and zeolite SiO_2/Al_2O_3, **86,** 289
olefin distribution, **86,** 297
decomposition
over zinc oxide, kinetics and mechanism, **87,** 305
on ZnO surfaces, **85,** 437
formation on zirconium dioxide, **90,** 17
higher alcohol formation in presence of metal acetylides, **90,** 127
hydrocarbonylation, in chelating solvents: in ethanol two-stage synthesis, **88,** 535
to olefins, reaction paths: over H-ZSM-5 zeolite, **88,** 478
oxidation over TiO_2
rate-limiting step, **87,** 461
reaction mechanism, **87,** 461
production on copper–zinc oxide, rate dependence on feed composition, **90,** 139
synthesis
from carbon monoxide and hydrogen, **85,** 428
chemical state of copper during, **90,** 165
over Cu/ThO_2, **89,** 131
from hydrogen/carbon monoxide conversion over copper–chromia, effect of carbon dioxide, **88,** 523
low-temperature, Cu–Zn–Al mixed oxide preparation for, **85,** 260
transformation to hydrocarbons over ZSM-type zeolites, stability and selectivity of catalytic action, **85,** 287
and water adsorption on H-ZSM-5, **89,** 150
Methoxy
decomposition on TiO_2 surface, **87,** 461
Methylation
olefins over H-ZSM-5, **88,** 478
Methyl chloride
reactions with hydrogen, relation to Fischer–Tropsch synthesis of hydrocarbons, **88,** 382
Methylcyclohexane
dehydrogenation
and fouling of Pt/Al_2O_3 reforming catalyst, **86,** 75
over platinum and platinum–rhenium catalysts, **88,** 150, 163
Methylcyclohexenes
double-bond shift isomerization over γ-alumina, **88,** 37
Methylcyclopentane
conversion
on platinum–tin, **88,** 466
on platinum–tin reforming catalysts, **85,** 197
over supported rhodium, **87,** 27

hydrogenolysis on Pt/SiO_2, effect of particle size, **85,** 530
skeletal reactions on iridium, **87,** 468
Methylenecyclohexane
double-bond shift isomerization over γ-alumina, **88,** 37
Methyl ethyl ketone
oxidation to
biacetyl over metal oxide catalysts, **90,** 232
diacetyl on V_2O_5–P_2O_5, **89,** 413
Methyl group
interchange in dimethyl ether conversion to ethylene, **87,** 528
Methylpentanes
aromatization on nickel and cobalt, CH_x addition–abstraction mechanism, **89,** 14
2-Methyl-1-propanol, *see* Isobutyl alcohol
Mica montmorillonite
nickel-substituted, hydroisomerization activity, **86,** 1
Microcalorimetry
copper surface area in Cu–ZnO, evaluation, **87,** 443
Microstructure
β-bismuth molybdate, electron microscopy, **89,** 545
Migration
double bond, of 2-propenyl ethers to 1-propenyl ethers over solid base catalysts, **85,** 457
nickel crystallite on carbon-contaminated alumina substrate, **86,** 457
oxide, Rh/TiO_2 model catalysts, **87,** 279
regions, during cyclohexane dehydrogenation over Pt/Al_2O_3, **90,** 351
supported rhodium during preparation for electron microscopy, **89,** 550
Mobility
adsorbed molecules, effects on selectivity, **87,** 10
carbon monoxide adsorbed on Pt, **87,** 1
Model
catalyst fouling, **88,** 400
cluster
of localized charge transfer in strong metal–support interactions, **88,** 519
platinum–titania vacancy interaction, **88,** 549
Langmuir–Hinshelwood, and quinoline hydrodenitrogenation kinetics, **85,** 117
mathematical, hydrogenation of cyclohexene and cyclooctene over $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads: intraparticle mass transfer effect on reaction rate, **86,** 32
reaction, benzene hydrogenation over iron, kinetics, **86,** 235
zeolite unit cell size, cracking catalyst behavior prediction, **85,** 466
Molecular shape selectivity
pentasil zeolites, **88,** 538
Molecular weight
distribution, heavy wax fraction from Fischer–Tropsch synthesis, **86,** 477
Molybdate
heterogeneous catalysts, propylene oxidation and ammoxidation over: surface intermediates, **87,** 363
surface species in MoO_3/Al_2O_3 catalysts, water effect, Raman spectroscopy, **90,** 314
Molybdena–alumina
reduced, holding preadsorbed hydrogen: *n*-butene isomerization and metathesis on, **88,** 317
sulfided, site selective chemisorption, **85,** 277
Molybdenite
thin single-crystal film, coke deposition, mechanism, **90,** 194
Molybdenum
on alumina
catalytic reactions, **88,** 388
deactivated resid demetallation catalyst, multitechnique analysis, **86,** 147
dispersion, effect of support: sulfided Mo catalysts, **85,** 53
K edge in oxidized state, **89,** 226
–methane interactions, **89,** 527
Mo(100) crystal surface, thiophene hydrodesulfurization, **88,** 546
$[Mo(CH_3CN)_4(NO)_2](BF_4)_2$ as model catalyst for NO chemisorption on reduced MoO_3/Al_2O_3 catalyst, **90,** 368
sulfided, effect of support on
activities, **85,** 53
molybdenum dispersion, **85,** 53
supported catalysts, reduced and sulfided characterization, **89,** 274
specific activities in CO hydrogenation, **89,** 536
Molybdenum carbide
Mo_2C, carbon monoxide hydrogenation over, kinetics, **89,** 168
Molybdenum–cobalt, *see* Cobalt–molybdenum
Molybdenum disulfide
unsupported and supported, oxygen chemisorption, **89,** 111
Molybdenum hexacarbonyl
on alumina, surface chemistry and catalytic activity, **86,** 301
supported, Fischer–Tropsch synthesis, **87,** 514
Molybdenum hexacarbonyl/alumina
catalysts, activated, cyclopropane and propylene hydrogenolysis, **88,** 388
Molybdenum–nickel, *see* Nickel–molybdenum
Molybdenum–platinum, *see* Platinum–molybdenum
Molybdenum/silica
supported, propane photocatalytic oxidation by oxygen, **90,** 49
Molybdenum sulfide, *see* Molybdenum disulfide
Molybdenum trioxide
acidic sites: conversion of acetone to propylene, **90,** 329
alumina supported, molybdenum surface species, water effect, Raman spectroscopy, **90,** 314

γ-alumina supported, molybdena surface coverage, **90,** 323
methanol and ammonia adsorption, infrared study, **86,** 215
–NaY zeolite catalysts, physicochemical characterization, **89,** 478
in nickel oxide–molybdenum trioxide/γ-alumina, **90,** 147
Molybdenum trisulfide
amorphous, different magnetic species, magnetic susceptibility and ESR probes, **89,** 244
12-Molybdophosphates
oxidation catalysts, effect of cations, **86,** 173
Molybdophosphoric acid
cesium salt, and vanadium promoter: butane oxidation, **85,** 324
Molybdotungstophosphoric acids
isobutyric acid oxidative dehydrogenation, **89,** 196
Molybdovanadophosphoric acids
isobutyric acid oxidative dehydrogenation, **89,** 196
Mordenite
acetic acid esterification, **85,** 519
electronegativity and Brønsted acidity, **86,** 454
iron-exchanged, nitrous oxide decomposition, **86,** 392
Mordenite–rhodium, *see* Rhodium–mordenite
Mössbauer spectroscopy
carbon monoxide/hydrogen reaction over iron/titania, **89,** 285
cobalt–molybdenum/alumina catalysts, calcined: cobalt precursors, **87,** 497
iron carbonyl on Cab-O-Sil, **87,** 163
iron catalysts, **89,** 116
iron Fischer–Tropsch synthesis catalysts, supported, **87,** 36
magnetite, **89,** 303
ruthenium carbonyl and iron carbonyl mixture, **87,** 179
in situ at cryogenic temperatures: $FeRh/SiO_2$, **89,** 138

