

Cumulative Subject Index¹

Volumes 61-66

A

- Acetaldehyde
adsorption on α -Fe₂O₃, ir spectra, **66**, 28
formation from ethylene over Pd-V₂O₅, **63**, 182
- Acetamide
adsorption on α -Fe₂O₃, ir spectra, **66**, 28
- Acetic acid
adsorption on α -Fe₂O₃, ir spectra, **66**, 28
formation from ethylene, over Pd-V₂O₅, **63**, 182, 191
opening of cyclohexene oxide by, over alumina, **64**, 497
- Acetic anhydride
adsorption on α -Fe₂O₃, ir spectra, **66**, 28
- Acetone
aldol condensation reaction path, **63**, 295
- Acetonitrile
adsorption on α -Fe₂O₃, ir spectra, **66**, 28
- Acetyl chloride
adsorption on α -Fe₂O₃, ir spectra, **66**, 28
- Acetylene
aromatic, adsorption on zinc oxide: ir and Raman spectra, **61**, 503
decomposition over nickel-iron surfaces, effect of oxide additives on filamentous carbon growth, **64**, 464
hydrogenation on Pd/SiO₂ and Pt/SiO₂, effect of steric strains, **63**, 11
- Acid
sites
number of strength relationship: on solid surfaces using ammonia adsorption, **62**, 157
surface, silica-alumina cracking catalyst: concentration measurement by ¹³C NMR, **66**, 294
- Acid-base
properties, metal oxides, **61**, 103
- Acidic centers
olefin oxidation over CdMoO₄, **65**, 369
- Acidity
aluminum chloride-copper sulfate mixtures, **64**, 13
generation, supported tungsten oxides, **65**, 442
metal oxides, quantum chemical study, **61**, 103
nickel silicate, **61**, 29
zirconium phosphates, relation to activity in cyclohexanol dehydration, **65**, 185
- Acraldehyde, *see* Acrolein
- Acrolein
deuterium exchange and hydrogenation, over Group VIII transition metals, **65**, 110
formation
from allyl alcohol over bismuth molybdate, **63**, 235
over copper, **65**, 166
from propene oxidation over ternary tungsten oxides, **61**, 256
- Acrylonitrile
hydrogenation over nickel borides, **65**, 195
from propylene ammoxidation over tellurium-molybdenum, **64**, 356
- Activation energy
carbide formation, in supported iron-nickel system, **63**, 404
correlations with lattice parameters, **65**, 121
oxygen ion removal from bismuth molybdate, **63**, 383
- Activity
correlations with selectivity and surface composition: carbon monoxide hydrogenation over oxidized rhodium, **66**, 257
ethylene oxidation over supported silver, influence of crystallite size and morphology, **66**, 368
governed by dilution of Ni active sites in Cu, **66**, 214
measurements, V₂O₅/SnO₂ for alkyldiimine oxidation, **64**, 51
methylcyclopropane hydrogenolysis and cyclopentane exchange with deuterium on Pt/Al₂O₃: comparison with Pt/SiO₂, **64**, 84
singly and doubly promoted catalysts for ammonia synthesis, **66**, 326
- Adsorbed species
staggered $\alpha\beta$ -di-, **63**, 102
- Adsorption
activated, carbon dioxide on nickel/silica, **62**, 280
alkenes and alkynes on plasma-grown aluminum oxide, **64**, 101
ammonia, relationship between number and strength of acid sites on solid surfaces, **62**, 157
aromatic acetylenes, on zinc oxide, **61**, 503
carbon monoxide
on ion-exchanged Ru zeolite, **64**, 482
and nitric oxide on alumina-supported iridium, **62**, 253
on platinum supported on zeolite Y, **61**, 553
on platinum-copper alloys, infrared spectra, **64**, 110
on silica-supported copper oxide, **65**, 437
competitive, on ideal surfaces: computer simulation, **62**, 176
energy, hydrogen in Cu-Ru system, **61**, 412

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

- ethylene
on Cu(I)Y and Ag(I)Y, **61**, 461
and hydrogen on chromia and lanthana, **61**, 184
on pure and doped (Li⁺ or Ga³⁺) zinc oxide, **62**, 341
- ethynylbenzene, on zinc oxide: Raman and ir spectra, **61**, 515
- gas, CO and O₂ on alumina-supported Rh₆(CO)₁₆, **66**, 424
- hydrogen
and carbon dioxide on Rh/Al₂O₃, **65**, 428
in copper-ruthenium model, **61**, 412
nitric oxide and nitrogen dioxide on silica-supported nickel, **62**, 294
nitrogen dioxide on calcium X-type zeolite, enhancement of catalytic activity for butene isomerization, **64**, 417
nitrous oxide on η-alumina, ir spectra, **65**, 231
- oxygen
induction by uv irradiation, **61**, 267
on platinum, **65**, 461
pyridine on X zeolites, Raman spectra, **62**, 316
states, oxygen on palladium, **61**, 299
stoichiometries, hydrogen and carbon monoxide on alumina- and silica-supported nickel, **65**, 390
theory, bond energy bond order (BEBO) method, **65**, 84
- Aggregation
supported rhodium complexes, **62**, 117
- Alcohol
conversion over indium oxide, **65**, 238, 241
dehydration over metal oxides, **61**, 279
opening of cyclohexene oxide by, over alumina, **64**, 497
phenol reactions with, over thoria, **63**, 433
primary
oxidation by chloramine-T over OsO₄, **61**, 165
and secondary, reactions over platinum-, iridium-, and rhodium-silica, **61**, 109
reactions with phenols over thoria, **66**, 281
sugar, branched: selective formation in modified formose reaction, **62**, 107
- Aldehydes
from alkanes, photooxidation over titanium dioxide, **62**, 99
competitive hydrogenation on copper chromite, **65**, 141
- Aldol condensation
vapor phase, acetone, **63**, 295
- Alkali phosphomolybdates
methacrolein oxidation, **61**, 285
- Alkane
photooxidation over titanium dioxide, mechanism, **62**, 99
reaction on silica-supported Pt and Pt-Au, **64**, 200
rearrangement, over silica-supported Pt-Pd alloys, **63**, 313
- Alkanols, *see* Alcohol
- Alkene
distributions, from 3-methyl-3-pentanol dehydration over tungsten and yttrium oxides, **61**, 298
hydrogenation over cobalt-molybdenum-alumina, mechanism, **64**, 143
isomerization over γ-alumina, **61**, 326
products, from 3-methyl-3-pentanol conversion over metal oxides, **61**, 279
selectivity, correlations with catalyst properties, **66**, 184
- Alkoxy
intermediates, identification on Fe(100), **65**, 36
- Alkylation
Friedel-Crafts, toluene and phenol, **61**, 96
side-chain: toluene with methanol over alkali-cation-exchanged X and Y zeolites, mechanism, **64**, 284
- Alkyl chloroformates
in Friedel-Crafts alkylation of toluene and phenol, **61**, 96
- Alkyl oxalates
in Friedel-Crafts alkylation of toluene and phenol, **61**, 96
- Alkyl phenols
steam dealkylation over γ-alumina-supported noble metals, **61**, 528
- Alkynes
reactions with carbon monoxide over polystyrene-supported molybdenum, **61**, 540
- Alloys
atomic and collective properties, **64**, 110
catalysis, in reforming, **63**, 112, 119
copper with Pt, Ir, Ni, and Pd: role of Cu in hydrogenolysis of pentane, **63**, 389
for graphite gasification, **62**, 44
iron-nickel system: oxidation-reduction studies, **61**, 242
iron-ruthenium, carbon deposition and activity changes during Fischer-Tropsch synthesis, **65**, 253
nickel-copper, in zeolite Y: formation, studied by ferromagnetic resonance method, **66**, 73
nickel-copper-aluminum, structure and leaching properties, **64**, 116
palladium-silver, preparation and activity, **61**, 57
platinum-copper
carbon monoxide adsorption, **64**, 110
hydrocarbon reforming reactions, **63**, 395
platinum-gold, supported: influence of carrier and oxygen treatment on catalytic behavior, **64**, 228
platinum-palladium, hydrocarbon reactions over, **63**, 313
- Allyl alcohol-1,1-*d*₂ and -3,3-*d*₂
oxidation, selective: over bismuth molybdate, **63**, 235
- Allylamine
double bond migration from, over basic oxides, **65**, 245

- π -Allyl anion
intermediates of diene hydrogenation and *n*-butene isomerization on CdO, 61, 135
- Alumina, *see also* Aluminum oxide
adsorbed H₂ resonance on, 61, 170
alkene isomerization over, 61, 326
n-butene isomerization, kinetics, 66, 1
-catalyzed opening of cyclohexene oxide by alcohols, acetic acid, and aniline, 64, 497
- Co-Mo-Al₂O₃
Co, Mo, Si, Ca distribution, 61, 66
high-temperature effects on, 61, 66
sulfided, surface hydroxyl groups, 64, 235
- Co-Mo/ γ -Al₂O₃
hydrodesulfurization catalysts: spent, concentration profiles in, 61, 146
hydrodesulfurization catalysts, structure, 63, 201
sulfided: benzothiophene hydrodesulfurization, kinetics, 62, 70
sulfided, dibenzothiophene hydrodesulfurization, 61, 523
- CoO-MoO₃/Al₂O₃
hydrodesulfurization catalyst, sulfoxide deoxygenation over, 61, 277
hydrodesulfurization of oxidized sulfur compounds over, 61, 115
- curved, support of platinum particles: coarsening kinetics, 66, 335
- deactivation, carbonyl sulfide vapor-phase hydrolysis, 62, 84
- electron transfer properties, 61, 291
- impregnation with chromium and copper, concentration profiles, 62, 367
- nickel impregnation on, concentration profiles, 63, 35
- oxidic precursor of CoMo/ γ -Al₂O₃ hydrodesulfurization catalysts, surface structure, 66, 469
- proton resonance, 62, 379
- radicals on, 61, 293
- rhodium/alumina, hydrogenation of carbon monoxide, 61, 87
- support for
iridium, carbon monoxide and nitric oxide adsorption, 62, 253
iridium, chemisorption properties, 65, 207
low-valent tungsten, 61, 216
molybdenum, sulfided: acidity, 61, 519
nickel, hydrogen and carbon monoxide chemisorption, 65, 390
nickel-tungsten, pyridine hydrogenation, 63, 456
platinum, redispersion, 62, 59; 66, 171
rhodium, carbon monoxide chemisorption: effect of D₂S, 63, 487
rhodium, surface interaction between H₂ and CO₂, 65, 428
ruthenium, carbon monoxide hydrogenation, 61, 77
ruthenium carbonyl clusters, ir spectra, 65, 374
surface reactions, 61, 293
- α -Alumina
doped with germanium oxide or magnesium oxide, support for silver: effect on ethylene oxidation, 66, 147
- γ -Alumina
catalysts, aluminum tungstate in tungsten oxide on, 61, 559
support for palladium, steam dealkylation of alkyl phenols, 61, 528
- η -Alumina
nitrous oxide adsorption, ir spectra, 65, 231
- Aluminum
 α -Al_{2-x}Cr_xO₃, methanol oxidation over, 62, 202
MgAl_{2-x}Cr_xO₄
isopropanol decomposition over, 62, 195
methanol oxidation over, 62, 202
- Aluminum chloride-copper sulfate mixtures, pentane isomerization over, 64, 13
- Aluminum oxide, *see also* Alumina
plasma grown, unstarated hydrocarbon adsorption, 64, 101
- Aluminum tungstate
in tungsten oxide on γ -alumina catalysts, 61, 559
- Amine
adsorption on silica-alumina, ¹³C NMR, 66, 294
- Ammonia
adsorption
on Mo-alumina, thermodynamics, 61, 519
relationship between number and strength of acid sites on solid surfaces, 62, 157
decomposition on iron, mechanism and kinetics, 61, 537
nitric oxide reduction over supported metals, sulfur dioxide poisoning, 61, 192, 204
oxidation
on platinum, steady state and transient oscillations, 64, 346
on Pt(111) and Pt(S)-12(111) \times (111) surfaces, 61, 543
reaction with nitric oxide
over chromia, role of surface oxygen, 63, 1
on vanadium oxide, 62, 140
reduction of divalent copper in zeolites, 61, 485
synthesis
over iron industrial catalysts, role of potassium as promoter, 66, 326
over supported Ru, kinetics, 62, 167
- Ammonium perchlorate/polystyrene propellants, solid state chemistry of copper chromite used as catalyst for burning of, 65, 25
- Ammonium phosphomolybdate
thermogravimetric analysis, 61, 285
- Ammonoxidation
3-picoline, on V-Ti-O, 65, 9
- propylene
over bismuth molybdates, redox kinetics, 66, 347
to pyridines, catalyst structure and reaction selectivity, 65, 470