N

Neopentane
hydrogenolysis and isomerization on silica-supported Rh–Pt bimetallic catalysts, **87,** 389
Network
structure, effect on porosimetry simulation, **89,** 217
Nickel
alumina support
carbon monoxide methanation, kinetics, **85,** 105
interactions with alumina surface, **86,** 84
surface characterization by infrared studies, **86,** 84
catalysts
deactivation by interaction with aliphatic amines, **88,** 81
effects of support, **85,** 16
sulfur-passivated, carbon-free steam reforming of methane, **85,** 31
crystallites
supported on alumina, redispersion and migration, **86,** 457
thermometry during ethane hydrogenolysis, **90,** 40
FeNiCrPB alloys, amorphous and crystalline: acetylene hydrogenation over, **90,** 178
hydrogen adsorption/desorption kinetics, effects of support, **87,** 55
methylpentane aromatization on, **89,** 14
multiple isotope tracing of methanation over, completion of ^{13}C and D tracing [*erratum* to **84,** 156 (1983)], **89,** 564
Ni^+ ions, in activity of NiCaY zeolite for ethylene dimerization, **89,** 470
niobia support, strong metal–support interaction, **86,** 315
particles, dispersion on alumina and silica in oxygen and hydrogen, **87,** 108
powder, decomposition of bulk nickel formate and formic acid on, **88,** 325
Raney, isomerization of substituted allyl alcohols over, **88,** 418
silica support, ethane hydrogenolysis over, magnetic crystallite thermometry, **86,** 450
-substituted mica montmorillonite, hydroisomerization activity, **86,** 1
supported
hydrogenolysis of saturated hydrocarbons, **88,** 8
intermetallic compound and alloy catalyst preparation, high surface area, **85,** 267
surface structure, effects of carbon deposition, **88,** 1
titania support, strong metal–support interaction, mechanism, **85,** 237
Nickel(111)
surface, β-carbon hydrogenation on, X-ray photoelectron spectroscopy, **89,** 159
Nickel/alumina
carbon monoxide and hydrogen reaction over, transient kinetics, **86,** 245
low-weight loading, carbon monoxide methanation, **89,** 380
Nickel(II) chiral diphosphine
complexes, asymmetric hydrogenation of prochiral unsaturated esters, **87,** 517
Nickel–copper–alumina
crotonaldehyde hydrogenation, activity and selectivity, **85,** 25
Nickel formate
bulk, decomposition on nickel powder, **88,** 325
Nickel–molybdenum
alumina support, sulfided: hydrotreating activity, oxygen chemisorption relationship, **90,** 10
α-alumina support, sulfided: hydroprocessing of organo-oxygen compounds in coal liquids, **85,** 256

Nickel–molybdenum/alumina
potassium promoted, water gas shift catalyst: nature and properties, **87,** 482
sulfided
promoting effect, **87,** 283
surface phases, **87,** 292
Nickel oxide
α-alumina and zirconia support, calcined at high temperatures, structure and activity, **88,** 54, 65
Nickel oxide–molybdenum trioxide/γ-alumina
sulfided, hydrodeoxygenation of ketones and alcohols, **90,** 147
Nickel/silica
carbon deposition from CH_4 and CO, **88,** 1
Nickel–thorium, *see* Thorium–nickel
Nickel/titanum dioxide
electronic effects in metal–support interactions, **89,** 404
strong metal–support interactions, **90,** 75
Nickel–titanium oxide
interactions, **86,** 359
Niobia
support for nickel, strong metal–support interaction, **86,** 315
Nitric oxide
adsorption on
magnetite, **89,** 314
Ni/Al_2O_3, as molecular probe, infrared studies, **86,** 84
chemisorption on
reduced MoO_3/Al_2O_3 catalyst: transition-metal complex model catalyst preparation, **90,** 368
sulfided molybdena–alumina, **85,** 277
decomposition on Pt(410), **85,** 127
in $deNO_x$ catalysis, **89,** 250
reduction by
CO over silica-supported rhodium, Rh–NCO and Si–SNO species formation, **85,** 389
hydrogen–carbon monoxide mixtures over silica-supported rhodium, **88,** 289
methane over Rh/Al_2O_3, **86,** 137
Nitride
formation in catalyst deactivation by interaction with aliphatic amines, **88,** 81
Nitrogen
coupling step, initial, in $deNO_x$ catalysis, **89,** 250
N_2 adsorption, analysis of deactivated resid demetallation catalyst, **86,** 147
Nitrous oxide
adsorption on titania-supported silver, **87,** 424
decomposition
evaluation of copper surface area in Cu–ZnO by microcalorimetry, **87,** 443
over iron-exchanged mordenite, **86,** 392
on polycrystalline platinum, **88,** 244
on rare earth cuprates, **86,** 121
on $Sn_{(1-x)}V_xO_2$ and $Ti_{(1-x)}V_xO_2$ catalysts, charge transfer effects, **90,** 305
surface intermediate, in nitric oxide reduction by methane over Rh/Al_2O_3, **86,** 137
surface probe of iron catalysts for Fischer–Tropsch synthesis, **89,** 116
Noble metals
ceria/alumina support, oxidation of CO and hydrocarbons over, **87,** 152
dispersion on ceria/alumina, effect on hydrocarbon oxidation kinetics, **87,** 152
Nuclear magnetic resonance
^{13}C, butene isomerization on mixed tin–antimony oxides, effects of acidity, **88,** 73
fluorinated silica, **85,** 311

O

Offretite–TMA, *see* TMA–offretite
Olefins
competitive isomerization over KC_{24}, adsorption measurements, **88,** 225
dimerization over NiCaY zeolite, **89,** 470
distribution, from methanol, **86,** 297
formation from methanol over H-ZSM-5 zeolite, **88,** 478
hydration on zeolites, **89,** 60
hydrogenation
over low valent actinides, **85,** 536
over rhodium complex, **86,** 32
isomerization over supported dichlorotriosmium clusters, **89,** 100
from methanol conversion over ZSM-5, **86,** 289, 297
oxidation on zeolite-supported silver, **87,** 319
Optical system
diffuse reflectance Fourier transform infrared spectroscopy of adsorbed species, **88,** 264
Orbital energy correlation diagram
initial nitrogen coupling step in $deNO_x$ catalysis, **89,** 250
Organometallic complexes
on alumina, surface chemistry and catalytic activity, **86,** 301
Organo-oxygen
compounds, in coal liquids, hydroprocessing by sulfided $Ni–Mo/γ-Al_2O_3$, **85,** 256
Orthosilicates
transition metal, electrocatalytic activity, **86,** 9
Oscillations
in carbon monoxide oxidation over
supported Pt and Pt–Pd, effect of treatment and reaction conditions, **88,** 333
supported Pt–Pd, effects of reactor operating conditions, **88,** 345
Osmium
alumina support
carbon monoxide hydrogenation, **86,** 95
catalyst preparation from $[Os(CO)_5]$, **86,** 95
structure, characterization, **86,** 95

clusters
aluimina support, hexene-1 isomerization, **85,** 176
derived from $Os_3(CO)_{12}$ and $Os_6(CO)_{18}$, supported
chemisorption of carbon monoxide and oxygen, **86,** 333
hydrogenation of ethene, carbon monoxide, and carbon doxide, and hydrogenolysis of ethane, **86,** 342
complexes derived from $Os_3(CO)_{12}$ on oxide supports: hexene-1 isomerization, **88,** 355
species, from $Os_3(CO)_{12}$ clusters on alumina, EPR study, **86,** 223
supported, olefin isomerization, **89,** 100
Osmium pentacarbonyl
catalyst preparation from, **86,** 95
Oxidation, *see also* Reoxidation
n-butane to maleic anhydride, mechanism, **89,** 44
carbon, by transition metal carbides and oxides, **85,** 154
carbon monoxide
on Cd-doped α-Fe_2O_3, kinetics and mechanism, **86,** 219
over cadmium oxide–lanthanum sesquioxide system, kinetics and mechanism, **88,** 283
on platinum
catalyst films deposited on stabilized zirconia solid electrolyte, emf: comment, **90,** 371; reply, **90,** 374
local current and emf, **87,** 1
relation of surface adsorption states and emf in solid electrolyte concentration cell, **86,** 437
thin films, critical temperature measurement, **86,** 373
on platinum/silica, surface reaction dynamics, **89,** 348
over supported metal, oscillations, **88,** 333, 345
catalysts, 12-heteropolymolybdates, effect of cations, **86,** 173
ethylene
on iron oxide, **88,** 125
reactions, selectivity characterization, and oxygen chemisorption on silver catalysts, **86,** 465
over silver, long induction period, **90,** 24
over silver–palladium alloys, **88,** 409
fuel-rich, methane on nickel oxide with α-alumina or zirconia support, **88,** 65
hydrocarbon, over supported precious metal: inhibition by halogenated hydrocarbons and organosiloxanes, **86,** 187
iron, magnetite formation, **89,** 303
methane, on polycrystalline silver, **88,** 490
methyl ethyl ketone to biacetyl over metal oxide catalysts, **90,** 232
olefins, by silver supported on zeolite, **87,** 319
in oxygen-stoichiometry controlled conditions, **89,** 44
photocatalytic, propane by oxygen on supported Mo/SiO_2, **90,** 49
propylene
to acrolein over tellurium-based multicomponent oxide catalysts, **88,** 214
over heterogeneous molybdate and antimonate, surface intermediates, **87,** 363
selective
butane on composite heteropoly compound, **85,** 324
butene on iron oxide, **89,** 172
Oxidation–reduction
dispersion of nickel particles on alumina and silica, **87,** 108
Oxidative coupling
2,6-dimethylphenol, over basic copper(II) complexes, **89,** 511
Oxides
catalysts, transfer hydrogenation of conjugated dienes, **90,** 160
migration, Rh/TiO_2 model catalysts, **87,** 279
multicomponent catalysts for oxidative butene dehydrogenation, structure, **88,** 119
perovskite-type ($LaCrO_3$): adsorption, reducibility, and total oxidation, **87,** 126
-supported osmium complexes, hexene-1 isomerization, support effects, **88,** 355
TiO_x, segregation on nickel, **90,** 75
transition metal, carbon oxidation, **85,** 154
Oxygen
adsorbed, hydrogen titration on titania-supported silver, **87,** 424
-adsorbed platinum supported on γ-alumina, effect of water in reduction stage, **86,** 446
adsorption
evaluation of copper surface area in Cu–ZnO by microcalorimetry, **87,** 443
on $LaCrO_3$, equilibrium and kinetics, **87,** 126
on $LaMnO_3$, kinetics, **89,** 209
on magnetite, **89,** 314
molecular, on polycrystalline rhodium at low temperatures, **85,** 98
and surface reactions on supported manganese oxides, infrared spectroscopy, **88,** 362
on titania-supported silver, **87,** 424
atoms, active: number on Co_3O_4, **88,** 526
catalytic gasification of graphite by barium, **87,** 255
chemisorption
relationship to hydrotreating activity of alumina-supported Ni–Mo, **90,** 10
on silver catalysts, and selectivity of ethylene oxidation reactions, **86,** 465
supported molybdenum catalysts, reduced and sulfided: characterization, **89,** 274
by supported osmium clusters, **86,** 333
on unsupported and supported MoS_2, **89,** 111
on vanadium pentoxide, adsorption isobars and isotherms, **87,** 520
effect on platinum black catalyst sintering, kinetics, **89,** 164

evolution, and transition metal orthosilicate electrocatalytic activity, **86,** 9
graphite gasification, **88,** 97
and hydrogen, nickel dispersion on alumina and silica, **87,** 108
and methanol, batch reaction over TiO_2: surface species and gas species, **87,** 461
molecular, copper cluster reaction with, **90,** 156
$^{18}O_2$ tracer study of tellurium oxide catalysts in propylene oxidation to acrolein, **88,** 214
propane photocatalytic oxidation on supported Mo/SiO_2, **90,** 49
storage, capacity of ceria in automotive exhaust catalysts, **86,** 254
Oxygen–hydrogen, *see* Hydrogen–oxygen

P

Packed bed
temperature-programmed desorption from, design parameters, **90,** 32
Palladium
alumina support, pretreatment effect on acetylene hydrogenation, **86,** 417
and aromatic hydrocarbon synthesis from synthesis gas, **87,** 136
$CePd_3$, mixed valence intermetallic compound: skeletal rearrangement of hydrocarbons, **89,** 1
interactions with
alkyl substituents, in cyclohexanone hydrogenation, **89,** 177
alumina and titanium oxide supports, **89,** 422
and Pt catalysts, comparison in cyclohexanedione and hydroxycyclohexanone hydrogenolysis, **90,** 221
silica or lanthanum oxide support, metal–support interactions, **87,** 398
supported
deactivation, effect of support, **86,** 187
hydrocarbon oxidation over, inhibition, **86,** 187
on SiO_2 and La_2O_3, catalytic activity: dispersion, morphology, and support composition effects, **90,** 205
titania support, enhanced activity for CO/H_2 reaction, **86,** 384
–vanadium pentoxide catalyst, alcohol oxycarbonylation to dialkyl oxalates, **90,** 261
zinc oxide support, reduction and reoxidation, X-ray photoelectron spectroscopy, **88,** 246
Palladium/lanthanum oxide
hydrogen and carbon monoxide chemisorption, effects of metal–support interactions, **89,** 498
preparation, characterization by laser Raman spectroscopy, **89,** 433
Palladium–nickel/alumina
catalysts, surface composition, **88,** 228
Palladium–platinum
alloy catalysts, supported: synthesis, structure, and effects of hydrogen absorption, **85,** 405
alumina support, oscillations during CO oxidation, **88,** 333, 345
Palladium/silica
carbon monoxide and C_2 hydrocarbon adsorption, magnetic study, **89,** 93
hydrogen and carbon monoxide chemisorption, effects of metal–support interactions, **89,** 498
preparation, characterization by laser Raman spectroscopy, **89,** 433
Palladium–silver, *see* Silver–palladium
Palladium–vanadyl sulfate–sulfuric acid
carbon support, for heterogeneous Wacker reactions, **85,** 284
Particles
copper, on magnesium oxide: wetting and spreading, direct observation of morphology, **85,** 187
size, effect on
photoassisted water gas shift reaction over Pt/TiO_2, **86,** 231
Pt/SiO_2, methylcyclopentane hydrogenolysis, **85,** 530
selectivity on C_6 hydrocarbon reactions on iridium, **87,** 468
selectivity, hydrogenolysis of hexanes and methylcyclopentane on supported Rh, **87,** 27
Passivation
sulfur, nickel catalysts for carbon-free steam reforming of methane, **85,** 31
Perchloroethylene
conversion by heterogeneous photocatalysis, **88,** 89
Periodic trends
in hydrodesulfurization, relation of transition metal sulfide synergic systems, **86,** 226
Perovskite
$LaCoO_3$, 1,3-butadiene selective hydrogenation over, **89,** 362
structure, rare earth cuprates: nitrous oxide decomposition, **86,** 121
Perovskite oxides
$LaMnO_3$, physicochemical properties, **89,** 209
Phases
surface, in bimetallic $FeRh/SiO_2$: *in situ* Mössbauer spectroscopy at cryogenic temperatures, **89,** 138
Phase transformation
anatase/rutile, **87,** 265
Phenol–O_2–Cu(II)
intermediate, **89,** 511
Phenyl alkyl ketones
from benzaldehyde over thoria, **89,** 489
Phlorol
hydrodeoxygenation on presulfided $CoMo/\gamma Al_2O_3$, **87,** 325
Phosphoboride
alloys, amorphous and crystalline, acetylene hydrogenation over, **90,** 178
Phosphorus
FeNiCrPB alloys, amorphous and crystalline, acetylene hydrogenation over, **90,** 178

Phosphorus/vanadium
ratio, effect on solid state chemistry and redox properties of vanadium phosphate-based catalysts, **88,** 43
Phosphotungstic acid
interactions with pyridine, **89,** 185
and related salts, characterization by photoacoustic spectroscopy, **88,** 177
Photoacoustic spectroscopy
infrared region
tungstophosphoric acid characterization, **88,** 177
12-tungstophosphoric acid interactions with pyridine, **89,** 185
Photoassisted reaction
water gas shift over Pt/TiO_2, effects of particle size, **86,** 231
Photocatalysis
heterogeneous, chlorocarbon mineralization, **88,** 89
propane oxidation by oxygen on supported Mo/SiO_2, **90,** 49
water gas shift reaction over Pt/TiO_2, effects of particle size, **86,** 231
Photoreduction
Ni^{2+} in hydrogen, **89,** 470
Physicochemical properties
$LaMnO_3$, reducibility and kinetics of O_2 adsorption, **89,** 209
molybdenum trioxide–NaY zeolite catalysts, **89,** 478
Pi bonding
benzene on iron oxide, **88,** 131
ethylene on iron oxide, **88,** 125
Piperidine
addition to butadienes over solid base catalysts, **85,** 509
reaction with aldehydes over alumina: 3-alkylpyridine synthesis, **87,** 478
Platinum
aggregates, atomic structure modification by sulfur adsorption, **87,** 86
alloys, carbon monoxide adsorption, **90,** 88
alumina support
carbon monoxide adsorption, electron transfer and ligand effects in ir spectra, **88,** 273
oscillations during CO oxidation over, **88,** 333
reforming catalyst, fouling, accompanying methylcyclohexane dehydrogenation, **86,** 75
sintering, **86,** 446
bulk, diffusion of oxidized titanium species into, **90,** 59
1-butene chemisorption and hydrogenation, temperature-programmed desorption, **87,** 144
carbon monoxide oxidation
local current and emf, **87,** 1
relation of surface adsorption states and emf in solid electrolyte concentration cell, **86,** 437
catalyst
in aqueous solution, propene hydrogenation, **86,** 129
hydrogen/oxygen titrations, thermodesorption analysis of water produced, **86,** 441
electrocatalyst, ethylbenzene dehydrogenation, kinetics, **85,** 477
electronic modification by tin, **85,** 197
films, hydrocarbon adsorption, calorimetry, **88,** 300
–methane interactions, **89,** 527
oxygen-adsorbed, effect of water in reduction stage, **86,** 446
and Pd catalysts, comparison in cyclohexanedione and hydroxycyclohexanone hydrogenolysis, **90,** 221
polycrystalline, nitrous oxide decomposition, **88,** 244
Pt(410), nitric oxide decomposition, **85,** 127
pure Pt(111) and $Pt_{0.5}Ni_{0.5}$(111) single-crystal alloy: comparison in selective hydrogenation of 1,3-butadiene, **90,** 358
redispersion on γ-Al_2O_3, SiO_2, and TiO_2, **90,** 279
reforming catalysts, behavior during methylcyclohexane dehydrogenation, **88,** 150, 163
silica support, methylcyclopentane hydrogenolysis, effect of particle size, **85,** 530
single crystal surfaces, *n*-hexane skeletal rearrangement reactions over, **85,** 206
supported
deactivation, effect of support, **86,** 187
hydrocarbon oxidation over, inhibition, **86,** 187
surface, dilution by tin, **85,** 197
surface oxidative dehydrogenation, ethylbenzene, **85,** 477
thin films, carbon monoxide oxidation, critical temperature measurement, **86,** 373
titania support, strong metal–support interaction state: gas consumption during high-temperature treatments, **85,** 253
in zeolite Y, *n*-hexane dehydrocyclization, **86,** 16
Platinum/alumina
catalysts
cyclohexane dehydrogenation: ensembling and monolayer parameters, **90,** 351
sulfurization, sulfur–platinum interaction, infrared spectroscopy, **89,** 52
poisoning with carbonaceous matter, **89,** 256
support and reduction effects, **89,** 462
Platinum black
catalyst sintering in different atmospheres, kinetics, **89,** 164
Platinum–Gold
bimetallic Au–Pt(111) single-crystal surfaces, cyclohexane dehydrogenation, **89,** 35
polyamide support, benzene selective hydrogenation, **86,** 210
Platinum–lead
alloys, carbon monoxide adsorption, **90,** 88
Platinum–molybdenum
zeolite Y support, *n*-butane conversion, activity and selectivity, **85,** 244