- selective, over bismuth molybdate: mechanism, **63**, 235
- Anchor**
effect, of second reducible function: selective hydrogenation of ethylenic double bond, **64**, 371
- Aniline**
formation, hydrogen transfer reactions between hydroaromatics and nitrobenzene over polynaphthoquinone, **61**, 366
opening of cyclohexene oxide by, over alumina, **64**, 497
- Anions**
intermediates
double bond migration by, **65**, 245
on MgO, **62**, 396
- Annealing**
palladium loss from supported platinum-palladium during, **61**, 15
- Antimony**
Fe₂O₃-Sb₂O₄, propylene oxidation over, **64**, 29
- Antimony bronzes**
propene oxidation to acraldehyde over, **61**, 256
- Aperiodic behavior**
chaotic, hydrogen oxidation on nickel, **66**, 11
- Atom**
diffusion, mechanism: in sintering of supported metal, **63**, 129
- Auger electron spectroscopy**
concentration profiles in spent hydrodesulfurization catalysts, **61**, 146
copper-ruthenium system, model, **61**, 397
metal foils, deactivated by sulfur dioxide in NO reduction by NH₃, **61**, 192, 204
natural and synthetic zeolites, surface and bulk compositions, **65**, 174
rare earth and transition metal exchanged zeolites, ion migration, **65**, 179
surface composition of alloys for graphite gasification, **62**, 44
- Automobile exhaust**
catalysts, metal-support interaction in, **61**, 547
emission control, selective reduction of nitric oxide over noble metals, **63**, 53
- B**
- Basicity**
metal oxides, quantum chemical study, **61**, 103
- Behavior**
aperiodic (chaotic), hydrogen oxidation on nickel, **66**, 11
- Benzaldehyde**
partial oxidation product of benzyl alcohol, **64**, 260
- Benzene**
ethylation over ZSM-5, mechanism, **61**, 477
gas phase hydrogenation on nickel-kieselguhr, kinetics, **63**, 346
hydrogenation on
platinum and ruthenium, pulse conditions at low contact times, **66**, 465
rhodium, **61**, 443
methylation over ZSM-5, mechanism, **61**, 477
- Benzothiophene**
hydrodesulfurization, over sulfided Co-Mo/Al₂O₃: kinetics, **62**, 70
and sulfone, hydrodesulfurization over Co-MoO₃-Al₂O₃, **61**, 115
- Benzothiophene sulfoxides**
deoxygenation over CoO-MoO₃/Al₂O₃, **61**, 277
- Benzyl alcohol**
oxidation over Co(II) NaY zeolites, **64**, 260
- Binding energy**
3d, relationship with oxidation state in molybdenum oxides, **62**, 185
relationship with oxidation state of Mo in molybdenum oxides, **62**, 182
- Bismuth molybdate**
Bi₂Mo₃O₁₂, Bi₂MoO₆, and Bi₃FeMo₂O₁₂: propylene oxidation, kinetics, **64**, 295
oxygen ion removal, activation energies, **63**, 383
propylene
ammoxidation, redox kinetics, **66**, 347
oxidation, mechanism, **61**, 316; **63**, 307
selective oxidation and ammoxidation mechanisms over, **63**, 235
surface structure, **63**, 152
- γ-Bismuth molybdate**
temperature programmed reoxidation, **62**, 26
- Bond**
CH, breaking: role in ethylene epoxidation over silver, **65**, 478
energy bond order calculation: interaction energies of diatomic molecules (H₂, N₂, CO) with d-metal surfaces, **65**, 84
-shift activity, in alkanes and cycloalkanes on silica-supported Pt and Pt-Au, **64**, 200
- Bonding**
capabilities, transition metal two-dimensional supported clusters, **66**, 237
- Book reviews**
Application of Zeolites in Catalysis. G. K. Boreskov and K. M. Minachev (Eds.), **65**, 490
Colloid Science, A Specialist Periodical Report, Vol. 3. D. H. Everett (Sr. reporter), **62**, 192
Gas-Liquid-Solid Reactor Design. Y. T. Shah, **62**, 191
Hydrocarbon Synthesis from Carbon Monoxide and Hydrogen. E. L. Kugler and F. W. Steffgen, **62**, 193
Nucleation and Growth of Thin Films. B. Lewis and J. C. Anderson, **62**, 192
Phase Equilibria and Phase Boundary Phenomena. A. I. Rusanov (W. Schirmer, Ed.), **61**, 296
Spectroscopy in Heterogeneous Catalysis. W. N. Delgass, G. L. Haller, R. Kellerman, and J. H. Lunsford, **61**, 296
Zeolites and Clay Materials. R. M. Barber, **62**, 193
Ziegler-Natta Catalysts and Polymerizations. J. Boor, Jr., **61**, 655

- Borided metals
carbon monoxide methanation over, **65**, 402
- Boron phosphate
stoichiometric and nonstoichiometric, adsorption of pyridine, 2,6-dimethylpyridine, and 2,6-di-*tert*-butylpyridine, **62**, 357
- Brønsted acid sites
in optimization of SiO₂/Al₂O₃ mole ratio of mor-denite for *n*-pentane isomerization, **66**, 290
poisoning by silylation, **66**, 112
- Burning
ammonium perchlorate/polystyrene propellants, copper chromite as catalyst, **65**, 25
- Butadiene
cyclodimerization over copper-exchanged zeolites, **61**, 485, 493
deuteration on CdO, molecular identity, **61**, 135
hydrogenation over Ni₂P, **62**, 286
- n*-Butane
hydrogenolysis over silica-supported nickel-cop-per, **66**, 214
- Butanols
dehydration over rare earth oxides, selectivities, **66**, 184
- Butene
hydrogenation over sulfided MoO₃/Al₂O₃, effect of surface structure, **66**, 93
isomerization
and exchange on supported iron, **66**, 412
on nickel silicate, **61**, 29
over supported tungsten oxides, **65**, 442
linear, isomerization on silica gel: poisoning of Brønsted acid sites by silylation, **66**, 112
- 1-Butene
isomerization over La₂O₃, mechanism, **63**, 520
reaction on calcined NaNH₄-Y zeolite, **65**, 416
- n*-Butene
isomerization
on CdO, **61**, 135
on H- and Ni-clinoptilolite, silica-alumina, alu-mina, and zinc oxide: kinetics, **66**, 1
- 4-*t*-Butyl-1-cyclohexenyl methyl ether
deuteration over platinum metals, **63**, 102
- Butylenes
production from methanol, over ZSM-5 zeolites, **61**, 155
- C
- Cab-O-Sil, *see* Silica
- Cadmium
CdMoO₄, olefin oxidation over: acidic centers, **65**, 369
- Cadmium oxide
diene hydrogenation and *n*-butene isomerization on, **61**, 135
- Calcination
effect on distribution of molybdenum in MoO₃/Al₂O₃ extrudates, **64**, 491
- Calcium hydroxide
-catalyzed formose reaction, modified, **62**, 107
- Calcium-nickel phosphate
dehydrogenation catalyst, determination of active center, **63**, 496
- Calorimetry
chromia/silica, characterization of reduced and oxi-dized forms, **66**, 200
oxygen adsorption on silver powder, **64**, 68
- Carbene
intermediate, olefin isomerization and dispropor-tionation over supported tungsten oxides, **65**, 442
- Carbenium ions
formation, in methanol and olefin reactions on H-ZSM-5 zeolite, **63**, 331
- Carbide
formation and removal on Ni(100), kinetics, **64**, 479
iron, nickel, and iron-nickel: formation in supported iron-nickel system, **63**, 404
stable chemilayer on tungsten, **62**, 264
- Carbon
CO_{2(ads)} formation on silver, **64**, 68
deposition
and activity changes over FeRu alloys during Fischer-Tropsch synthesis, **65**, 253
in methanation on nickel, **64**, 272
from propylene on crystal faces of iron, **62**, 35
on spent hydrodesulfurization catalysts, **61**, 146
filamentous, growth on nickel-iron surfaces, effect of oxide additives, **64**, 464
formation
effect on product distribution, **65**, 416
on iron, kinetics, **62**, 35
gasification, in methanation on nickel, **64**, 272
graphitized, support for platinum particles: electron microscopy, **64**, 381
overlayers on tungsten, **62**, 329
- Carbonaceous deposit
influence on cyclohexene conversion over platinum, **65**, 78
- Carbon-carbon
bond, rupture: mechanism, **63**, 307
- Carbon dioxide
adsorption and methanation, on nickel/silica, **62**, 280
and hydrogen, surface interaction on Rh/Al₂O₃, **65**, 428
interactions with preadsorbed oxygen on silver, **64**, 68
methanation over
nickel-alumina, kinetics, **62**, 349
supported Ru, effect of γ -irradiation, **66**, 101
- Carbon monoxide
adsorption on
ion-exchanged Ru zeolite, **64**, 482
palladium, **61**, 305
platinum supported on zeolite Y, **61**, 553
platinum-copper alloys, **64**, 110

- ruthenium, gold, and ruthenium-gold clusters, **61**,
 19
 silica-supported copper oxide, **65**, 437
 supported platinum group metals, hydrogenation,
61, 7
 chemisorption on
 alumina- and silica-supported nickel, **65**, 390
 rhodium, sulfur modification, **63**, 487
 silica-supported Ni, Raman spectra, **62**, 94
 transition *d*-metals, **65**, 84
 desorption from
 nickel using mercaptans, **63**, 324
 palladium, **61**, 305
 diphenylacetylene reactions with, over polystyrene-
 supported molybdenum, **61**, 540
 dissociation, blocked by sulfur on Ni/SiO₂, **63**, 355
 formation from hydrogen and carbon dioxide on
 Rh/Al₂O₃, **65**, 428
 homogeneous hydrogenation over Group VIII ele-
 ments, **61**, 359
 hydrogenation
 over borided metals, **65**, 402
 infrared detection, **61**, 77
 on nickel, support and crystallite size effects, **65**,
 335
 over oxidized rhodium, activity and selectivity,
66, 257
 reactions over titania-supported nickel, **66**, 242
 over reduced natural garnierite, **64**, 251
 on rhodium/alumina, **61**, 87
 over ruthenium, influence of support, **63**, 255
 over single crystal nickel, kinetics, **63**, 226
 over supported potassium-Group VIII metal
 complexes, **63**, 25
 insertion reaction in methylmanganese-penta-
 carbonyl, **64**, 1
 interactions with preadsorbed oxygen on silver, **64**,
 68
 isotopic equilibration on supported ruthenium, **65**,
 16
 methanation
 over borided metals, **65**, 402
 on molybdenum compounds, **63**, 438
 and nitric oxide adsorption on alumina-supported
 iridium, **62**, 253
 nitric oxide reduction by, on rhodium surfaces, **65**,
 318
 oxidation
 over Co₃O₄, changes in catalyst composition dur-
 ing, **65**, 475
 by nitric oxide and oxygen over noble metals, **63**,
 53
 with oxygen on molybdenum trioxide, mechanism
 and kinetics, **64**, 437
 over platinum/silica, metal crystallite size effects
 and low-temperature deactivation, **62**, 173
 over polycrystalline palladium and rhodium, **64**,
 38
 on rhodium, oxygen inhibition of, **61**, 374
 over ruthenium, **63**, 261
 on supported platinum, models, **65**, 281
 over (110) surface of Ir, **62**, 1
 reaction with
 hydrogen on molybdenum-alumina, **63**, 463
 nitric oxide on silica-supported nickel, **62**, 304
 nitric oxide on supported iridium, isocyanate for-
 mation, **63**, 217
 reactivity to oxygen adsorption on Pt, **65**, 461
 shift, on Cu/ZnO
 forward and reverse, **63**, 83
 kinetics and mechanism, **63**, 83, 94
 uptake, iridium on alumina, **65**, 207
 Carbonylation
 and decarbonylation cycle, Rh₆(CO)₁₆, alumina sup-
 port, **66**, 424
 Carbonyl sulfide
 hydrolysis over alumina, kinetics, **62**, 84
 Carboxylic acids
 reactions and reaction intermediates on iron sur-
 faces, **65**, 49
 Carburization
 supported Fe-Ni system, **63**, 404
 Carrier
 effect on
 catalytic behavior of supported platinum-gold
 alloys, **64**, 228
 olefin isomerization and disproportionation over
 supported tungsten oxides, **65**, 442
 Catalysis
 carbon monoxide oxidation with oxygen on molyb-
 denum trioxide, mechanism and kinetics, **64**,
 437
 energy schemes in, **66**, 1
 heterogeneous
 conditions for rate-maximizing temperature in,
61, 270
 by solid superacids, **61**, 96
 photoassisted heterogeneous, **66**, 383
 skeletal reactions of hydrocarbons over supported
 iridium-gold, **64**, 448
 surface homogeneity assumption, kinetics model,
61, 430
 Catalyst
 acid sites, concentration measurement by ¹³C NMR,
66, 294
 bimetallic
 alloys, in reforming, **63**, 119
 ensemble effect, **63**, 112, 119
 iridium-gold, skeletal reactions of hydrocarbons
 over, **64**, 448
 carbon-supported platinum, electron microscopy,
64, 381
 heterogeneous: tungsten on alumina, synthesis, **61**,
 216
 hydrotreating: high-temperature effects, Co, Mo, Si,
 Ca inclusions, **61**, 66
 iridium-gold, supported: skeletal reactions of hy-
 drocarbons over, **64**, 448

- nonuniformly active, preparation, 63, 425
 photoassisted, 66, 383
 porous
 impregnation of nickel on alumina, concentration profiles, 63, 35
 temperature-programmed desorption: shape index analysis, 66, 391
 preparation
 molybdena-alumina, 66, 251
 silica-supported copper oxide, 65, 437
 structure, imaging Pd particles, 63, 265
 surfaces, silica-supported nickel, carbon monoxide chemisorption, Raman spectra, 62, 94
 synthesis, Fe-Ni alloy: oxidation reduction studies, 61, 242
 for vapor-phase Fischer indole synthesis, 66, 49
- Catalytic activity
 alkene isomerization over γ -alumina, 61, 326
 calcium X-type zeolite, enhancement by preadsorption of nitrogen dioxide, 64, 417
 nickel (boride, phosphide, Raney, Urushibara, and decomposed), 64, 397
 ruthenium-gold on magnesia, 64, 405
- Catalytic behavior
 Fe₂O₃-MoO₃/SiO₂, 62, 13
- Catalytic properties
 nickel (boride, phosphide, Raney, Urushibara, and decomposed), 64, 397
- Catalytic reaction
 ethylene oxidation to acetic acid over Pd-V₂O₅, kinetics, 63, 191
- Chaotic behavior
 aperiodic, hydrogen oxidation on nickel, 66, 11
- Chemical states
 Co and Mo in Co-Mo-Al₂O₃, 61, 66
- Chemical properties
 ruthenium-gold on magnesia, 64, 405
- Chemisorption
 activated, hydrogen on scandium oxide: kinetics, 66, 222
 alkenes and alkynes on plasma grown-aluminum oxide, 64, 101
 carbon monoxide on
 silica-supported Ni, Raman spectra, 62, 94
 supported rhodium, effect of D₂S, 63, 487
 cyclohexanol and cyclohexanone on Pt/SiO₂, 66, 191
 determination of supported metal cluster morphology, 63, 476
 diatomic molecules (H₂, N₂, CO) on transition *d*-metals, 65, 84
 dissociative, sulfur compounds on Ni/SiO₂, 63, 355
 hydrogen
 and carbon monoxide on alumina- and silica-supported nickel, 65, 390
 and carbon monoxide on Raney nickel-copper, 64, 124
 inhibition by copper in Cu-Ru system, 61, 412
 and oxygen on Pt/Al₂O₃, 64, 74
 oxygen
 correlation with hydrodesulfurization activity, MoS₂, 63, 515
 on reduced molybdena-alumina, 61, 282
 properties, iridium on alumina, 65, 207
- Chloramine-T
 oxidation of primary alcohols by, over OsO₄, 61, 165
- Chromia
 ethylene hydrogenation, 61, 184
 nitric oxide reaction with ammonia over, role of surface oxygen, 63, 1
 unsupported, formation of isocyanate surface species over, 65, 235
- Chromia/silica
 reduced and oxidized forms, characterization, 66, 200
- Chromium
 and copper impregnation in alumina, concentration profiles, 62, 367
 Cr(II) on silica, reaction of Rh and Pd complexes with: ethane hydrogenolysis, 61, 348
 ions, silica support: chemistry, 66, 200
 solid solutions, MgAl_{2-x}Cr_xO₄
 and α -Al_{2-x}Cr_xO₃: methanol oxidation over, 62, 202
 isopropanol decomposition over, 62, 195
 supported, nitric oxide interaction with, 63, 447
- Claus reaction
 formation of SO₂⁻ anion radicals, 63, 72
- Clinoptilolite
 H- and Ni-: *n*-butene isomerization, kinetics, 66, 1
- Clusters
 bimetallic
 copper-ruthenium system: model, 61, 397, 412
 highly dispersed: platinum-iridium on alumina, 62, 127
 ruthenium-gold, 61, 19
 silica-supported platinum-palladium: segregation in oxidizing atmospheres, 64, 487
- metal
 polymer-bound phosphine-substituted tetrairidium carbonyl: olefin hydrogenation, 62, 149
 supported: morphology, 63, 476
 ruthenium carbonyls, ir spectra, 65, 374
 supported, two-dimensional: transition metals, bonding capabilities, 66, 237
 tetraruthenium, polymer bound: ethylene hydrogenation, 63, 175
- CNDO, *see* Complete neglect of differential overlap
- Coadsorption
 hydrogen and fluorine on platinum, 61, 336
- Coarsening
 platinum particles on curved oxides, kinetics, 66, 335
- Cobalt
 on γ -alumina, magnetic susceptibility, 63, 285
 Co/Mo systems, thiophene desulfurization and exchange with deuterium over, 63, 285