Platinum–palladium, *see* Palladium–platinum
Platinum–rhenium
alloys, carbon monoxide adsorption, **90,** 88
interaction, temperature-programmed reduction, **87,** 437
reforming catalysts, behavior during methylcyclohexane dehydrogenation, **88,** 150, 163
Platinum/rhenium/alumina
surface area measurement
effects of catalyst pretreatment, **85,** 8
hydrogen–oxygen chemisorptions and titrations, stoichiometry, **85,** 1
Platinum–rhodium *see* Rhodium–platinum
Platinum–ruthenium
bimetallic clusters, supported, surface composition, **85,** 331
Platinum/silica
carbon monoxide oxidation, surface reaction dynamics, **89,** 348
support and reduction effects, **89,** 462
Platinum–sulfur, *see* Sulfur–platinum
Platinum–tin
alloys, carbon monoxide adsorption, **90,** 88
catalysts, X-ray photoelectron spectroscopy and reaction study, **88,** 466
reforming catalysts, methylcyclopentane conversion, **85,** 197
Platinum–tin/alumina
reforming catalysts, state of tin, **90,** 96
tin chemical state, **89,** 371
Platinum–titania
electronic effects in metal–support interactions, **89,** 404
photoassisted water gas shift reaction over, effects of particle size, **86,** 231
vacancy interaction, cluster models, **88,** 549
Platinum titanium
Pt_3Ti polycrystalline surface, ligand effects for CO and H_2 chemisorption, **85,** 272
Platinum/ZSM-5
shape-selective catalysts, hydrogenation over, **89,** 520
Poisoning
carbonaceous matter in reforming catalyst, **89,** 256
catalyst, sulfate as precursor, **87,** 276
H-ZSM-5
modification for *p*-xylene selectivity, **87,** 77
with quinoline derivatives, in *p*-xylene isomerization, **88,** 505
site, catalyst deactivation, **88,** 188
sulfide, magnesium oxide-supported rhodium, **88,** 18
Polyamide
support for platinum–gold, benzene selective hydrogenation, **86,** 210
Polymerization
n-1-alkenes, with surface chromium(II) on silica gel at low temperatures and normal pressure, **88,** 424
ethylene, over organometallic complexes on alumina, **86,** 301
Polyphenylene oxide
C–O coupling product, **89,** 511
Polyphosphine/rhodium, *see* Rhodium/polyphosphine
Polystyrene–divinylbenzene
polymer beads, $RhCl(PPh_3)_3$ bound to: hydrogenation of cyclohexene and cyclooctene over, **86,** 32
Pore
blockage, catalyst deactivation, **88,** 188
mouth plugging, resid demetallation catalyst during demetallation process, **86,** 147
size and size distribution, effect on deactivation by site poisoning and pore blockage, **88,** 188
structure
of catalyst, and intraparticle diffusion of gas, **86,** 427
and porosimetry simulation, **89,** 217
Porosimetry
simulation, effect of network structure, **89,** 217
Potassium
-catalyzed gasification of graphite in oxygen and steam, **88,** 97
Potassium carbonate
interactions with carbon black, **90,** 65
promoter for $NiMo/Al_2O_3$ water gas shift catalyst, **87,** 482
Potassium–graphite
intercalation compounds (C_8K, $C_{24}K$), mechanism of H_2–D_2 equilibration, **86,** 280
KC_{24}, olefin competitive isomerization over, adsorption measurements, **88,** 225
Precious metal
catalysts, supported
deactivation by halogenated hydrocarbons and organosiloxanes, **86,** 187
hydrocarbon oxidation over, inhibition, **86,** 187
Pressure
atmospheric, ethylene and propylene hydroformylation over rhodium–Y zeolite, **85,** 89
effects on selectivity, FeCo system, **85,** 349
normal, polymerization of *n*-1-alkenes with surface chromium(II) on silica gel, **88,** 424
Pretreatment
effects on
platinum/rhenium/alumina surface area measurement, **85,** 8
surface properties and catalytic activities, ethylbenzene dehydrogenation over TiO_2–ZrO_2, **87,** 98
temperature, oxide phase of Ni/Al_2O_3, **89,** 380
Probes
of magnetic species in MoS_3, **89,** 244
surface, of iron catalysts for Fischer–Tropsch synthesis: nitrous oxide, **89,** 116
Prochiral unsaturated esters
asymmetric hydrogenation by cobalt(II) and nickel(II) chiral diphosphine complexes, **87,** 517

Promoters
alkali metals, in methanation and Fischer–Tropsch reaction, **89,** 392
vanadium, in heteropoly compounds: selective oxidation of butane, **85,** 324
Propane
conversion to aromatic hydrocarbons on Pt/H-ZSM-5 catalysts, **90,** 366
hydrogenolysis over nickel, kinetics, **88,** 8
photocatalytic oxidation by oxygen on supported Mo/SiO_2, **90,** 49
Propene, *see* Propylene
1-Propenyl ethers
double-bond migration from 2-propenyl ethers over solid base catalysts, **85,** 457
2-Propenyl ethers
double-bond migration to 1-propenyl ethers over solid base catalysts, **85,** 457
Propylene
from acetone deoxygenation on MoO_3, **90,** 329
hydroformylation
over rhodium–Y zeolite, atmospheric pressure, comparison with ethylene, **85,** 89
vapor phase, over X and Y zeolite-supported rhodium, comparison, **86,** 67
hydrogenation
on Mo/Al_2O_3, **88,** 388
over organometallic complexes on alumina, **86,** 301
on platinum catalyst in aqueous solution, **86,** 129
and vibrational resonance, **88,** 509
from methanol, over H-ZSM-5, **88,** 478
oxidation
to acrolein over tellurium-based multicomponent oxide catalysts, **88,** 214
over noble metals, **87,** 152
selective oxidation and ammoxidation over heterogeneous molybdate and antimonate, surface intermediates, **87,** 363
Pyridine
adsorption, and nickel-substituted mica montmorillonite hydroisomerization activity, **86,** 1
desorption, heteropoly compounds, **88,** 253
interactions with 12-tungstophosphoric acid, **89,** 185

Q

Quinoline
hydrodenitrogenation over sulfided cobalt–molybdenum catalysts, non-first-order kinetics, **85,** 117
poison for H-ZSM-5, **87,** 77
Quinoline derivatives
poisoning of H-ZSM-5 zeolite, in *p*-xylene isomerization, **88,** 505

R

Radial distribution function
analysis, palladium–platinum alloy formation, **85,** 405
Raman cross sections
relative, tungsten oxides, **90,** 150
Raman spectroscopy
cobalt molybdate hydrodesulfurization catalyst sulfiding *in situ*, **85,** 488
cobalt–molybdenum/alumina, **89,** 334
laser, characterization of palladium/silica and palladium/lanthanum oxide, **89,** 433
MoO_3/Al_2O_3 catalysts, molybdenum surface species, water effect, **90,** 314
Rare earth
cuprates, Ln_2CuO_4 type (Ln = La,Pr,Nd,Sm,Gd), nitrous oxide decomposition, **86,** 121
mixed valence intermetallic compound, hydrocarbon skeletal rearrangement, **89,** 1
Rate equation
parameter estimation, **87,** 530
Reaction
alkyl intermediates, during Fischer–Tropsch synthesis, **86,** 239
batch, methanol and oxygen over TiO_2: surface species and gas species, **87,** 461
behavior of α,ω-dienes, **89,** 452
catalytic, vibrational resonance, **88,** 509
competitive, benzene–toluene hydrogenation, **89,** 52
conditions, effects on
low-temperature CO shift reaction, **90,** 113
oscillatory and catalytic behavior of $(Pt–Pd)/Al_2O_3$, **88,** 333
intermediates, on iron/titania during CO/H_2 reaction, **89,** 327
measurements, platinum–tin catalysts, **88,** 466
mechanism
Fischer–Tropsch synthesis, **86,** 239
hydrogenation of propene on Pt catalyst in aqueous solution, **86,** 129
model, benzene hydrogenation over iron, kinetics, **86,** 235
paths for olefin formation over H-ZSM-5 zeolite, **88,** 478
scheme, effects of interaction and mobility on selectivity, **87,** 10
secondary, of cracking *n*-hexadecane, **89,** 442
skeletal rearrangement, *n*-hexane over platinum single crystal surfaces, **85,** 206
surface carbon with hydrogen on Ni/SiO_2, **88,** 1
temperature-programmed, carbon monoxide oxidation on Pt/SiO_2, surface reaction dynamics, **89,** 348
Reactivity
α,ω-dienes, **89,** 452

Reactivity sequences
H-ZSM-5 surface sites in methanol conversion, Fourier transform-infrared spectroscopy, **88,** 137
Reactor
operating conditions, effects on oscillatory behavior of (Pt–Pd)/Al_2O_3, **88,** 345
recycle, gradientless: carbon monoxide methanation on alumina-supported nickel, kinetics, **85,** 105
slurry, and chain growth in Fischer–Tropsch synthesis, **85,** 370
Readsorption
in temperature-programmed desorption from packed bed, **90,** 32
Rearrangement
skeleton, hydrocarbons on $CePd_3$, **89,** 1
Recycle reactor, *see* Reactor
Redispersion
metal, in calcined samples of NiO/ZrO_2 reduced in hydrogen, **88,** 54
and migration on Ni supported on alumina, **86,** 457
nickel on alumina and silica by oxidation–reduction cycling, **87,** 108
platinum on γ-Al_2O_3, SiO_2, and TiO_2, **90,** 279
Redox
catalysis, N_2O decomposition over iron-exchanged mordenite, **86,** 392
vanadium phosphate-based catalysts, effect of phosphorus/vanadium ratio, **88,** 43
Reducibility
and reoxidizability, 12-molybdophosphates: increase with standard electrode potential of cation, **86,** 173
Reduction
catalytic, carbon monoxide over iron surfaces, **87,** 66
$LaMnO_3$, kinetics, **89,** 209
nitric oxide
by CO over silica-supported rhodium, Rh–NCO and Si–NCO species formation, **85,** 389
by methane over Rh/Al_2O_3, **86,** 137
photoassisted, carbon dioxide by hydrogen and water vapor over metal oxides, **90,** 173
platinum/alumina, X-ray absorption spectroscopy, **89,** 462
platinum/silica, X-ray absorption spectroscopy, **89,** 462
platinum–tin catalysts, **88,** 466
stage of oxygen-adsorbed platinum supported on γ-alumina, effect of water, **86,** 446
temperature-programmed
ceria on alumina, in automotive exhaust catalysts, **86,** 254
and metal–support interactions in titania-supported copper, **85,** 380
platinum–rhenium interaction, **87,** 437
platinum–tin/alumina, **90,** 96
platinum–tin catalysts, **88,** 466
zinc oxide-supported palladium, **88,** 246
Reforming
steam
carbon-free: methane over sulfur-passivated nickel catalysts, **85,** 31
of dialkyl- and monoalkyl-benzenes on supported Rh catalysts, **90,** 292
Reforming catalysts, *see* Catalysts, reforming
Reinsertion
aluminum, in framework of dealuminated Y zeolites, **88,** 513
Reoxidation
zinc oxide-supported palladium, **88,** 246
Resid demetallation
catalyst, deactivated: multitechnique analysis, **86,** 147
Rhenium heptoxide
in cesium nitrate–rhenium heptoxide–alumina, **89,** 452
Rhenium oxide
metathesis catalysts, alumina- and silica-supported, ESCA study, **90,** 362
Rhenium–platinum, *see* Platinum–rhenium
Rhodium
alumina or silica support, catalytic properties: effect of particle size and support, **87,** 27
alumina support, nitric oxide reduction by methane over, **86,** 137
catalysts
dialkyl- and monoalkyl-benzene steam conversion and hydroconversion, **90,** 292
hydrogen/oxygen titrations, thermodesorption analysis of water produced, **86,** 441
SiO_2-supported, CO hydrogenation: formation mechanism of acetaldehyde and ethanol, **90,** 183
chromia support, activity and structure, toluene steam dealkylation, **85,** 169
complex $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, hydrogenation of cyclohexene and cyclooctene over, **86,** 32
exchange in zeolites, **88,** 431
hydrogenolysis of hexanes and methylcyhclopentane, effect of particle size and support, **87,** 27
magnesium oxide support, effect of impurities on chemisorption and activity, **88,** 18
paramagnetic centers in Rh–Y-zeolite, hydration electron spin echo modulation studies, **86,** 413
paramagnetic species, identification on rhodium/polyphosphine catalysts, **88,** 313
polycrystalline, oxygen adsorption at low temperatures, **85,** 98
Rh^I sites, carbon monoxide chemisorption, **89,** 79
silica support
nitric oxide reduction by hydrogen–carbon monoxide mixtures over, kinetics, **88,** 289
Rh–NCO and Si–NCO species formation during NO reduction by CO over, **85,** 389
supported, migration during preparation for electron microscopy, **89,** 550

zeolite support, for methanol carbonylation: extended X-ray absorption fine structure, **87,** 414
Rhodium carbonyl
complexes in zeolites, **88,** 431
$Rh(CO)_2^+$ on zeolite X and $Rh_6(CO)_{16}$ on zeolite Y after hydroformylation, **86,** 67
Rhodium iron, *see* Iron rhodium
Rhodium–mordenite
rhodium exchange and surface hydrolysis, **88,** 431
Rhodium–platinum
bimetallic catalysts, silica support: *n*-butane and 2,2-dimethylpropane reactions on, **87,** 389
Rhodium/polyphosphine
catalysts, paramagnetic metal species on, **88,** 313
Rhodium/titania
electronic effects in metal–support interactions, **89,** 404
model catalysts, strong metal–support interactions: oxide migration, **87,** 279
Rhodium–Y zeolite
ethylene and propylene hydroformylation over, atmospheric pressure, **85,** 89
Rhodium(III) zeolites
thiophene hydrodesulfurization, **86,** 108
Rotating cryostat
at 77 K, copper clusters (Cu_3 and Cu_5) reaction with molecular oxygen, **90,** 156
Ruthenium
silica support
carbon dioxide hydrogenation, specific activity and selectivity, **87,** 352
carbon monoxide and carbon deposition during Fischer–Tropsch synthesis, **86,** 158
supported, carbonaceous species deposition by ethylene, **88,** 457
zeolite support, effects on CO hydrogenation, **85,** 499
Ruthenium carbonyl
$Ru_3(CO)_{12}$ clusters
and $Fe_3(CO)_{12}$, interaction with Cab-O-Sil and alumina, **87,** 179
impregnation and decomposition on Cab-O-Sil, mechanism of decomposition, **87,** 179
Ruthenium–copper, *see* Copper–ruthenium
Ruthenium–iron
bimetallic catalyst, formation and catalytic activity, **87,** 179
Ruthenium–platinum, *see* Platinum–ruthenium
Ruthenium–silica
carbon monoxide chemisorption, effect of coadsorbates, **90,** 119
Rutile/anatase, *see* Anatase/rutile