- Co-Mo-Al₂O₃
 activation, effects of feed components, 65, 158
 alkene hydrogenation over, mechanism, 64, 143
 Co, Mo, Si, Ca distribution, 61, 66
 high-temperature effects on, 61, 66
 hydrodesulfurization catalysts, structure, 63, 201
 relation between pretreatment conditions and hydrodesulfurization activity, 65, 150
 sulfided: benzothiophene hydrodesulfurization, kinetics, 62, 70
 sulfided, dibenzothiophene hydrodesulfurization, 61, 523
 sulfided: surface hydroxyl groups, 64, 235
 Co, Mo/g-Al₂O₃, hydrodesulfurization catalyst: spent, concentration profiles in, 61, 146
 Co(II)NaY zeolites
 benzyl alcohol oxidation over, 64, 260
 ethylenediamine addition, inhibition of oxidation activity, 64, 260
 piperidine addition, increased oxidation activity, 64, 260
 pyridine addition, increased oxidation activity, 64, 260
 Co₃O₄, changes in composition during carbon monoxide oxidation, 65, 475
 Co-O species, intermediate in benzaldehyde formation, 64, 260
 CoO-MoO₃/Al₂O₃
 hydrodesulfurization catalyst, sulfoxide deoxygenation over, 61, 277
 hydrodesulfurization of oxidized sulfur compounds over, 61, 115
 surface structure, 65, 448
 effect on
 states and reducibility of molybdena-alumina, 64, 320
 sulfiding of molybdena-alumina, 64, 332
 homogeneous hydrogenation of carbon monoxide over, 61, 359
 oxidic precursor of CoMo/γ-Al₂O₃ hydrodesulfurization catalysts, surface structure, 66, 469
 Cocatalyst
 groups, -Snφ₃ and -SnCl₃: for Pt(Pφ₃)₂ClQ in 1,5-cyclooctadiene isomerization, 62, 389
 systems, zinc chloride-metal: dibenzyl ether hydrogenolysis, 64, 494
 Coke, *see* Carbon
 Complete neglect of differential overlap
 method: carbon monoxide insertion reactions, reaction pathway, 64, 1
 Computer
 simulation, competitive adsorption on ideal surfaces, 62, 176
 Contact
 times, low: benzene hydrogenation on platinum and ruthenium, 66, 465
 Conversion
 alcohols over indium oxide, 65, 238, 241
n-hexane over supported and unsupported PtSn, 63, 119
 hydrocarbon, over rhenium-platinum, role of sulfur, 63, 112
 methanol, over H-ZSM-5 zeolites: fuels from, 63, 331
 3-methyl-3-pentanol over metal oxides, alkene products from, 61, 279
 propylene and ethylene to higher molecular weight products, over ZSM-5: mechanism, 61, 477
 Copper
 and chromium impregnation in alumina, concentration profiles, 62, 367
 Cu(110) surface, formic acid decomposition, 61, 48
 Cu(I), Y zeolite: ethylene complexes in 61, 461
 Cu/ZnO, kinetics and mechanism of CO shift on, 63, 83, 94
 epitaxy, in copper-ruthenium system, 61, 397
 -exchanged zeolites
 stability and regenerability, 61, 485
 structure, 61, 493
 homogeneous, catalyst, 61, 493
 poly(4-vinylpyridine)-Cu(II) chelate, thiosalt oxidation over, effect of ligand ratio, 61, 533
 propylene oxidation over, retardation by adsorbate, 65, 166
 role in pentane hydrogenolysis on Cu alloys: Pt, Ir, Ni, and Pd, 63, 389
 Copper chromite
 competitive hydrogenation of
 aldehydes, ketones, and olefins, 65, 141
 ketones, 65, 133
 formation by solid state reaction between copper carbonate and chromium carbonate: catalyst for burning propellants, 65, 25
 Copper(I)-ethylene
 complexes, in Y zeolites, 61, 461
 Copper-nickel-aluminum
 alloys, structure and leaching properties, 64, 116
 Copper oxide
 silica support, carbon monoxide adsorption, 65, 437
 Copper-platinum
 alloys, carbon monoxide adsorption, 64, 110
 Copper-ruthenium
 system, model
 Cu on Ru(0001), 61, 397
 hydrogen adsorption, 61, 412
 Copper X radiation
 determination of faujasite content of cracking catalysts, 62, 374
 Corundum
 solid solution, α-Al_{2-x}Cr_xO₃: methanol oxidation over, 62, 202
 Cracking
 1-butene, mechanism, 65, 416
 catalysts, determination of faujasite content by molybdenum and copper X radiations, 62, 374

- catalytic
n-hexadecane over silica–alumina, effect of water, 66, 463
 paraffins over Y zeolites, promoting effect of olefins on rate, 65, 221
- Crystal
 single, nickel: effect of surface composition on methanation kinetics, 63, 226
- Crystallite
 platinum, supported: effect of wetting on morphology, 63, 523
 rhodium, structure, 64, 232
 size effects
 carbon monoxide hydrogenation on nickel, 65, 335
 carbon monoxide oxidation over Pt/SiO₂, 62, 173
 on selectivity and activity of ethylene oxidation over supported silver, 66, 368
- Cumene
 oxidation to hydroperoxide over platinum, 62, 79
- Cumene hydroperoxide
 from cumene oxidation over platinum, 62, 79
- Cycloalkanes
 reaction on silica-supported Pt and Pt–Au, 64, 200
- Cyclodimerization
 butadiene, over copper-exchanged zeolites, 61, 485
- Cyclohexane
 from benzene hydrogenation on nickel–kieselguhr, 63, 346
 dehydrogenation over molybdena–alumina, 66, 65
- Cyclohexanol
 chemisorption on Pt/SiO₂, ir spectra, 66, 191
 dehydration over zirconium phosphates, 65, 185
- Cyclohexanone
 chemisorption on Pt/SiO₂, ir spectra, 66, 191
- Cyclohexene
 heterogeneous oxidation, liquid-phase: supported molybdenum–chromium binary oxide, 66, 267
 hydrogenation and dehydrogenation on platinum over 10-orders-of-magnitude pressure range, 65, 78
 liquid-phase hydrogenation over Pt, Ru, and Ir with silica support, 64, 371
 oxidation over molybdenum zeolites, 64, 184
- Cyclohexene oxide
 opening, by alcohols, acetic acid, and aniline over alumina, 64, 497
- 2-Cyclohexenone
 liquid-phase hydrogenation over Pt, Ru, and Ir with silica support, 64, 371
- 1,5-Cyclooctadiene
 isomerization over Pt(Pφ₃)₂ClQ, comparison of –Snφ₃ and –SnCl₃ as cocatalyst groups, 62, 389
- Cyclopentane
 exchange with deuterium on Pt/Al₂O₃, 64, 84
 hydrogenolysis on rhodium, 61, 443
- Cyclopropane
 hydrogenation on Ru and Ru–Au, 61, 223
 isomerization over zeolites, 63, 501
- D
- Deactivation
 low temperature, in carbon monoxide oxidation over Pt/SiO₂, 62, 173
 thermal, chromia/silica, 66, 200
- Dealkylation
 steam, alkyl phenols over γ-alumina-supported noble metals, 61, 528
- Dealumination
 Y zeolites, properties, 61, 435
- Deammoniation
 ammonium X zeolite, 61, 454
- Decarbonylation
 and carbonylation reactions, Rh₆(CO)₁₆, alumina support, 66, 424
- Decomposition
 ammonia on iron, mechanism and kinetics, 61, 537
 formic acid
 on Cu(110) surface, 61, 48
 on Cu/ZnO, kinetics, 63, 94
 isopropanol over spinel solid solutions MgAl_{2–x}Cr_xO₄, 62, 195
 nitrous oxide on rare earth manganites, mechanism, 65, 121
- Dehydration
 butanols, over rare earth oxides: selectivities, 66, 184
 cyclohexanol over zirconium phosphates, 65, 185
 isopropyl alcohol: in semicrystalline, sulfonated polyethylene-grafted styrene, 63, 372
 3-methyl-3-pentanol over
 metal oxides, 61, 279
 tungsten and yttrium oxides, 61, 298
- Dehydrocyclization
 hydrocarbon on platinum–copper alloys, 63, 395
 pentane, on copper alloys: Pt, Ir, Ni, and Pd, 63, 389
- Dehydrogenation
 catalyst, calcium-nickel phosphate, 63, 496
 cyclohexane, over molybdena–alumina, 66, 65
 oxidative: ethane over supported molybdenum oxide, role of O[–] ions, 63, 505
- Demetallization
 residual oils, 62, 211
- Deoxygenation
 sulfoxides over CoO–MoO₃/Al₂O₃, 61, 277
- Desorption
 carbon monoxide from nickel using mercaptans, 63, 324
 electron-stimulated, *see* Electron-stimulated desorption
 energy
 carbon monoxide on palladium, 61, 305
 oxygen on palladium, 61, 299
 temperature programmed
 carbon dioxide on nickel/silica, 62, 280
 from hydroprocessing catalysts, 66, 162
 -mass spectrometer, olefins over CdMoO₄, 65, 369

- from porous catalysts, shape index analysis, 66, 391
 - reactive, hydrogen carrier gas: hydrogenation of CO on supported Pt group metals, 61, 7
 - thermal
 - carbon monoxide on palladium, 61, 305
 - formic acid decomposition on Cu(110) surface, 61, 48
 - oxygen on palladium, 61, 299
 - spectra, copper-ruthenium system, 61, 397, 412
 - Desulfurization
 - thiophene over Co/Mo systems, correlation with deuterium exchange, 63, 285
 - Deuteration
 - 4-*t*-butyl-1-cyclohexenyl methyl ether over platinum metals, 63, 102
 - ethene over supported platinum, support effects, 65, 31
 - Deuterium exchange
 - between butenes and perdeuteropropene on supported iron, 66, 412
 - with cyclopentane on Pt/Al₂O₃, 64, 84
 - of methane, ethane, and propane with: on silica-supported nickel, 63, 138
 - on PtY zeolite, 65, 105
 - with thiophene, and hydrodesulfurization over Co/Mo systems, 63, 285
 - reactions with acrolein over Group VIII transition metals, 65, 110
 - retention in 1,1-*d*₂ propene oxidation over oxides, 63, 307
 - surface diffusion on oxides, 65, 105
 - Deuterium sulfide
 - effect on carbon monoxide chemisorption on rhodium, 63, 487
 - Dibenzothiophene
 - methyl-substituted, hydrodesulfurization over sulfided Co-Mo/ γ -Al₂O₃, 61, 523
 - sulfoxides
 - deoxygenation over CoO-MoO₃/Al₂O₃, 61, 277
 - and sulfone, hydrodesulfurization over CoO-MoO₃-Al₂O₃, 61, 115
 - Dibenzyl ether
 - hydrogenolysis over zinc chloride-metal cocatalyst systems, 64, 494
 - 2,6-Di-*tert*-butylpyridine
 - adsorption on boron phosphate, 62, 357
 - Diene
 - hydrogenation on CdO, 61, 135
 - Diffuse reflectance spectroscopy
 - cobalt-molybdenum/alumina hydrodesulfurization catalysts, structure, 63, 201
 - Diffusion
 - atom, mechanism: in sintering of supported metal, 63, 129
 - hydrogen in H_{1.66}MoO₃, 62, 401
 - restricted, theory: of catalyst utilization, demetallization activity, 62, 211
 - surface, in heterogeneous catalysis, 61, 270
 - 3,4-Dihydro-2*H*-pyran
 - liquid-phase hydrogenation over Pt, Ru, and Ir with silica support, 64, 371
 - 2,4-C-Dihydroxymethyl pentitol
 - formation, 62, 107
 - Dimerization
 - ethylene
 - over molybdena-alumina, 62, 243
 - on nickel silicate, 61, 29
 - 3,3-Dimethylbut-1-ene
 - isomerization over γ -alumina, 61, 326
 - 2,6-Dimethylpyridine
 - adsorption on boron phosphate, 62, 357
 - Diphenylacetylene
 - reactions with carbon monoxide over polystyrene-supported molybdenum, 61, 540
 - Dispersion
 - measurements, cobalt-molybdenum/alumina, 63, 201
 - supported metal clusters, morphology, 63, 476
 - Disproportionation
 - olefins over supported tungsten oxides, 65, 442
 - Dissociation
 - carbon monoxide, blocked by sulfur on Ni/SiO₂, 63, 355
 - Distribution
 - molybdenum in MoO₃/Al₂O₃ extrudates after drying and calcining, 64, 491
 - Double bond
 - migration of allylamine to enamine over basic oxides, 65, 245
- E
- Electric conductivity
 - molybdenum trioxide, in carbon monoxide oxidation with oxygen on, 64, 437
 - Electrolyte
 - solid, potentiometry
 - in ethylene oxide oxidation on silver, 64, 18
 - measurement of oxygen activity in ethylene oxidation on platinum, 66, 36
 - Electron
 - donor
 - and acceptor properties, γ -alumina surface, 61, 291
 - properties, Claus catalysts, 63, 72
 - transfer, alumina surface, 61, 291
 - Electronic properties
 - nickel (boride, phosphide, Raney, Urushibara, and decomposed), 64, 397
 - Electron microscopy
 - carbon-supported platinum particles, direct imaging, 64, 381
 - characterization of small Pt particles on graphite, 64, 213
 - platinum-alumina, artifacts in sample preparation, 63, 167
 - small particle contrast, 63, 265