S

Segregation
TiO_x on nickel, **90,** 75
Selectivity
butane oxidation, **85,** 324
n-butane conversion by Pt–Mo supported on Y-zeolite, **85,** 244
carbon dioxide hydrogenation on silica-supported Co, Fe, and Ru, **87,** 352
carbon monoxide hydrogenation over cobalt, effects of support and dispersion, **85,** 78
cracking, of delaminated clay catalyst, **90,** 256
effects of interaction and mobility of adsorbed molecules, **87,** 10
ethylene oxidation reactions, and oxygen chemisorption on silver catalysts, **86,** 465
Fischer–Tropsch, iron–cobalt system, **85,** 349
hydrocarbon reactions over iridium, role of carbonaceous layers and particle size, **87,** 468
nickel–copper–alumina for crotonaldehyde hydrogenation, **85,** 25
oxidation of butene on iron oxide, **89,** 172
rhodium on X and Y zeolites, comparison: propylene hydroformylation, **86,** 67
ZSM-type zeolites in methanol transformation, **85,** 287
Shape
selectivity, *p*-ethyltoluene production over zeolites, **89,** 267
Silica, *see also* Cab-O-Sil
gel, support for chromium(II): polymerization of *n*-1-alkenes, **88,** 424
fluorinated, NMR spectra, **85,** 311
platinum redispersion on, **90,** 279
support for
cobalt, iron, and ruthenium: carbon dioxide hydrogenation, specific activities and selectivities, **87,** 352
copper–ruthenium bimetallic catalysts, carbon monoxide hydrogenation over, **90,** 337
nickel, particle dispersion in oxygen and hydrogen, **87,** 108
palladium, metal–support interactions, **87,** 398
platinum, methylcyclopentane hydrogenolysis, effect of particle size, **85,** 530
rhenium oxide metathesis catalysts, ESCA study, **90,** 362
rhodium
nitric oxide reduction by hydrogen–carbon monoxide mixtures, kinetics, **88,** 289
Rh–NCO and Si–NCO species formation during NO reduction by CO, **85,** 389
ruthenium, carbon monoxide and carbon deposition during Fischer–Tropsch synthesis, **86,** 158
Silica–alumina
amorphous, secondary cracking reactions over, **89,** 442
dealuminated, support for nickel: hydrogenolysis of saturated hydrocarbons, **88,** 8
Silica/platinum, *see* Platinum/silica
Silver
catalyst, ethylene oxidation over: long induction period, **90,** 24
polycrystalline, films: methane oxidation, **88,** 490

titania support
adsorption of O_2, H_2, and N_2O, **87,** 424
hydrogen titration of adsorbed oxygen on, **87,** 424
zeolite support, olefin oxidation, **87,** 319
Silver acetate
intermediate, in ethylene oxidation over silver, **90,** 24
Silver–palladium
alloys, ethylene oxidation over, **88,** 409
Simulation
computer, of mercury porosimetry: effect of network structure, **89,** 217
Sintering
platinum black catalyst, kinetics, **89,** 164
platinum supported on γ-alumina, **86,** 446
Site, *see also* Ensemble
basic and acid, role in alcohol dehydration over HY zeolite, **90,** 1
poisoning, catalyst deactivation, **88,** 188
reaction, multiple: temperature-programmed reaction, **89,** 380
selective chemisorption on sulfided molybdena–alumina, **85,** 277
surface, H-ZSM-5: in methanol conversion, Fourier transform-infrared spectroscopy, **88,** 137
Sodium
and alkene products obtained with alumina, **88,** 542
Solid electrolyte concentration cell
electromotive forces during CO oxidation on platinum: comment, **90,** 371; reply, **90,** 374
local current and emf for CO oxidation on Pt, **87,** 1
Solid electrolyte potentiometry
measurement of oxygen activity in methane oxidation on silver, **88,** 490
Solids
high surface area, morphology measurement, **89,** 217
Solid state chemistry
vanadium phosphate-based catalysts, effect of phosphorus/vanadium ratio, **88,** 43
Solid state properties
vanadium–antimony oxide catalysts, **88,** 232
Spillover
hydrogen, and sintering of platinum supported on γ-alumina, **86,** 446
Spreading
nickel crystallites on alumina substrates, **86,** 457
Stability
catalytic action of ZSM-5 type zeolites in methanol transformation, **85,** 287
12-tungstophosphoric acid, effect of heat, **88,** 177
Stacking fault
single, random blocking of 12-ring channels: TMA–offretite, **86,** 24
Stationary states
carbon monoxide oxidation on Pt, **86,** 373
Steam
catalytic gasification of graphite by barium, **87,** 255
graphite gasification, **88,** 97
Steam dealkylation
toluene, Rh/Cr_2O_3 activity and structure for, **85,** 169
Steam reforming, *see* Reforming
Stoichiometry
hydrogen
and carbon monoxide adsorptions on cobalt, effects of support and preparation, **85,** 63
–oxygen chemisorptions and titrations, in platinum/rhenium/alumina surface area measurement, **85,** 1
Storage
oxygen, capacity of ceria in automotive exhaust catalysts, **86,** 254
Strontium oxide
allyl ether isomerization, **85,** 457
amine addition to conjugated dienes, **85,** 509
Structure, *see also* Microstructure
and catalytic properties, relationship: TMA–offretite, **86,** 24
K_2NiF_4 type, rare earth cuprates, **86,** 121
multicomponent oxide catalyst for oxidative butene dehydrogenation, **88,** 119
nickel oxide with α-alumina or zirconia support, calcined at high temperatures, **88,** 54, 65
perovskite, rare earth cuprates, **86,** 121
pore, of catalyst: and intraparticle diffusion of gas, **86,** 427
tin–antimony oxide catalysts, high-resolution electron microscopy, **88,** 107
Structure–activity
correlations, rare earth cuprates: nitrous oxide decomposition, **86,** 121
Structure sensitivity
aromatization of *n*-hexane over platinum single crystal surfaces, **85,** 206
Sulfate
impurity in magnesium oxide support for rhodium, **88,** 18
precursor of catalyst poisoning, **87,** 276
Sulfides
poisoning, magnesium oxide-supported rhodium, **88,** 18
supported, catalytic functionalities, effect of support
and additives on CoMo catalyst, **85,** 44
on Mo dispersion in Mo and CoMo catalysts, **85,** 53
Sulfiding
cobalt molybdate hydrodesulfuration catalysts, Raman spectroscopy, **85,** 488
temperature, and structure and supported cobalt molybdate, **85,** 295
Sulfur
elemental, adsorption: platinum aggregate atomic structure modification, **87,** 86
passivation of nickel catalysts for carbon-free steam reforming of methane, **85,** 31
pretreatment, platinum and platinum–rhenium catalysts, **88,** 163

role in methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 163
Sulfur dioxide
adsorption, platinum aggregate atomic structure modification, **87,** 86
Sulfur–platinum
interaction in Pt/Al_2O_3 catalysts, **89,** 52
Support
effect on
activities, sulfided CoMo, **85,** 44
activities, sulfided Mo, **85,** 53
carbon monoxide hydrogenation activity on molybdenum catalysts, **89,** 536
catalytic properties of rhodium, **87,** 27
CO hydrogenation over Ru/zeolite, **85,** 499
hexene-1 isomerization over oxide-supported osmium complexes, **88,** 355
hydrogen and carbon monoxide adsorption on cobalt, **85,** 63
Mo dispersion in sulfided Mo catalysts, **85,** 53
nickel catalysts, **85,** 16
platinum/alumina, **89,** 462
platinum/silica, **89,** 462
redispersion of nickel on alumina and silica in oxygen and hydrogen, **87,** 108
interactions, nickel on alumina, **86,** 84
Support–cluster, *see* Cluster–support
Support–metal, *see* Metal–support
Surface
acidity, γ-alumina: modification, **89,** 531
characterization, cobalt–molybdenum/alumina catalysts, **89,** 334
composition
MoO_3/γ-Al_2O_3 catalysts, electrophoretic migration, **90,** 323
palladium–nickel/alumina, determination by chemisorption methods, **88,** 228
and structure, supported Pt–Ru bimetallic clusters, **85,** 331
compounds, of transition metals, **88,** 424
concentration during reaction: O and CO on Pt, **87,** 1
external
and intracrystalline, catalytic activity of pentasil zeolites, **88,** 538
ultrastable zeolite-Y, enrichment of aluminum, **87,** 524
hydrolysis, rhodium in zeolites, **88,** 431
properties
effect of pretreatment: ethylbenzene dehydrogenation over TiO_2–ZrO_2, **87,** 98
zinc and alumina catalysts, **86,** 266
reactions
oxygen on supported manganese oxides, **88,** 362
temperature-programmed, deactivated copper, nickel, and cobalt catalysts, **88,** 81
science, carbon monoxide reduction over iron, **87,** 66
sites, H-ZSM-5: in methanol conversion, Fourier transform-infrared spectroscopy, **88,** 137
speciation, cobalt–molybdenum/alumina, **89,** 334
species
in methanol oxidation over TiO_2, infrared spectroscopy, **87,** 461
reactive, in carbon monoxide methanation over Ni/Al_2O_3, **86,** 245
structure
effect on hydrogenolysis of hexanes on supported rhodium, **87,** 27
and *n*-hexane skeletal rearrangement reactions over platinum single crystal surfaces, **85,** 206
nickel, effects of carbon deposition, **88,** 1
thorium–nickel intermetallic catalysts, characterization, **88,** 26
titration, iron/titania during carbon monoxide/hydrogen reaction, **89,** 327
topography, platinum–tin/alumina reforming catalysts, **90,** 96
Surface area
high, supported intermetallic compound and alloy nickel catalyst preparation, **85,** 267
platinum/rhenium/alumina, measurement
effects of catalyst pretreatment, **85,** 8
hydrogen–oxygen chemisorptions and titrations, **85,** 1
titania: and gold dispersion, **87,** 265
Synergic systems
transition metal sulfide catalysis, relation to periodic trends in hydrodesulfurization, **86,** 226
Syngas, *see* Synthesis gas
Synthesis gas
adsorption on zirconium dioxide
Fourier transform infrared spectroscopy, **87,** 381
temperature-programmed studies, **87,** 238
aromatic hydrocarbon synthesis, over mixed catalyst (methanol synthesis catalyst and zeolites), **87,** 136
conversion to ethane over metal–zeolite catalysts, **90,** 84
treatment of thorium–nickel intermetallic compounds, **88,** 26

T

Tantalum carbide
carbon monoxide hydrogenation over, kinetics, **89,** 168
Tellurium
-based multicomponent oxide catalysts, $^{18}O_2$ tracer study, **88,** 214
Tellurium oxide
catalysts, $^{18}O_2$ tracer study: propylene oxidation to acrolein, **88,** 214
Temperature
critical, measurement: carbon monoxide oxidation on platinum thin films, **86,** 373
cryogenic, *in situ* Mössbauer spectroscopy: FeRh/SiO_2 surface phases, **89,** 138

-dependence of
n-hexane skeletal rearrangement reactions over platinum single crystal surfaces, **85,** 206
surface area and crystallinity of titania and gold dispersion, **87,** 265
effect on
carbon monoxide/hydrogen reaction over iron/titania, **89,** 285
isomerization of deuterated butenes over magnesium oxide, **89,** 69
methanol conversion to olefins over ZSM-5, **86,** 289
high, gas consumption during: strong metal–support interaction state in Pt/TiO_2 system, **85,** 253
low
oxygen adsorption on polycrystalline rhodium, **85,** 98
polymerization of *n*-1-alkenes with surface chromium(II) on silica gel, **88,** 424
pretreatment, oxide phase of Ni/Al_2O_3, **89,** 380
sulfiding, and structure of supported cobalt molybdate, **85,** 295
Thermal phase
changes, effect on catalytic activity of titanium–zirconium phosphates, **85,** 398
Thermodesorption
analysis of water produced in hydrogen/oxygen titrations on Pt and Rh catalysts, **86,** 441
thiophene hydrodesulfurization reaction with Co–Mo–Al_2O_3 catalysts and components, **86,** 55
Thermometry
magnetic crystallite, during ethane hydrogenolysis over Ni/SiO_2, **86,** 450
nickel crystallite, during ethane hydrogenolysis, **90,** 40
Thiophene
hydrodesulfurization
Co–Mo–Al_2O_3 catalysts and components, adsorption and catalytic properties, **86,** 55
on Mo(100) crystal surface, **88,** 546
rhodium(III) zeolites 13X and ZSM-5, **86,** 108
in methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 163
Thoria, *see* Thorium dioxide
Thorium
complexes on alumina, **86,** 301
Thorium copper
$ThCu_6$ alloy, in preparation of Cu/ThO_2 catalyst for methanol synthesis, **89,** 131
Thorium dioxide
benzaldehyde reaction over, **89,** 489
Thorium dioxide/copper, *see* Copper/thorium dioxide
Thorium–nickel
intermetallic catalysts, surface characterization, **88,** 26
Thorium oxide, *see* Thorium dioxide
Tin
chemical state in platinum–tin–alumina catalysts, **89,** 371
oxidation states on platinum–tin catalysts, **88,** 466
state in platinum–tin/alumina reforming catalysts, **90,** 96
Tin–antimony
mixed oxides, butene isomerization: effects of acidity, **88,** 73
oxide catalysts, structure, high-resolution electron microscopy, **88,** 107
Tin oxide
–vanadium solid solution catalysts, N_2O decomposition, charge transfer effects, **90,** 305
Tin–platinum, *see* Platinum–tin
Titania, *see* Titanium dioxide
Titania–gold, *see* Gold–titania
Titania–platinum, *see* Platinum–titania
Titania/rhodium, *see* Rhodium/titania
Titanium
oxidized species, diffusion into bulk platinum, **90,** 59
Titanium carbide
carbon monoxide hydrogenation over, kinetics, **89,** 168
Titanium dioxide
in heterogeneous photocatalysis of chlorinated hydrocarbons, **88,** 89
metal deposition, electronic effects in metal–support interactions, **89,** 404
methanol and oxygen batch reaction over, surface and gas species, **87,** 461
platinum redispersion on, **90,** 279
support for
copper, metal–support interactions, **85,** 380
nickel, strong metal–support interaction: mechanism, **85,** 237
palladium, enhanced activity for CO/H_2 reaction, **86,** 384
platinum, strong metal–support interaction state: gas consumption during high-temperature treatments, **85,** 253
silver, characterization, **87,** 424
temperature dependence of surface area and crystallinity, and gold dispersion, **87,** 265
Titanium oxide
support for palladium, interactions, **89,** 422
–vanadium solid solution catalysts, N_2O decomposition, charge transfer effects, **90,** 305
Titanium oxide–nickel, *see* Nickel–titanium oxide
Titanium oxide–zirconium oxide
ethylbenzene nonoxidative dehydrogenation over, **87,** 98
Titanium phosphate
crystalline, cyclohexanol dehydration, **85,** 398
Titanium–zirconium phosphates
mixed
cyclohexanol dehydration, **85,** 398
thermal phase changes and catalytic activity, **85,** 398
TMA–offretite
large-pore zeolite, 12-ring channels: random blocking by stacking faults, **86,** 24

synthetic, structure and catalytic properties, relationship, **86,** 24
Toluene
alkylation with ethylene for *p*-ethyltoluene production over zeolites, **89,** 267
methylation, with methanol over zeolite H-ZSM-5, **87,** 77
oxidation over noble metals, **87,** 152
steam dealkylation, Rh/Cr_2O_3 activity and structure for, **85,** 169
Tracer study
$^{18}O_2$, of tellurium oxide catalysts, **88,** 214
Transformation
methanol to hydrocarbons over ZSM-type zeolites, stability and selectivity of catalytic action, **85,** 287
Transient behavior
ethanol–diethyl ether–water–alumina system, **87,** 452
Transient response method
carbon monoxide
and carbon adsorbed on Ru/SiO_2 during Fischer–Tropsch synthesis, quantitation, **86,** 158
and hydrogen reaction over nickel–alumina, kinetics, **86,** 245
intermediates in ethylene oxidation over silver, **90,** 24
Transition metals
carbides
carbon monoxide hydrogenation over, kinetics, **89,** 168
carbon oxidation by, **85,** 154
chlorides, first-row, *tert*-butyl chloride dehydrochlorination on, **89,** 553
orthosilicates, electrocatalytic activity, **86,** 9
oxides, carbon oxidation by, **85,** 154
sulfides
catalysis, relation of synergic systems to periodic trends in hydrodesulfurization, **86,** 226
electronic factors related to hydrodesulfurization activity, **86,** 400
surface compounds, **88,** 424
Transmission electron microscopy
carbonaceous deposits in reforming catalyst, **89,** 256
high resolution
γ-alumina in transition alumina films, **89,** 182
nickel particles on titanium oxide, **86,** 359
Transport, *see also* Mass transfer
mass, effect on bound complexes, **86,** 32
Trimethyl phosphite
poison for H-ZSM-5, **87,** 77
Triosmium
clusters
alumina support, hexene-1 isomerization, **85,** 176
supported, olefin isomerization, **89,** 100
Triphenylphosphine
in $RhCl(PPh_3)_3$ bound to polystyrene–divinylbenzene polymer beads, effect on catalytic activity, **86,** 32
Tungsten
methane decomposition on, **89,** 527
Tungsten oxides
Raman cross sections, relative, **90,** 150
Tungstophosphoric acid, *see* Phosphotungstic acid
12-Tungstophosphoric acid, *see* Phosphotungstic acid

U

Unit cell
size model, zeolite: cracking catalyst behavior prediction, **85,** 466
Uranium
complexes on alumina, **86,** 301
Uranium antimonates
formation and dissociation, **88,** 448

V

Valence
fluctuations, cerium in $CePd_3$, **89,** 1
state of vanadium, role in *n*-butane oxidation to maleic anhydride over vanadium–phosphorus oxides, **89,** 44
Vanadium
promoter, in heteropoly compounds: selective oxidation of butane, **85,** 324
in tin and titanium oxides, solid solution catalysts: N_2O decomposition, charge transfer effects, **90,** 305
Vanadium–antimony
oxide catalysts, solid state properties, **88,** 232
Vanadium pentoxide
insertion of hydrogen, **87,** 339
oxygen chemisorption, adsorption isobars and isotherms, **87,** 520
–palladium catalyst, alcohol oxycarbonylation to dialkyl oxalates, **90,** 261
Vanadium phosphate
catalysts, solid state chemistry and redox properties: effect of phosphorus/vanadium ratio, **88,** 43
Vanadium–phosphorus oxides
n-butane oxidation over, mechanism, **89,** 44
V_2O_5–P_2O_5, methyl ethyl ketone oxidation to diacetyl, **89,** 413
Vanadyl sulfate, *see* Palladium–vanadyl sulfate–sulfuric acid
Vibrational resonance
in catalytic reactions, comparison of ethene and propene hydrogenation, **88,** 509
Vibrational spectroscopy
nickel on titanium dioxide, **90,** 75
Vinyl acetate
synthesis from acetic acid and acetylene catalyzed by active carbon–zinc acetate, initial mechanism, **86,** 328
Visible light
carbon dioxide reduction assistance, **90,** 173