- Electron paramagnetic resonance
anions on MgO, 62, 396
carbonyl sulfide hydrolysis over alumina, 62, 84
molybdenum ions supported on silica, selective photoreduction, 64, 426
oxygen and propylene interaction with V₂O₅, redox processes, 66, 316
superoxide on supported metal surfaces, 61, 551
- Electron probe microanalysis
radial Pt profiles, 63, 425
- Electron probe microanalyzer
concentration profiles of copper and chromium impregnation in alumina, 62, 367
- Electron spectroscopy for chemical analysis, *see* X-Ray photoelectron spectroscopy
- Electron spin resonance, *see* Electron paramagnetic resonance
- Electron-stimulated desorption
carbon monoxide on palladium, 61, 305
coadsorption of H and F on Pt, 61, 336
oxygen on palladium, 61, 299
parameters: cross sections, ion energy distributions, 61, 336
- Electron tunneling, *see* Tunneling spectroscopy
- Emission spectroscopy
carbon monoxide adsorption on Pt supported on zeolite Y, 61, 553
- Enamine
double bond migration to, over basic oxides, 65, 245
- Energy
activation, *see* Activation, energy
path method, oxygen ion removal from bismuth molybdate, 63, 383
potential, curves: diatomic molecules (H₂, N₂, CO), interactions with transition *d*-metal surfaces, 65, 84
- Energy-loss spectra
surface composition of alloys for graphite gasification, 62, 44
- Enol ether
deuteration over platinum metals, 63, 102
- Ensemble effect
in reforming, 63, 112
- Epoxidation
ethylene over silver
on doped aluminas, 66, 147
role of CH bond breaking, 65, 478
ethylene-1,2-*d*₂, over silver: stereochemistry, 65, 297
reactions, over molybdenum zeolites, 64, 173, 184
- 1,2-Epoxybutane
isomerization and hydrogenolysis on platinum, 61, 1
- ESCA, *see* X-Ray photoelectron spectroscopy
- Ethane
exchange with deuterium on silica-supported nickel, 63, 138
hydrogenolysis over
noble metals supported on Phillips-type catalysts, 61, 348
silica-supported nickel-copper, 66, 214
oxidative dehydrogenation over supported molybdenum oxide, role of O⁻ ions, 63, 505
- Ethanol
adsorption on α-Fe₂O₃, ir spectra, 66, 28
reactions
and reaction intermediates on iron surfaces, 65, 36
over ZSM-5 zeolites, 63, 510
- Ethene, *see* Ethylene
- Ether
formation, over platinum-, iridium-, and rhodium-silica, 61, 109
from phenols and alcohols over thoria, mechanism, 66, 281
- Ethyl alcohol, *see* Ethanol
- Ethylene
adsorption and hydrogenation on pure and doped (Li⁺ or Ga³⁺) zinc oxide, 62, 341
complexes in copper(I) and silver(I) Y zeolites, 61, 461
conversion over ZSM-5, mechanism, 61, 477
dimerization
over molybdena-alumina, 62, 243
on nickel silicate, 61, 29
epoxidation over silver
on doped aluminas, 66, 147
role of CH bond breaking, 65, 478
stereochemistry, 65, 297
hydrogenation
on chromia and lanthana, 61, 184
over platinum, support effects, 65, 31
rates on silica-supported palladium-silver alloys, 61, 57
over supported nickel-palladium, 62, 161
over tetraruthenium clusters, 63, 175
oxidation
to acetic acid over Pd-V₂O₅, 63, 182, 191
on platinum: kinetics, limit cycles, and mechanism, 66, 36
over supported silver, influence of crystallite size and morphology on selectivity and activity, 66, 368
polymerization over molybdena-alumina, 62, 243
production from methanol, over ZSM-5 zeolites, 61, 155
transformation over molybdena-alumina reduced with hydrogen, 62, 243
- Ethylenediamine
oxidation inhibition of Co(II)NaY zeolites, 64, 260
- Ethylene oxide
hydrogenolysis and isomerization, stereochemistry, 63, 364
interaction with phenol over ion-exchange resin, kinetics, and mechanism, 62, 231
oxidation on silver, 64, 18
- Ethylidene
formation from carbon monoxide on rhodium/alumina, 61, 87
- 4-Ethylpyridine
adsorption on silica-alumina, ¹³C NMR, 66, 294

- Ethynylbenzene
adsorption on zinc oxide, Raman and ir spectra, 61, 515
- Exchange
deuterium
between butenes and perdeuteropropene on supported iron, 66, 412
with cyclopentane on Pt/Al₂O₃, 64, 84
hydrogen–deuterium, reaction on platinum, 66, 441
oxygen, kinetics, 61, 562
thiophene with deuterium over Co/Mo systems, 63, 285
- Exhaust, *see* Automobile exhaust
- Extended X-ray absorption fine structure
morphology of supported metal clusters, 63, 476
- F
- Faujasite
content of cracking catalysts, determination by molybdenum and copper X radiations, 62, 374
copper exchanged, structure, 61, 493
- Feed
components, effects on Co–Mo–Al₂O₃ activation, 65, 158
- Ferromagnetic resonance
method, study of nickel–copper alloy formation in zeolite Y, 66, 73
- Films
palladium: reconstruction and catalytic activity, effect of palladium hydride phase transformations, 61, 264
- Fischer
vapor-phase, indole synthesis, 66, 49
- Fischer–Tropsch
catalysts
carburization studies of Fe–Ni system, 63, 404
oxidation reduction studies of Fe–Ni system, 61, 242
reaction
on fused iron by transient method, 64, 163
on molybdenum–alumina, 63, 463
on ruthenium zeolites, 65, 328
selectivity, metal particle size distributions and, 65, 328
synthesis
carbon deposition over FeRu alloys during, 65, 253
of hydrocarbons, mechanism, 66, 401
infrared detection, 61, 77
reaction, over ruthenium: influence of support, 63, 255
over ruthenium, intermediates, 62, 19
- Fluorine
and hydrogen coadsorption on Pt, 61, 336
- Force constants
carbon monoxide chemisorption on silica-supported Ni, 62, 94
- Formaldehyde
adsorption on α -Fe₂O₃, ir spectra, 66, 155
reactions on tungsten and tungsten–carbon, 64, 132
- Formate
ion, surface: formation from H₂ and CO₂ on Rh/Al₂O₃, 65, 428
surface, in formic acid decomposition, 61, 48
- Formic acid
adsorption on α -Fe₂O₃, ir spectra, 66, 155
decomposition on
Cu(110) surface, 61, 48
Cu/ZnO, kinetics, 63, 94
interaction with Ni surfaces, molecular beam relaxation spectrometry, 61, 310
- Formose
reaction, modified: selectivities, 62, 107
- Fourier transform ir spectroscopy
propylene oxidation over supported Ag, solid/gas interfaces, 65, 311
- G
- Gallium
Ga³⁺-doped zinc oxide, ethylene adsorption and hydrogenation, 62, 341
- Gamma irradiation
effect on carbon dioxide methanation over supported Ru, 66, 101
- Garnierite
natural, reduction in hydrogen: carbon monoxide hydrogenation, 64, 251
- Gas
adsorption, CO and O₂ on alumina-supported Rh₄(CO)₁₆, 66, 424
analysis at atmospheric pressure, rapid, 66, 441
dilute: oxygen, effect on reaction of NO and NH₃ on V₂O₅, 62, 140
- Gasification
graphite
by bimetallic particles, 62, 221
in water vapor and hydrogen over alloys, 62, 44
- Gas–solid
reaction, kinetic equations, 63, 182
- Glass
support for palladium and platinum
particle size distribution, 65, 348
role of molecular interactions during preparation, 65, 359
Vycor, porous: photoformation of (O₂⁻)_{ads} radicals, 61, 267
- Glycol
synthesis, from carbon monoxide hydrogenation over Group VIII elements, 61, 359
- Gold
carbon monoxide adsorption, ir spectra, 61, 19
Ru–Au, cyclopropane hydrogenation, 61, 223
supported, isotopic oxygen exchange on, 63, 415
- Graphite
catalytic hydrogenation by platinum, iridium, and platinum–iridium, 66, 56
gasification
by bimetallic particles, 62, 221

- in water vapor and hydrogen over alloys, 62, 44
- hydrogenation over
 - alloys, 62, 44
 - nickel, 66, 451
- oxidation, by iridium and rhodium, 61, 378
- support for small platinum particles
 - catalytic properties and structure, 64, 223
 - characterization by electron microscopy, 64, 213
- Graphite ferric chloride
 - reduced, location of catalytic iron in, 62, 187, 189
- Growth
 - filamentous carbon, on nickel-iron surfaces, inhibition by oxide additives, 64, 464

H

- Hematite
 - adsorption of methanol, formaldehyde, and formic acid: ir spectra, 66, 155
 - surface reactivity, infrared spectra of adsorbed molecules, 66, 28
- n*-Hexadecane
 - catalytic cracking over silica-alumina, effect of water, 66, 463
- n*-Hexane
 - conversion over supported and unsupported PtSn, 63, 119
 - skeletal reactions over Pt-Pd/SiO₂, 63, 313
- 1-Hexene
 - hydrogenation over palladium and platinum with glass support, 65, 359
- Hydride
 - transfer reactions, influence of coke precursors, 65, 416
- Hydroaromatics
 - hydrogen transfer reactions over polynaphthoquinone, 61, 366
- Hydrocarbon
 - conversion over
 - rhenium-platinum, role of sulfur, 63, 112
 - silica-supported Pt-Pd alloys, 63, 313
 - formation from carbon monoxide on rhodium/alumina, 61, 87
 - hydrogenation on palladium-, platinum-, and ruthenium-containing zeolites, 66, 121
 - intermediates, alkene isomerization over γ -alumina, 61, 326
 - oxygenated, formation over rhodium, 66, 257
 - pentane hydrogenolysis on Cu alloys, 63, 389
 - reactions and reaction intermediates on iron surfaces, 65, 49
 - reforming reactions on platinum-copper alloys, 63, 395
 - skeletal reactions over supported iridium-gold, 64, 448
 - synthesis
 - on ruthenium zeolites, mechanism, 66, 401
 - over supported ruthenium and iron, 61, 77
 - transformation, on type Y zeolites, 65, 221
 - unsaturated, adsorption on aluminum oxide, inelastic electron tunneling spectroscopy, 64, 101
- Hydrodenitrogenation
 - pyridine, over nickel-tungsten-alumina, 63, 456
- Hydrodesulfurization
 - activity
 - Co-Mo-Al₂O₃, relation with pretreatment conditions, 65, 150
 - MoS₂, correlation of O₂ chemisorption with, 63, 515
 - benzothiophene, over sulfided Co-Mo/Al₂O₃, kinetics, 62, 70
- catalysts
 - CoMo/Al₂O₃ oxide, structure, 63, 201
 - CoO-MoO₃/Al₂O₃: sulfoxide deoxygenation over, 61, 277
 - molybdena-alumina, effect of cobalt on states and reducibility, 64, 320
 - molybdena-alumina, effect of cobalt on sulfiding, 64, 332
 - oxidic precursor of CoMo/ γ -Al₂O₃, surface structure, 66, 469
 - spent: concentration profiles, 61, 146
- Co-Mo-Al₂O₃ activation, effects of feed components, 65, 158
- methyl-substituted dibenzothiophenes over sulfided Co-Mo/ γ -Al₂O₃, 61, 523
- oxidized sulfur compounds over CoO-MoO₃-Al₂O₃, 61, 115
- residual oils, over zinc-deficient zinc aluminate-supported catalysts, 62, 211
- thiophene
 - compounds, mechanism, 61, 128
 - with deuterium over Co/Mo systems, 63, 285
 - over Ni-Mo, 66, 82
 - over sulfided MoO₃/Al₂O₃, effect of surface structure, 66, 93
- Hydrogen
 - abstraction, O or N insertion: in selective oxidation of propylene, 63, 235
 - adsorption
 - on alumina and molybdena-alumina, proton resonance from, 61, 170
 - on chromia and lanthana, 61, 184
 - in copper-ruthenium model, 61, 412
 - and alcohols over Pt, Ir, and Rh on silica, 61, 109
 - and carbon dioxide, surface interaction on Rh/Al₂O₃, 65, 428
 - and carbon monoxide
 - reactivity to oxygen adsorption on Pt, 65, 461
 - uptakes, iridium on alumina, 65, 207
 - chemisorption on
 - alumina- and silica-supported nickel, 65, 390
 - scandium oxide, kinetics, 66, 222
 - transition *d*-metals, 65, 84
 - exchange
 - propene on cation-exchanged resin: reaction intermediates, 62, 275
 - reaction: methane, ethane, and propane with deuterium on silica-supported nickel, 63, 138