W

Wacker reactions
1-butene and ethylene oxidation over carbon-supported palladium catalysts, **85,** 284
heterogeneous, carbon-supported palladium–vanadyl sulfate–sulfuric acid system, **85,** 284
Water
effect on
molybdenum surface species in MoO_3/Al_2O_3 catalysts, Raman spectroscopy, **90,** 314
reduction stage of oxygen-adsorbed platinum supported on γ-alumina, **86,** 446
in ethanol–diethyl ether–water–alumina system, transient behavior, **87,** 452
and methanol adsorption on H-ZSM-5, **89,** 150
production in hydrogen/oxygen titrations on Pt and Rh catalysts, thermodesorption analysis, **86,** 441
and pyridine, desorption from heteropoly acids, **88,** 253
supplies, contaminated: removal of chloroolefins and chloroaldehydes by heterogeneous photocatalysis, **88,** 89
vapor, in carbon dioxide photoassisted reduction over metal oxides, **90,** 173
Water–gas
shift catalyst: potassium-promoted $NiMo/Al_2O_3$, nature and properties, **87,** 482
shift reaction over Pt/TiO_2, photoassisted, effects of particle size, **86,** 231
Wax
fraction, heavy: from Fischer–Tropsch synthesis, molecular weight distribution, **86,** 477
Wetting
and spreading, copper particles on magnesium oxide, **85,** 187

X

X-ray absorption spectroscopy
platinum/alumina, **89,** 462
platinum/silica, **89,** 462
X-ray diffraction
cobalt–molybdenum/alumina, **89,** 334
deactivated resid demetallation catalyst, **86,** 147
high intensity, odd *l* lines in TMA–offretite, **86,** 24
supported molybdenum catalysts, reduced and sulfided: characterization, **89,** 274
X-ray photoelectron spectroscopy
alumina- and silica-supported rhenium oxide metathesis catalysts, **90,** 362
β-carbon hydrogenation on nickel(111), **89,** 159
cobalt–molybdenum/alumina, **89,** 334
deactivated resid demetallation catalyst, **86,** 147
iron carbides, **87,** 66
low-temperature carbon monoxide shift reaction
effects of alumina and reaction conditions, **90,** 113
on unreduced copper–zinc system, **90,** 106
metal–support interactions on Pd/SiO_2 and Pd/La_2O_3, **87,** 398
platinum–tin catalysts, **88,** 466
rhodium-zeolite catalysts, surface analysis and characterization: thiophene hydrodesulfurization, **86,** 108
supported molybdenum catalysts, reduced and sulfided: characterization, **89,** 274
thorium–nickel alloys, surface characterization, **88,** 26
zinc ions and γ-alumina, interactions, **86,** 266
zinc oxide-supported palladium reduction and reoxidation, **88,** 246
p-Xylene
isomerization on H-ZSM-5 zeolite, poisoned with quinolines, **88,** 505
selectivity, H-ZSM-5 modification for, **87,** 77
Xylenol
oxidative coupling, over basic copper(II) complexes, **89,** 511

Y

Yield
patterns, methylcyclohexane dehydrogenation over Pt and PtRe catalysts, **88,** 150, 163
Yttria
-stabilized zirconia, support for polycrystalline silver films, **88,** 490

Z

Zeolite–metal, *see* Metal–zeolite
Zeolites, *see also* Faujasite, Mordenite, TMA-offretite
acid property, role in methanol conversion to hydrocarbons, **85,** 521
and aromatic hydrocarbon synthesis from synthesis gas, **87,** 136
bifunctional catalysts, ethylbenzene disproportionation as test reaction for acidity, **88,** 249, 251
n-butene hydration over, effect of aluminum content on activity, **89,** 60
decationized, acid–base properties, **90,** 1
diffusion of gases, frequency response technique, **88,** 530
H-forms, acidity measurement by temperature-programmed desorption of ammonia, **85,** 362
HY, alcohol dehydration over: role of basic and acid sites, **90,** 1
H-ZSM-5
adsorption of methanol and water, **89,** 150
aqueous methanol conversion, **88,** 499
butane cracking catalyzed by, **88,** 240
deuterated, infrared spectroscopy, **87,** 77
modification with
phosphorus and metal oxides, *p*-ethyltoluene production, **89,** 267
poisons for *p*-xylene selectivity, **87,** 77
olefin formation over: reaction paths, **88,** 478

poisoned with quinolines in *p*-xylene isomerization, **88,** 505
Pt-exchanged catalysts, propane conversion to aromatic hydrocarbons on, **90,** 366
surface sites and reactivity sequences in methanol conversion, Fourier transform-infrared spectroscopy, **88,** 137
iron-containing: synthesis, characterization, and Fischer–Tropsch studies, **89,** 20
MoO_3–NaY, catalysts: physicochemical characterization, **89,** 478
NaY, hexene-1 isomerization on, active site characterization, **90,** 270
NiCaY, ethylene dimerization over: role of Ni^+ ions in activity, **89,** 470
pentasil, external and intracrystalline surface catalytic activity, **88,** 538
Rh–Y
rhodium exchange and surface hydrolysis, **88,** 431
rhodium hydration: electron spin echo modulation studies, **86,** 413
Rh–ZSM-11, rhodium exchange and surface hydrolysis, **88,** 431
Rh–ZSM-34, rhodium exchange and surface hydrolysis, **88,** 431
secondary cracking reactions, **89,** 442
shape-selective
catalytic dewaxing activity, **86,** 24
reactions with, **89,** 267
support for
rhodium, for methanol carbonylation: extended X-ray absorption fine structure, **87,** 414
ruthenium, effects on CO hydrogenation, **85,** 499
silver, olefin oxidation, **87,** 319
synthesis using amine bases: $NH_2(CH_2)_6NH_2$–Al_2O_3–SiO_2–H_2O system, **85,** 135
unit cell size model, cracking catalyst behavior prediction, **85,** 466
X and Y, support for rhodium, comparison: propylene hydroformylation, **86,** 67
13X and ZSM-5, rhodium(III): thiophene hydrodesulfurization, **86,** 108
Y
acidity, **88,** 374
dealuminated, aluminum reinsertion into framework, **88,** 513
platinum (optimum dispersion) in, *n*-hexane dehydrocyclization, **86,** 16
Pt–Mo bimetallic catalysts, *n*-butane conversion, activity and selectivity, **85,** 244
and rhodium catalyst, ethylene and propylene hydroformylation, atmospheric pressure, **85,** 89
ultrastable, external surface, enrichment of aluminum, **87,** 524
ZSM-5
external and intracrystalline surface catalytic activity, **88,** 538
in metal catalysts, for syngas conversion to ethane, **90,** 84
methanol conversion to olefins over, **86,** 289, 297
ZSM-11, external and intracrystalline surface catalytic activity, **88,** 538
ZSM-type, stability and selectivity of catalytic action in methanol transformation, **85,** 287
Zeolite silica/alumina
molar ratio, effect on methanol conversion to olefins, **86,** 289
Zinc
Cu–Zn–Al mixed oxides, preparation from hydrotalcite-like precursors: for low-temperature methanol synthesis, **85,** 260
ions, interaction with γ-alumina, **86,** 266
Zinc acetate
on active carbon, vinyl acetate synthesis, **86,** 328
Zinc–copper, *see* Copper–zinc
Zinc halides
and benzylaryl ether cleavage, **87,** 210
and diarylmethane cleavage, **87,** 196
and dibenzyl ether cleavage, **87,** 226
Zinc oxide
methanol decomposition over, kinetics and mechanism, **87,** 305
nonpolar $(10\bar{1}0)$, stepped $(50\bar{5}1)$, and (0001) surfaces: decomposition of methanol, formaldehyde, and formic acid, **85,** 437
support for palladium, reduction and reoxidation, **88,** 246
Zinc oxide–copper, *see* Copper–zinc oxide
Zirconia, *see* Zirconium oxide
Zirconium dioxide, *see* Zirconium oxide
Zirconium oxide
gels, crystallization behavior, **86,** 473
methanol formation on, **90,** 17
support for nickel oxide, calcined at high temperatures: structure and activity, **88,** 54, 65
synthesis gas adsorption
Fourier transform infrared spectroscopy, **87,** 381
temperature-programmed desorption, **87,** 238
yttria-stabilized, support for polycrystalline silver films, **88,** 490
Zirconium oxide–titanium oxide, *see* Titanium oxide–zirconium oxide
ZSM-5/platinum, *see* Platinum/ZSM-5