- and fluorine coadsorption on Pt, 61, 336
 - in graphite gasification by alloys, 62, 44
 - held by solids, proton resonance on molybdena-alumina, 62, 379
 - isothermal oxidation on platinum wires, influence of inerts on kinetic oscillations during, 61, 289
 - nitric oxide reduction by, over Pt/ γ -Al₂O₃, 66, 229
 - oxidation
 - on nickel, surface state and kinetic oscillations, 66, 11
 - reactions on platinum, 66, 441
 - reactions
 - with carbon monoxide on molybdenum-alumina, 63, 463
 - surface state and catalytic activity and selectivity of nickel, 64, 397
 - reduction of molybdena-alumina: effect on ethylene transformation, 62, 243
 - self-diffusion in H_{1.45}MoO₃, 62, 401
 - spillover, mechanism: role in deuterium exchange on PtY zeolite, 65, 105
 - temperature-programmed desorption from nickel-kieselguhr, 63, 346
 - transfer, from hydroaromatics to nitrobenzene over polynaphthoquinone: reaction mechanism, 61, 366
- Hydrogenation**
- acrylonitrile over nickel boride, 65, 195
 - adsorbed carbon monoxide on supported platinum group metals, 61, 7
 - alkenes over cobalt-molybdenum-alumina, mechanism, 64, 143
 - benzene on
 - platinum and ruthenium, pulse conditions at low contact times, 66, 465
 - rhodium, turnover number, 61, 443
 - butadiene, over Ni₂P: oxygen promoting effect, 62, 286
 - butenes, over sulfided MoO₃/Al₂O₃: effect of surface structure, 66, 93
 - carbon monoxide
 - on molybdenum, 63, 438
 - on molybdenum-alumina, 63, 463
 - on nickel, support and crystallite size effects, 65, 335
 - over oxidized rhodium, 66, 257
 - over reduced natural garnierite, 64, 251
 - over single crystal nickel, kinetics, 63, 226
 - over supported potassium-Group VIII metal complexes, 63, 25
 - over titania-supported nickel, 66, 242
 - catalytic
 - graphite: by platinum, iridium, and platinum-iridium, 66, 56
 - on oxides, general aspect, 65, 1
 - competitive
 - aldehydes, ketones, and olefins on copper chromite, 65, 141
 - ketones on copper chromite, 65, 133
 - cyclopropane on Ru and Ru-Au, 61, 223
 - ethylene
 - on chromia and lanthana, 61, 184
 - on pure and doped (Li⁺ or Ga³⁺) zinc oxide, 62, 341
 - rates on silica-supported palladium-silver alloys, 61, 57
 - over supported nickel-palladium, 62, 161
 - over supported platinum: support effects, 65, 31
 - over tetraruthenium clusters, 63, 175
 - gas phase, benzene on nickel-kieselguhr: rate maximum, 63, 346
 - graphite over nickel, 66, 451
 - 1-hexene over palladium and platinum with glass support, 65, 359
 - high-pressure homogeneous, carbon monoxide over Group VIII elements, 61, 359
 - hydrocarbons on palladium-, platinum-, and ruthenium-containing zeolites, 66, 121
 - liquid-phase: 2-cyclohexenone, 2-methyl-2-cyclohexenone, cyclohexene, and 3,4-dihydro-2H-pyran over Pt, Ru, and Ir with silica support, 64, 371
 - olefins
 - and acetylenes on Pd/SiO₂ and Pt/SiO₂: effect of steric strains, 63, 11
 - over polymer-bound phosphine-substituted tetrairidium carbonyl clusters, 62, 149
 - over reduced molybdena-alumina, 64, 150
 - pyridine over nickel-tungsten-alumina, 63, 456
 - selective, diene on CdO, 61, 135
- Hydrogen-carbon monoxide**
- synthesis reaction over ruthenium, influence of support, 63, 255
- Hydrogen-deuterium**
- exchange reaction on platinum, 66, 441
- Hydrogen molybdenum bronze**
- hydrogen self-diffusion in, 62, 401
- Hydrogenolysis**
- cyclopentane on Rh, 61, 443
 - dibenzyl ether, over zinc chloride-metal cocatalyst systems, 64, 494
 - 1,2-epoxybutane on platinum, 61, 1
- ethane**
- over noble metals supported on Phillips-type catalysts, 61, 348
 - propane, and *n*-butane over silica-supported nickel-copper, 66, 214
- hydrocarbons**
- on platinum-copper alloys, 63, 395
 - over supported iridium-gold, 64, 448
 - methylcyclopropane on Pt/Al₂O₃, 64, 84
 - on nickel/silica, mechanism, 66, 248
 - oxiranes on Pt, Pd, and Ni: mechanisms, 63, 364
 - pentane, on copper alloys: Pt, Ir, Ni, and Pd, 63, 389
 - propane over Ni/SiO₂, mechanism and structure sensitivity, 62, 235

- Hydrogen sulfide
deactivation of alumina-supported nickel and ruthenium, 61, 232
- Hydrolysis
vapor phase: carbonyl sulfide over alumina, kinetics, 62, 84
- Hydroprocessing
catalysts: characterization by temperature-programmed desorption, reduction, and sulfiding, 66, 162
- Hydrotreating
catalyst: high-temperature effects, Co, Mo, Si, Ca inclusions, 61, 66
- Hydrous melt
stannous chloride, preparation of tin-palladium electroless plating catalysts, 65, 95
- Hydroxyl groups
surface
HNaY zeolite: exchange with deuterium, faster in presence of platinum, 65, 105
nature, on sulfided Co-Mo/Al₂O₃, 64, 235
- 2-C-Hydroxymethyl glycerol
formation, 62, 107
- 3-C-Hydroxymethyl pentitol
formation, 62, 107
- I
- Impregnation
alumina spheres with chromium and/or copper, concentration profiles, 62, 367
nickel on alumina, concentration profiles, 63, 35
- India, *see* Indium oxide
- Indium oxide
selectivity in alcohol conversion, 65, 238, 241
- Indole
vapor-phase Fischer synthesis, 66, 49
- Inelastic electron tunneling spectroscopy, *see* Tunneling spectroscopy
- Inerts, *see* Noble, gas
- Infrared emission spectroscopy
carbon monoxide adsorption on Pt supported on zeolite Y, 61, 553
- Infrared spectra
adsorbed molecules on α -Fe₂O₃, 66, 28, 155
alumina-supported Rh₆(CO)₁₈, characterization, 66, 424
aromatic acetylenes, adsorption on zinc oxide, 61, 503
bismuth molybdate, surface structure, 63, 152
bridge CO and linear CO on supported platinum group metals, 61, 7
carbon monoxide adsorption on
ion-exchanged Ru zeolite, 64, 482
platinum-copper alloys, 64, 110
silica-supported copper oxide, 65, 437
supported ruthenium-gold clusters, 61, 19
carbon monoxide and nitric oxide adsorption on alumina-supported iridium, 62, 253
- chemisorption of cyclohexanol and cyclohexanone on Pt/SiO₂, 66, 191
- ethylene complexes in Cu(I)Y and Ag(I)Y, 61, 461
- ethynylbenzene adsorption on zinc oxide, 61, 515
- Fourier transform, propylene oxidation over supported Ag: solid/gas interfaces, 65, 311
- hydrogen and carbon dioxide surface interaction on Rh/Al₂O₃, 65, 428
- in situ*, carbon monoxide hydrogenation over supported ruthenium and iron, 61, 77
- isocyanate surface species, formation over unsupported chromia, 65, 235
- nitric oxide adsorption on
platinum, 65, 271
silica-supported nickel, 62, 294
- nitrous oxide adsorption on η -alumina, 65, 231
- pyridine, 2,6-dimethylpyridine, and 2,6-di-*tert*-butylpyridine adsorption on boron phosphate, 62, 357
- ruthenium carbonyl clusters on alumina and silica, 65, 374
- silica-supported platinum-palladium bimetallic clusters, segregation in oxidizing atmospheres, 64, 487
- sulfided Co-Mo/Al₂O₃, nature of surface hydroxyl groups, 64, 235
- Insertion
reactions, carbon monoxide in methylmanganese-pentacarbonyl, 64, 1
- Interconversion
monomolecular, catalytic: three components, kinetics, 66, 1
- Intermediates
anionic, double bond migration by, 65, 245
carbene, olefin isomerization and disproportionation over supported tungsten oxides, 65, 442
in Fischer-Tropsch synthesis over Ru, 62, 19
ionic and nonionic, catalytic hydrogenation and isomerization reactions on oxides, 65, 1
on iron surfaces, identification, 65, 36, 49
oxygen, in reduction of NO by CO over rhodium surfaces, 65, 318
reaction, 2-propyl type and allyl type: in hydrogen exchange of propene on cation exchanged resin, 62, 275
staggered $\alpha\beta$ -diadsorbed, 63, 102
- Intermetallic compounds
brominated, *n*-pentane isomerization over, 64, 238
Ni-ThO₂ mixtures, synthesis gas reactions over, 65, 127
- Ion
migration, in rare earth and transition metal exchanged zeolites, 65, 179
radical
anions/cations on γ -alumina surface, 61, 293
formation on γ -alumina surface, 61, 291
- Ion-exchange resin
cation, Fe-form, Ni-form, and Hg-form, 62, 275

- Wofatit SBW, kinetics and mechanism of phenol interaction with ethylene oxide over, **62**, 231
- Ionization potential
correlation with activity, $\text{CoO-MoO}_3\text{-Al}_2\text{O}_3$, **61**, 115
- Iridium
alumina support
carbon monoxide and nitric oxide adsorption, **62**, 253
chemisorption properties, **65**, 207
catalytic hydrogenation of graphite, **66**, 56
clusters, polymer support: olefin hydrogenation, **62**, 149
graphite oxidation by, **61**, 378
Ir(111), oxidation, influence of carbon monoxide, **62**, 180
morphology and redispersion on SiO_2 in oxidizing and reducing atmospheres, **66**, 301
nitric oxide reduction over, **63**, 53
oxidation and agglomeration in alumina-supported platinum-iridium, **62**, 127
platinum-iridium particles, graphite gasification by, **62**, 221
-promoted nickel, resistance to deactivation by H_2S , **61**, 232
silica support, selective hydrogenation of ethylenic double bond, **64**, 371
supported, isocyanate formation in $\text{NO} + \text{CO}$ reaction on, **63**, 217
(110) surface, carbon monoxide oxidation, **62**, 1
- Iridium-gold
hydrocarbon skeletal reactions over, **64**, 448
- Iridium-silica
primary and secondary alcohol reactions over, **61**, 109
- Iron
ammonia decomposition, mechanism and kinetics, **61**, 537
catalytic, location in reduced graphite ferric chloride, **62**, 187, 189
 $\text{Fe}_2\text{O}_3\text{-MoO}_3/\text{SiO}_2$, redox processes at surfaces, **62**, 13
 $\text{Fe}_2\text{O}_3\text{-Sb}_2\text{O}_4$, propylene oxidation over, **64**, 29
films, comparison with pumice-supported iron: butene isomerization, mechanisms, **66**, 412
fused, reaction of hydrogen and carbon monoxide on, **64**, 163
industrial catalysts for ammonia synthesis, role of potassium as promoter, **66**, 326
polycrystalline and single crystal: carbon deposition from propylene, geometric effects, **62**, 35
pumice support, comparison with iron films: butene isomerization, mechanisms, **66**, 412
silica support, carbon monoxide hydrogenation, **61**, 77
surfaces, reactions of
alcohols, **65**, 36
hydrocarbons and carboxylic acids, **65**, 49
- Iron carbide
formation in supported iron-nickel system, **63**, 404
surface formation on alloys, **62**, 44
- Iron-nickel
alloy, Fischer-Tropsch catalysts
carburization studies, **63**, 404
oxidation-reduction studies, **61**, 242
- Iron-nickel carbide
formation in supported iron-nickel system, **63**, 404
- Iron-ruthenium
alloys, carbon deposition and activity changes during Fischer-Tropsch synthesis, **65**, 253
- Isocyanate
formation
on nickel, **62**, 294, 304
in $\text{NO} + \text{CO}$ reaction on supported iridium, **63**, 217
surface species, formation over unsupported chromia, **65**, 235
- Isomerization
alkene, over γ -alumina, **61**, 326
butene
on CdO , **61**, 135
over La_2O_3 , mechanism, **63**, 520
on nickel silicate, **61**, 29
1,5-cyclooctadiene, over $\text{Pt}(\text{P}\phi_3)_2\text{ClQ}$, comparison of $-\text{Sn}\phi_3$ and $-\text{SnCl}_3$ as cocatalyst groups, **62**, 389
cyclopropane over zeolites, **63**, 501
1,2-epoxybutane on platinum, **61**, 1
and exchange of butenes on supported iron, **66**, 412
- hydrocarbons
on platinum-copper alloys, **63**, 395
over supported iridium-gold, **64**, 448
- linear butenes on silica gel, poisoning of Brønsted acid sites by silylation, **66**, 112
- neopentane on platinum on graphite, **64**, 223
- olefins over supported tungsten oxides, **65**, 442
- oxiranes on Pt, Pd, and Ni: mechanisms, **63**, 364
- pentane
over $\text{AlCl}_3\text{-CuSO}_4$, **64**, 13
over brominated intermetallic compounds, **64**, 238
on copper alloys: Pt, Ir, Ni, and Pd, **63**, 389
over mordenite and Group VIII metal, **66**, 290
over nickel-loaded Y-type zeolite, kinetics, **64**, 241
reactions on oxides, general aspect, **65**, 1
- Isophorone
from aldol condensation of acetone, **63**, 295
- Isopropanol
decomposition over spinel solid solutions $\text{MgAl}_{2-x}\text{Cr}_x\text{O}_4$, **62**, 195
dehydration in semicrystalline, sulfonated polyethylene-grafted styrene, **63**, 372
reactions and reaction intermediates on iron surfaces, **65**, 36
- Isopropyl alcohol, *see* Isopropanol
- Isotope
effect, for hydrogen abstraction, **63**, 307

- equilibration, carbon monoxide over supported ruthenium, **65**, 16
- exchange
deuterium with olefin on reduced molybdena-alumina, **64**, 150
oxygen, on supported Ru and Au, **63**, 415
tracers, mechanism of propylene oxidation over bismuth molybdates, **61**, 316
tracing, multiple: methanation over nickel, **65**, 59
- K
- Ketones
from alkanes, photooxidation over titanium dioxide, **62**, 99
competitive hydrogenation on copper chromite, **65**, 133, 141
- Kinetic orders
determination, selective hydrogenation, **64**, 371
- L
- Lanthana, *see* Lanthanum oxide
Lanthanide oxides, *see* Rare earth
Lanthanum oxide
1-butene isomerization over, mechanism, **63**, 520
ethylene hydrogenation, **61**, 184
- Lattice
parameters, alkali phosphomolybdates, **61**, 285
- Lifetimes
surface, formic acid on Ni, **61**, 310
- Ligand
ratio, poly(4-vinylpyridine)-copper(II) chelate: effect in thiosalt oxidation, **61**, 533
- Lithium
Li⁺-doped zinc oxide, ethylene adsorption and hydrogenation, **62**, 341
- Low-energy electron diffraction
copper-ruthenium system, model, **61**, 397
- M
- Magnesia, *see* Magnesium oxide
Magnesium
MgAl_{2-2x}Cr_xO₄ isopropanol decomposition over, **62**, 195
methanol oxidation over, **62**, 202
- Magnesium oxide
alumina support, aldol condensation of acetone over, **63**, 295
interaction with gold, **63**, 415
spectra of anions on, **62**, 396
support for
platinum, support effects in ethene hydrogenation, **65**, 31
ruthenium, gold, and bimetallic ruthenium-gold clusters: carbon monoxide adsorption, **61**, 19
ruthenium-gold, chemisorption properties and catalytic activity, **64**, 405
- Magnetic properties
cobalt, γ -alumina support, **63**, 285
- Mass spectrometry
gas analysis, H₂-D₂ exchange and H₂ oxidation reactions on Pt, **66**, 441
- Mercaptans
carbon monoxide desorption from nickel by, **63**, 324
- Mesityl oxide
from aldol condensation of acetone, **63**, 295
- Metal
borided, methanation of carbon monoxide over, **65**, 402
clusters
polymer-bound phosphine-substituted tetrairidium carbonyl: olefin hydrogenation, **62**, 149
supported: morphology, **63**, 476
concentration profiles in spent hydrodesulfurization catalysts, **61**, 146
Group VIII, with mordenite: *n*-pentane isomerization, **66**, 290
noble, *see* Noble, metals
particles
formation on graphite in gasification by alloys, **62**, 44
size distribution, bimodal, **65**, 348
size distributions, and Fischer-Tropsch selectivity, **65**, 328
physical state and chemical reactivity, role of molecular interactions, **65**, 359
platinum group, supported: hydrogenation of adsorbed carbon monoxide, **61**, 7
supported
deactivated by sulfur dioxide in NO reduction by NH₃, **61**, 192, 204
kinetics of sintering, **63**, 129
structure and activity, **61**, 57
surfaces, supported: EPR of O₂⁻ on, **61**, 551
transition, *see* Transition metals
- Metal oxides
alkene products from 3-methyl-3-pentanol conversion over, **61**, 279
- Metal-support
effects in carbon monoxide/hydrogen synthesis reaction over ruthenium, **63**, 255
interaction
in automotive exhaust catalysts, **61**, 547
effects of silver on doped aluminas: ethylene oxidation, **66**, 147
platinum on alumina, **66**, 171
- Metathesis
olefin, over reduced molybdena-alumina, **64**, 150
- Methacrolein
oxidation on alkali phosphomolybdates, **61**, 285
- Methacrylic acid
from methacrolein oxidation on alkali phosphomolybdates, **61**, 285
- Methanation
alkylation of toluene with, over alkali-cation-exchanged X and Y zeolites: mechanism, **64**, 284

- carbon dioxide
 over nickel–alumina, kinetics, 62, 349
 on nickel/silica, 62, 280
 over supported Ru, effect of γ -irradiation, 66, 101
- carbon monoxide
 over borided metals, 65, 402
 on molybdenum–alumina, 63, 463
 over molybdenum compounds, 63, 438
- on nickel
 carbide buildup and removal, kinetics, 64, 479
 kinetics, 64, 272
 transient isotope tracing, mechanism, 65, 59
- reaction
 on fused iron by transient method, 64, 163
 over single crystal nickel, effect of surface chemical composition on kinetics, 63, 226
 over ruthenium, influence of support, 63, 255
 synthesis gas reactions over Ni–ThO₂ mixtures, 65, 127
- Methane**
 exchange with deuterium on silica-supported nickel, 63, 138
 formation
 from formaldehyde on tungsten and tungsten–carbon, 64, 132
 over nickel–alumina, mechanism, 62, 349
- Methanol**
 adsorption on α -Fe₂O₃, ir spectra, 66, 155
 conversion
 fuels from, reaction pathways on H-ZSM-5 zeolite, 63, 331
 to olefins, over ZSM-5 zeolites, 61, 155
 decomposition on tungsten and tungsten carbide, 62, 264
 oxidation over spinel and corundum solid solutions, 62, 202
 reactions and reaction intermediates on iron surfaces, 65, 36
- Methyl**
 migration in manganese–pentacarbonyl complex, 64, 1
- Methylbenzothiophene**
 sulfoxide and sulfone, hydrodesulfurization over CoO–MoO₃–Al₂O₃, 61, 115
- 2-Methylbutane**
 photooxidation over titanium dioxide, 62, 99
- 2-Methyl-2-cyclohexenone**
 liquid-phase hydrogenation over Pt, Ru, and Ir with silica support, 64, 371
- 3-Methylcyclopent-1-ene**
 isomerization over γ -alumina, 61, 326
- Methylcyclopropane**
 hydrogenolysis on Pt/Al₂O₃, 64, 84
- Methylenecyclopentane**
 isomerization over γ -alumina, 61, 326
- 2-Methyl-5-ethylpyridine**
 oxidation over V₂O₅/SnO₂, 64, 51
- Methyl formate**
 decomposition on tungsten, tungsten carbide, and tungsten–carbon monoxide, 62, 329
- Methylmanganese–pentacarbonyl**
 carbon monoxide insertion reaction in, 64, 1
- 3-Methyl-3-pentanol**
 conversion over metal oxides, alkene products from, 61, 279
 dehydration over
 metal oxides, 61, 279
 tungsten and yttrium oxides, 61, 298
- Microreactor**
 pulse, examination of vapor-phase aldol condensation of acetone over MgO–Al₂O₃, 63, 295
- Microwave spectroscopy**
 deuterium–acrolein reactions over Group VIII transition metals, 65, 110
 reaction intermediates in hydrogen exchange of propene on cation-exchanged resin, 62, 275
- Migration**
 ruthenium with oxidation of RuY zeolite, 61, 39
- Model**
 bimetallic Cu/Ru catalysts, 61, 397, 412
 kinetics of gas–solid oxidation over vanadium oxide, assumption of surface homogeneity, 61, 430
 surface chemistry, carbon monoxide oxidation on supported platinum, 65, 281
- Molecular beam relaxation spectrometry**
 formic acid interaction with Ni surfaces, 61, 310
- Molecular orbital**
 analysis: reaction pathway of carbon monoxide insertion reactions, 64, 1
 calculations, metal oxides, 61, 103
- Molybdates**
 multicomponent, propylene ammoxidation: redox kinetics, 66, 347
 propylene oxidation, mechanism, 61, 316
- Molybdena**
 supported, reduction, 66, 65
- Molybdena–alumina**
 adsorbed H₂ resonance on, 61, 170
 effect of cobalt on
 properties, 64, 332
 states and reducibility, 64, 320
 sulfiding, 64, 332
 nature and density of sites, 64, 150
 preparation, Raman spectra, 66, 251
 proton resonance, 62, 379
 reduced
 with hydrogen, ethylene transformation over, 62, 243
 propylene reactions over, 64, 150
 specific surface area, oxygen chemisorption, 61, 282
 sulfided, surface structures and activity: thiophene hydrodesulfurization and butene hydrogenation, 66, 93
 surface area, O₂ chemisorption, and cyclohexane dehydrogenation, 66, 65
- Molybdena–silica**
 specific surface area of molybdena in, 65, 263
- Molybdenum**
 alumina support, sulfided: acidity, 61, 519

- on γ -alumina, thiophene desulfurization and exchange with deuterium over, **63**, 285
- CdMoO_4 , olefin oxidation over: acidic centers, **65**, 369
- Co/Mo systems, thiophene desulfurization and exchange with deuterium over, **63**, 285
- Co-Mo- Al_2O_3
activation, effects of feed components, **65**, 158
Co, Mo, Si, Ca distribution, **61**, 66
high-temperature effects on, **61**, 66
oxide, hydrodesulfurization catalysts, structure, **63**, 201
relation between pretreatment conditions and hydrodesulfurization activity, **65**, 150
sulfided: benzothiophene hydrodesulfurization, kinetics, **62**, 70
sulfided, surface hydroxyl groups, **64**, 235
- Co,Mo/ γ - Al_2O_3 , hydrodesulfurization catalyst: spent, concentration profiles in, **61**, 146
- compounds, activity in methanation of carbon monoxide, **63**, 438
- CoO-MoO₃/ Al_2O_3
hydrodesulfurization catalyst, sulfoxide deoxygenation over, **61**, 277
hydrodesulfurization of oxidized sulfur compounds over, **61**, 115
surface structure, **65**, 448
- Fe_2O_3 -MoO₃/ SiO_2 , redox processes at surfaces, **62**, 13
- hydrogen self-diffusion in $\text{H}_{1.65}\text{MoO}_3$, **62**, 401
- ions, silica support: selective photoreduction, **64**, 426
- oxidic precursor of CoMo/ γ - Al_2O_3 hydrodesulfurization catalyst, surface structure, **66**, 469
- polystyrene support, diphenylacetylene reactions with carbon monoxide, **61**, 540
- relationship between binding energy and oxidation state, in molybdenum oxides, **62**, 182
- supported, nitric oxide interaction with, **63**, 447
- Molybdenum-chromium
binary oxide, cyclohexene oxidation, **66**, 267
- Molybdenum disulfide
hydrodesulfurization activity, correlation of O₂ chemisorption with, **63**, 515
structure and properties, **63**, 515
- Molybdenum hexacarbonyl
alumina support, hydrogenation of carbon monoxide, **63**, 463
- Molybdenum oxides
relationship between
binding energy and oxidation state of Mo in, **62**, 182
3d binding energy in molybdenum oxides, **62**, 185
silica gel support, role of O⁻ ions in ethane oxidative dehydrogenation, **63**, 505
supported, propylene oxidation over, mechanism, **63**, 307
- Molybdenum sulfide, *see* Molybdenum disulfide
- Molybdenum trioxide/alumina
distribution of molybdenum in extrudates after drying and calcining, **64**, 491
- Molybdenum X radiation
determination of faujasite content of cracking catalysts, **62**, 374
- Molybdenum zeolites
cyclohexene oxidation, **64**, 184
exoxidation reactions over, **64**, 184
preparation and characterization, **64**, 173
- Monte Carlo
simulation, competitive adsorption on ideal surfaces, **62**, 176
- Mordenite
optimization of SiO_2 / Al_2O_3 mole ratio, for *n*-pentane isomerization, **66**, 290
- Mössbauer spectra
⁵⁷Fe used as probe, alumina-supported platinum-iridium, structure, **62**, 127
 Fe_2O_3 -MoO₃/ SiO_2 , **62**, 13
- N
- Nafion-H, *see* Perfluorinated resin/sulfonic acid
- Neopentane
isomerization on platinum on graphite, **64**, 223
reactions over supported platinum-gold, **61**, 140
- Nickel
alumina
and silica support, stoichiometry of hydrogen and carbon monoxide chemisorption, **65**, 390
support, deactivation by H₂S, **61**, 232
boride, phosphide, Raney, Urushibara, and decomposed: electronic and catalytic properties, **64**, 397
carbon gasification over, **66**, 451
carbon monoxide
desorption, using mercaptans, **63**, 324
hydrogenation on, support and crystallite size effects, **64**, 335
garnierite
carbon monoxide hydrogenation, **64**, 251
reduction in hydrogen: characterization, **64**, 251
impregnation on alumina, concentration profiles, **63**, 35
iridium promoted, deactivation by H₂S, **61**, 232
-loaded Y-type zeolite: pentane isomerization, kinetics, **64**, 241
methanation on
kinetics, **64**, 272
multiple isotope tracing, **65**, 59
- Ni(100), carbide formation and removal, kinetics, **64**, 479
- Ni-ThO₂ mixtures, synthesis gas reactions over, **65**, 127
- particles, *in situ* observation in graphite hydrogenation, **66**, 451
- plate, hydrogen oxidation: surface state and kinetic oscillations, **66**, 11
- Raney, in methanation of carbon monoxide, **65**, 402

- silica support
 adsorption of NO and NO₂, 62, 294
 exchange of methane, ethane, and propane with deuterium on, 63, 138
 nitric oxide reaction with carbon monoxide, 62, 304
 reactions of sulfur compounds, 63, 355
 sintering: particle size distribution, 64, 303
 single crystal, carbon monoxide hydrogenation over, 63, 226
 surfaces, formic acid interaction with, 61, 310
 titania support, carbon monoxide hydrogenation reactions over, 66, 242
- Nickel-alumina
 carbon dioxide methanation over, kinetics, 62, 349
- Nickel borides
 acrylonitrile hydrogenation, surface states, 65, 195
- Nickel carbide
 formation in supported iron-nickel system, 63, 404
- Nickel-copper
 alloys in zeolite Y
 bulk and surface composition, 66, 73
 formation, studied by ferromagnetic resonance method, 66, 73
- Raney
 chemisorption of hydrogen and carbon monoxide, 64, 124
 structure and leaching properties, 64, 116
 surface and pore structures, 64, 124
 silica support, hydrogenolysis of ethane, propane, and *n*-butane, 66, 214
- Nickel-copper-aluminum
 alloys, structure and leaching properties, 64, 116
- Nickel-graphite
 interaction, 66, 451
- Nickel-iron
 surfaces, filamentous carbon growth on, 64, 464
- Nickel-kieselguhr
 benzene hydrogenation on, 63, 346
- Nickel-molybdenum
 unsupported, role of nickel in activity: thiophene hydrodesulfurization, 66, 82
- Nickel-palladium
 supported, ethylene hydrogenation, 62, 161
- Nickel phosphide
 butadiene hydrogenation over, oxygen promoting effect, 62, 286
- Nickel/silica
 carbon dioxide adsorption and methanation, 62, 280
 hydrogenolysis on, mechanism, 66, 248
 propane hydrogenolysis, mechanism and structure sensitivity, 62, 235
- Nickel silicate
 acidity and catalytic activity, 61, 29
- Nickel-tungsten
 alumina support, pyridine hydrogenation, 63, 456
- Nitric oxide
 adsorption on silica-supported nickel, 62, 294
 and carbon monoxide adsorption on alumina-supported iridium, 62, 253
 dissociation over Pt/ γ -Al₂O₃, 66, 229
 interaction with supported chromium, molybdenum, and tungsten, 63, 447
¹⁴NO and ¹⁵NO on low-area Pt surface, ir spectra, 65, 271
 reaction with
 ammonia over chromia, role of surface oxygen, 63, 1
 ammonia on vanadium oxide, 62, 140
 carbon monoxide on silica-supported nickel, 62, 304
 carbon monoxide on supported iridium, isocyanate formation, 63, 217
 reduction by
 ammonia over supported metals, sulfur dioxide poisoning, 61, 192, 204
 carbon monoxide on rhodium surfaces, 65, 318
 hydrogen over Pt/ γ -Al₂O₃, kinetics, 66, 229
 selective reduction over noble metals, 63, 53
- Nitrobenzene
 hydrogen transfer reactions over polynaphthoquinone, 61, 366
- Nitrogen
 chemisorption on transition *d*-metals, 65, 84
- Nitrogen dioxide
 adsorption on
 calcium X-type zeolite, enhancement of catalytic activity for butene isomerization, 64, 417
 silica-supported nickel, 62, 294
- Nitrous oxide
 adsorption on η -alumina, ir spectra, 65, 231
 decomposition on rare earth manganites, mechanism, 65, 121
- Noble
 gas, influence on kinetic oscillations during isothermal hydrogen oxidation on platinum wires, 61, 289
 metals
 γ -alumina support, steam dealkylation of alkyl phenols, 61, 528
 selective reduction of nitric oxide over, 63, 53
 supported on Phillips-type catalysts: ethane hydrogenolysis, 61, 348
- Nuclear magnetic resonance
¹³C, measurement of surface acid site concentration, silica-alumina, 66, 294
 proton, ethylene adsorption on pure and doped (Li⁺ of Ga³⁺) zinc oxide, 62, 341
- O
- Oil, residual, *see* Residual oil
- Olefins
 competitive hydrogenation on copper chromite, 65, 141
 conjunct polymerization over H-ZSM-5 zeolite, 63, 331

- heterogeneous oxidation, liquid-phase, 66, 267
- hydrogenation
and metathesis over reduced molybdena-alumina, 64, 150
on Pd/SiO₂ and Pt/SiO₂, effect of steric strains, 63, 11
over polymer-bound phosphine-substituted tetrairidium carbonyl clusters, 62, 149
- insertion in growing hydrocarbon chains, 66, 401
- isomerization and disproportionation over supported tungsten oxides, 65, 442
- oligomers and aromatics from, 63, 331
- oxidation over CdMoO₄, 65, 369
- production from methanol, over ZSM-5 zeolites, 61, 155
- promoting effect on rate of catalytic cracking on Y zeolites, 65, 221
- reactions on zeolites, 65, 416
- Oscillations
in ethylene oxidation on platinum, 66, 36
- kinetics
during isothermal hydrogen oxidation on platinum wires: influence of inerts, 61, 289
and surface state: hydrogen oxidation on nickel, 66, 11
- steady state and transient, in ammonia oxidation on platinum, 64, 346
- thermochemical, in surface reactions, 66, 130
- Osmium tetroxide
chloramine-T oxidation of primary alcohols over, 61, 165
- Overlayer
effects, formic acid interaction with Ni surfaces, 61, 310
- Oxidation
ammonia
on platinum, steady state and transient oscillations in, 64, 346
on Pt(111) and Pt(S)-12(111) × (111) surfaces, 61, 543
and ammoxidation, selective: over bismuth molybdate, mechanisms, 63, 235
- benzyl alcohol over Co(II)NaY zeolites, 64, 260
- carbon monoxide
over iridium (110) surface, 62, 1
over polycrystalline palladium and rhodium, 64, 38
over rhodium, oxygen inhibition of, 61, 374
over ruthenium, 63, 261
on supported platinum, models, 65, 281
- catalytic
carbon monoxide over Co₃O₄, 65, 475
graphite, by iridium and rhodium, 61, 378
propylene over Bi₂Mo₃O₁₂, Bi₂MoO₆, and Bi₃FeMo₃O₁₂, kinetics, 64, 295
propylene over bismuth molybdates, mechanism with isotope tracers, 61, 316
- cumene to hydroperoxide over platinum, 62, 79
- cyclohexene over molybdenum zeolites, 64, 184
- ethylene
to acetic acid over Pd-V₂O₅, 63, 182; kinetics, 63, 191
on platinum: kinetics, limit cycles, and mechanism, 66, 36
over silver on doped aluminas, 66, 147
over supported silver: influence of crystallite size and morphology on selectivity and activity, 66, 368
- ethylene oxide on silver, 64, 18
- heterogeneous, liquid-phase: cyclohexene with supported molybdenum-chromium binary oxide, kinetics, 66, 267
- hydrogen on nickel, surface state and kinetic oscillations, 66, 11
- Ir(111), influence of carbon monoxide, 62, 180
- isothermal: hydrogen on platinum wires, influence of inerts on kinetic oscillations during, 61, 289
- methacrolein, on alkali phosphomolybdates, 61, 285
- methanol, over spinel and corundum solid solutions, 62, 202
- Ni-ThO₂ mixtures, synthesis gas reactions over, 65, 127
- olefins over CdMoO₄, 65, 369
- photocatalytic, 2-methylbutane over titanium dioxide, 62, 99
- primary alcohols by chloramine-T over OsO₄, kinetics and mechanism, 61, 165
- propylene
over γ-bismuth molybdate, 62, 26
over Fe₂O₃-Sb₂O₄, mechanism, 64, 29
influence of retardation caused by adsorbate, 65, 166
over oxides: mechanism, 63, 307
over supported silver, 65, 311
- rate, molybdenum trioxide by oxygen: relation with reduction rate by carbon monoxide, 64, 437
- selective, propene over ternary tungsten oxides, 61, 256
- state
of copper during reaction of propylene oxidation to acrolein, 65, 166
relationship with binding energy of Mo in molybdenum oxides, 62, 182
relationship with 3d binding energy in molybdenum oxides, 62, 185
- thiosalts over poly(4-vinylpyridine)-copper(II) chelate, 61, 533
- toluene over V₂O₅-K₂SO₄-silica system, 65, 481
- vapor phase, alkylpyridines over V₂O₅/SnO₂: activity measurements and X-ray photoelectron spectroscopy, 64, 51
- o*-xylene, over vanadium oxide: assumption of surface homogeneity, 61, 430
- Oxidation-reduction
studies, Fe-Ni systems, 61, 242

Oxides

- additives, effect on filamentous carbon growth on nickel-iron surfaces, **64**, 464
- basic, double bond migration of allylamine over, **65**, 245
- catalytic hydrogenation and isomerization reactions on, **65**, 1
- curved: coarsening of platinum particles on, kinetics, **66**, 335
- metal, alcohol dehydration over, **61**, 279
- support for tungsten oxides, olefin isomerization and disproportionation, **65**, 442
- vapor-phase Fischer indole synthesis over, **66**, 49

Oxidizing atmosphere

- air, morphology and redispersion of iridium on silica in, **66**, 301
- segregation of silica-supported platinum-palladium bimetallic clusters, **64**, 487

Oxidizing environments

- effect on RuY zeolite, **61**, 39

Oxirane, *see* Ethylene oxide

Oxygen

- active, in carbon monoxide oxidation on molybdenum trioxide, **64**, 437
- activity
 - on silver, **64**, 18
 - surface, measurement by solid electrolyte potentiometry, **66**, 36
- adsorption
 - on chromium with silica support, **66**, 200
 - induction by uv irradiation, **61**, 267
 - on palladium, **61**, 299
 - on platinum, reactivity to hydrogen and carbon monoxide, **65**, 461
 - on Pt/Al₂O₃, reactivity, **64**, 74
 - on silver powder, calorimetry, **64**, 68
- chemisorption
 - correlation with hydrodesulfurization activity, MoS₂, **63**, 515
 - on molybdena-alumina, **66**, 65
 - on reduced molybdena-alumina, **61**, 282
- CO_{2(ads)} formation on silver, **54**, 68
- desorption from palladium, **61**, 299
- under dilute gas condition, effect on reaction of NO and NH₃ on V₂O₅, **62**, 140
- exchange, kinetics, **61**, 562
- inhibition of carbon monoxide oxidation on rhodium, **61**, 374
- intermediate, in reduction of NO by CO over rhodium surfaces, **65**, 318
- ion removal from bismuth molybdate, activation energies, **63**, 383
- isotope
 - carbon monoxide oxidation on molybdenum trioxide, **64**, 437
 - exchange on supported Ru and Au, kinetics, **63**, 415
- lattice, in ethylene oxidation over Pd-V₂O₅, **63**, 191

- molecular, thiosalt oxidation by, **61**, 533
- and nitrogen σ -allyl complexes, of molybdenum, **63**, 235
- O⁻ ion, role in ethane oxidative dehydrogenation over supported molybdenum oxide, **63**, 505
- O₂⁻
 - ion formation on MgO, **62**, 396
 - on supported metal surfaces, EPR, **61**, 551
- (O₂⁻)_{ads} radicals, photoformation on porous Vycor glass, **61**, 267
- promoting effect, for butadiene hydrogenation over Ni₂P, **62**, 286
- and propylene interaction with V₂O₅, ESR investigation of redox processes, **66**, 316
- surface, role in reaction of nitric oxide with ammonia over chromia, **63**, 1
- treatment, effect on catalytic behavior of supported platinum-gold alloys, **64**, 228
- ultraviolet activation, in photooxidation of 2-methylbutane over titanium dioxide, **62**, 99

P

Palladium

- γ -alumina support, steam dealkylation of alkyl phenols, **61**, 528
- complexes, reaction with Cr(II) on silica: ethane hydrogenolysis, **61**, 348
- electron-stimulated and thermal desorption carbon monoxide, **61**, 305
- oxygen, **61**, 299
- films: reconstruction and catalytic activity, effect of palladium hydride phase transformations, **61**, 264
- glass support, preparation: role of molecular interactions in physical state and chemical reactivity, **65**, 359
- loss from supported platinum-palladium during annealing, **61**, 15
- particles, crystalline: supported, contrast effects, **63**, 265
- polycrystalline, carbon monoxide oxidation, **64**, 38
- supported, distribution of active component on carrier, **63**, 491
- vitreous supports, bimodal particle size distribution by SAXS, **65**, 348
- in zeolite Y, hydrogenation of unsaturated hydrocarbons, **66**, 121
- Palladium-copper
 - catalysts, preparation, **63**, 491
- Palladium hydride
 - phase transformations, effect on reconstruction and catalytic activity of palladium films, **61**, 264
- Palladium-nickel
 - supported, ethylene hydrogenation, **62**, 161
- Palladium/silica
 - hydrogenation of olefins and acetylenes, effect of steric strains, **63**, 11

- Palladium-silver
alloys, silica support: preparation and activity, **61**,
57
- Palladium-vanadium pentoxide
ethylene oxidation to acetic acid over, **63**, 182;
kinetics, **63**, 191
- Paraffins
catalytic cracking over Y zeolites, promoting effect
of olefins on rate, **65**, 221
- Particles
bimetallic, graphite gasification by, **62**, 221
metal, size distributions: and Fischer-Tropsch se-
lectivity, **65**, 328
platinum, on curved oxides: coarsening kinetics, **66**,
335
size
distribution, palladium and platinum on vitreous
supports, **65**, 348
distribution, sintering of silica-supported nickel,
64, 303
effect on cyclopropane hydrogenation on Ru, **61**,
223
influence on catalytic properties of alumina sup-
ported rhodium, **61**, 443
small, platinum: graphite support
characterization by electron microscopy, **64**, 213
structure and catalytic properties, **64**, 223
splitting, alumina-supported platinum, **62**, 59
- Pentane
isomerization over
AlCl₃-CuSO₄, **64**, 13
brominated intermetallic compounds, **64**, 238
mordenite and Group VIII metal, **66**, 290
nickel-loaded Y-type zeolite, kinetics, **64**, 241
skeletal reactions over Pt-Pd/SiO₂, **63**, 313
- Perfluorinated resinsulfonic acid
-catalyzed alkylation of toluene and phenol, **61**, 96
- Perylene
adsorption on γ -alumina surface, **61**, 291
- Phase
transition
Co-Mo-Al₂O₃, **61**, 66
palladium hydride: effect on reconstruction and
catalytic activity of palladium films, **61**, 264
- Phenol
from alkyl phenols, steam dealkylation over γ -
alumina-supported noble metals, **61**, 528
alkylation, **61**, 96
interaction with ethylene oxide over ion-exchange
resin, kinetics and mechanism, **62**, 231
reactions with alcohols over thoria, **63**, 433; **66**,
281
- Phenoxyethanol
preparation, **62**, 231
- Phenylhydrazones
indole synthesis from, over oxides, **66**, 49
- Phillips
-type catalyst, support for noble metals: ethane
hydrogenolysis, **61**, 348
- Phosphate
calcium nickel, dehydrogenation catalyst, **63**, 496
- Phosphine
-substituted tetrairidium carbonyl clusters, polymer-
bound: olefin hydrogenation, **62**, 149
- Photocatalysis
criteria, **66**, 383
heterogeneous: photooxidation of 2-methylbutane,
62, 99
on insulator, porous Vycor glass, **61**, 267
- Photoformation
(O₂⁻)_{ads} radicals on porous Vycor glass, **61**, 267
- Photoluminescence
porous Vycor glass, **61**, 267
- Photooxidation
2-methylbutane, over titanium dioxide, **62**, 99
- Photoreduction
selective, molybdenum ions supported on silica, **64**,
426
- 2-Picoline
oxidation over V₂O₅/SnO₂, **64**, 51
- 3-Picoline
ammonoxidation over V-Ti-O, **65**, 9
oxidation over V₂O₅/SnO₂, **64**, 51
- Platinum
 γ -alumina support
dispersed phase, **66**, 229
nitric oxide reduction by hydrogen over, as func-
tion of metal loading, **66**, 229
nonuniformly active, preparation, **63**, 425
redispersion model, **62**, 59
surface structure, **66**, 229
benzene hydrogenation, pulse conditions at low
contact times, **66**, 465
catalytic hydrogenation of graphite, **66**, 56
crystal surfaces, cyclohexene hydrogenation and
dehydrogenation, **65**, 78
crystallites, supported, effect of wetting on mor-
phology, **63**, 523
cumene oxidation to hydroperoxide, **62**, 79
ethylene oxidation, **66**, 36
foil surface, coadsorption of H and F, **61**, 336
glass support, preparation: role of molecular inter-
actions in physical state and chemical reactiv-
ity, **65**, 359
group metals, supported: hydrogenation of adsorbed
oxygen monoxide, **61**, 7
H₂PtCl₆ solutions, plus coingredients: modificaton
of radial Pt profiles, **63**, 425
hydrogen and deuterium exchange and hydrogen
oxidation reactions on, **66**, 441
isomerization and hydrogenolysis of epoxides, ef-
fect of hydrogen on activity, **61**, 1
metals, deuteration of enol ether, **63**, 102
oxygen adsorption, reactivity to hydrogen and car-
bon monoxide, **65**, 461
particles
on curved oxides: coarsening kinetics, **66**,
335

- graphitized carbon support: direct imaging, electron microscopy, **64**, 381
 small: graphite support, characterization by electron microscopy, **64**, 213
 small: graphite support, structure and catalytic properties, **64**, 223
 percentage exposed, effect on reactivity of adsorbed oxygen on Pt/Al₂O₃, **64**, 74
 profiles, radial: types, **63**, 425
 Pt(111) and Pt(S)-12(111) × (111) surfaces, ammonia oxidation, **61**, 543
 Pt(P7φ₃)₂ClQ, comparison of -Sn7φ₃ and -SnCl₃ as cocatalyst groups in 1,5-cyclooctadiene isomerization, **62**, 389
 redispersion on alumina, effect of chlorine, **66**, 171
 silica support
 carbon monoxide oxidation, **62**, 173
 reaction of alkanes and cycloalkanes, **64**, 200
 selective hydrogenation of ethylenic double bond, **64**, 371
 sintering, effect of atmosphere, **66**, 171
 support effects in ethene hydrogenation, **65**, 31
 supported, carbon monoxide oxidation: models, **65**, 281
 surface, nitric oxide adsorption: ir spectra, **65**, 271
 vitreous supports, bimodal particle size distribution by SAXS, **65**, 348
 wires
 and foils, ammonia oxidation on: steady state and transient oscillations in, kinetics, **64**, 346
 kinetic oscillations during isothermal hydrogen oxidation, influence of inerts, **61**, 289
 zeolite Y support
 chemisorptive properties, **61**, 553
 deuterium exchange on, **65**, 105
 hydrogenation of unsaturated hydrocarbons, **66**, 121
- Platinum-alumina**
 electron microscopy, artifacts in sample preparation, **63**, 167
 methylcyclopropane hydrogenolysis and cyclopentane exchange with deuterium, activity and selectivity patterns: comparison with Pt/SiO₂, **64**, 84
 oxygen adsorption, effect of percentage of exposed platinum, **64**, 74
- Platinum-copper**
 alloys
 carbon monoxide adsorption, **64**, 110
 hydrocarbon reforming reactions, **63**, 395
 role of copper in pentane hydrogenolysis, **63**, 389
- Platinum-gold**
 alloys
 silica support: reaction of alkanes and cycloalkanes, **64**, 200
 supported: influence of carrier and oxygen treatment on catalytic behavior, **64**, 228
 supported, neopentane reactions over, **61**, 140
- Platinum-iridium**
 alumina support, highly dispersed clusters: structure, effect of calcination in air, **62**, 127
 particles
 catalytic hydrogenation of graphite, **66**, 56
 graphite gasification by, **62**, 221
- Platinum-palladium**
 silica support
 segregation of bimetallic clusters in oxidizing atmospheres, **64**, 487
 skeletal reactions of *n*-pentane and *n*-hexane over, **63**, 313
 supported, palladium loss during annealing, **61**, 15
- Platinum-rhenium**
 alloys
 hexane conversion, **63**, 112
 role in reforming, **63**, 112
 hydrocarbon conversion catalysts, role of sulfur, **63**, 112
- Platinum-rhodium**
 particles, graphite gasification by, **62**, 221
- Platinum/silica**
 chemisorption of cyclohexanol and cyclohexanone, **66**, 191
 hydrogenation of olefins and acetylenes, effect of steric strains, **63**, 11
 methylcyclopropane hydrogenolysis and cyclopentane exchange with deuterium, activity and selectivity patterns: comparison with Pt/Al₂O₃, **64**, 84
 primary and secondary alcohol reactions over, **61**, 109
- Platinum-tin**
 alloys, hexane conversion, **63**, 119
- Poisoning**
 active sites of reduced molybdena-alumina, **64**, 150
- Polycyclic aromatic hydrocarbons**, *see* Polynuclear aromatic hydrocarbons.
- Polyethylene**
 -grafted styrene, sulfonated: isopropyl alcohol dehydration in, **63**, 372
- Polymer**
 -bound
 phosphine-substituted tetrairidium carbonyl clusters, olefin hydrogenation, **62**, 149
 tetraruthenium clusters, ethylene hydrogenation, **63**, 175
 semicrystalline, sulfonated polyethylene-grafted styrene: isopropyl alcohol dehydration in, **63**, 372
 support for molybdenum, diphenylacetylene reactions with carbon monoxide, **61**, 540
- Polymerization**
 ethylene, over molybdena-alumina, **62**, 243
- Polynaphthoquinone**
 hydrogen transfer reactions between hydroaromatics and nitrobenzene over, **61**, 366
- Polynuclear aromatic hydrocarbons**
 adsorption on γ -alumina, **61**, 291

- Polystyrene
 support for molybdenum, diphenylacetylene reactions with carbon monoxide, **61**, 540
- Polystyrene/ammonium perchlorate
 propellants, solid state chemistry of copper chromite used as catalyst for burning of, **65**, 25
- Poly(4-vinylpyridine)-copper(II)
 chelate, thiosalt oxidation over, **61**, 533
- Pore
 structure, Raney nickel-copper, **64**, 124
- Porous catalysts
 temperature-programmed desorption, shape index analysis, **66**, 391
- Potassium
 role as promoter in iron industrial catalysts for ammonia synthesis, **66**, 326
- Potassium-Group VIII metal
 complexes, supported; carbon monoxide hydrogenation, **63**, 25
- Pressure
 ammonia, importance in kinetics of ammonia synthesis over supported Ru, **62**, 167
 effects in kinetics of activated chemisorption, hydrogen on scandium oxide, **66**, 222
- Pretreatment
 conditions, relation with hydrodesulfurization activity of Co-Mo-Al₂O₃, **65**, 150
- Probes
 basic molecules, Mo-alumina, **61**, 519
- Propane
 exchange with deuterium on silica-supported nickel, **63**, 138
 hydrogenolysis over
 Ni/SiO₂, mechanism and structure sensitivity, **62**, 235
 silica-supported nickel-copper, **66**, 214
- Propellants
 ammonium perchlorate/polystyrene, solid state chemistry of copper chromite used as catalyst for burning of, **65**, 25
- Propene, *see* Propylene
- Propylene
 ammoxidation
 to acrylonitrile over tellurium-molybdenum oxide, **64**, 356
 over bismuth molybdates, redox kinetics, **66**, 347
 to pyridines, catalyst structure and reaction selectivity, **65**, 470
 conversion over ZSM-5, mechanism, **61**, 477
 from cyclopropane, secondary transformations over zeolites, **63**, 501
 hydrogen exchange, on cation-exchanged resin: reaction intermediates, **62**, 275
 oxidation
 over bismuth molybdates, kinetics, **64**, 295
 over bismuth molybdates, mechanism with isotope tracers, **61**, 316
 over γ -bismuth molybdate, **62**, 26
 over Fe₂O₃-Sb₂O₄, mechanism, **64**, 29
 influence of retardation caused by adsorbate, **65**, 166
 over oxides, mechanism, **63**, 307
 over supported silver, **65**, 311
 and oxygen interaction with V₂O₅, ESR investigation of redox processes, **66**, 316
 production from methanol, over ZSM-5 zeolites, **61**, 155
 reactions over reduced molybdena-alumina, **64**, 150
 selective oxidation over ternary tungsten oxides, to acraldehyde, **61**, 256
- Proton resonance
 adsorbed H₂ on alumina and molybdena-alumina, **61**, 170
 alumina and molybdena-alumina, **62**, 379
- Pulse
 conditions, benzene hydrogenation on platinum and ruthenium, **66**, 465
 microreactor, examination of vapor-phase aldol condensation of acetone over MgO-Al₂O₃, **63**, 295
- Pyridine
 adsorption on
 boron phosphate, **62**, 357
 X zeolites, Raman spectra, **62**, 316
 hydrogenation, over nickel-tungsten-alumina, **63**, 456
 from propylene ammoxidation, catalyst structure and reaction selectivity, **65**, 470
- Q
- Quantum chemistry
 calculations, side-chain alkylation of toluene with methanol, **64**, 284
 metal oxides, **61**, 103
- Quinone
 polymer, polynaphthoquinone: hydrogen transfer over, **61**, 366
- R
- Rake-like scheme
 in simultaneous formation of acetic acid and acetaldehyde from ethylene oxidation over Pd-V₂O₅, **63**, 191
- Raman spectra
 aromatic acetylenes, adsorption on zinc oxide, **61**, 503
 bismuth molybdate, surface structure, **63**, 152
 carbon monoxide chemisorbed on silica-supported Ni, **62**, 94
 ethynylbenzene adsorption on zinc oxide, **61**, 515
 molybdena-alumina catalysts, **66**, 251
 pyridine adsorbed on X zeolites, **62**, 316
- Rare earth
 exchanged zeolites, ion migration, **65**, 179
 ion, participation in nitrous oxide decomposition, **65**, 121

- manganites, LnMnO_3 ($\text{Ln} = \text{La}, \text{Nd}, \text{Sm}, \text{Gd}$):
nitrous oxide decomposition mechanism, 65, 121
oxides, selectivities for dehydration of butanols, 66, 184
- Rate constants
empirical and kinetic, correlations, 66, 1
- Rate equations
Langmuir type, 66, 1
- Reaction
insertion, carbon monoxide in methylmanganese-pentacarbonyl, 64, 1
intermediates, 2-propyl type and allyl type: in hydrogen exchange of propene on cation-exchanged resin, 62, 275
mechanisms, Langmuir-Hinshelwood and Eley-Rideal heterogeneous catalysis, 61, 270
nitric oxide
with ammonia over chromia, role of surface oxygen, 63, 1
and carbon monoxide on silica-supported nickel, 62, 304
probabilities, formic acid on Ni, 61, 310
recombination, surface, 63, 355
reforming, *see* Reforming reactions
skeletal, hydrocarbons over supported iridium-gold, 64, 448
sulfur compounds on Ni/SiO₂, 63, 355
surface, *see* Surface, reactions
- Reactor
micro-, pulse: examination of vapor-phase aldol condensation of acetone over MgO-Al₂O₃, 63, 295
- Redispersion
alumina-supported platinum, 62, 59
iridium on silica in oxidizing and reducing atmospheres, 66, 301
platinum on alumina, effect of chlorine, 66, 171
- Redox
kinetics, bismuth molybdate ammoxidation catalysts, 66, 347
mechanism, in ethylene oxidation over Pd-V₂O₅, 63, 191
processes
oxygen and propylene interaction with V₂O₅, ESR spectra, 66, 316
surfaces of Fe₂O₃-MoO₃/SiO₂, 62, 13
- Reducing atmosphere
hydrogen, morphology and redispersion of iridium on silica in, 66, 301
- Reducing environments
effect on RuY zeolite, 61, 39
- Reduction
Fe₂O₃-Sb₂O₄, with propene, 64, 29
at low temperature, production of V₄O₉ from Pd-V₂O₅, 63, 182
nitric oxide by
ammonia over supported metals, sulfur dioxide poisoning, 61, 192, 204
carbon monoxide on rhodium surfaces, 65, 318
hydrogen over Pt/γ-Al₂O₃, 66, 229
rate, molybdenum trioxide by carbon monoxide: relation with oxidation rate by oxygen, 64, 437
selective
nitric oxide by ammonia over supported metals poisoned by SO₂, 61, 204
nitric oxide over noble metals, 63, 53
sites, role in vapor-phase hydrolysis of carbonyl sulfide over alumina, 62, 84
temperature programmed, of hydroprocessing catalysts, 66, 162
- Reforming reactions
hydrocarbon on platinum-copper alloys, reaction mechanisms, 63, 395
role of copper in pentane hydrogenolysis on Cu alloys, 63, 389
- Regenerability
copper-exchanged zeolites, 61, 485
- Regioselectivity
oxirane hydrogenolysis and isomerization of Pt, Pd, and Ni, 63, 364
- Reoxidation
temperature programmed, characterization of γ-bismuth molybdate, 62, 26
- Residual oil
hydrodesulfurization, over zinc-deficient zinc aluminate-supported catalysts, 62, 211
- Retardation
by adsorbate, in propylene oxidation to acrolein, 65, 166
- Rhenium
and sulfur, role in platinum-based hydrocarbon-conversion catalysts, 63, 112
- Rhodium
alumina support
effect of D₂S on CO adsorption, 63, 487
influence of particle size on catalytic properties, 61, 443
surface interaction between H₂ and CO₂: adsorption and ir spectra, 65, 428
carbon monoxide oxidation, 64, 38
clusters, two-dimensional supported: bonding capabilities, 66, 237
complexes, reaction with Cr(II) on silica: ethane hydrogenolysis, 61, 348
crystallites, structure, 64, 232
graphite oxidation by, 61, 378
interaction with washcoat material, in automotive exhaust catalysts, 61, 547
nitric oxide reduction over, 63, 53
oxidized, foil and single crystals: surface composition during carbon monoxide hydrogenation, 66, 257
polycrystalline, oxygen inhibition of carbon monoxide oxidation on, 61, 374
Rh(III)-exchanged zeolites, ESCA study, 65, 227
Rh₆(CO)₁₆, alumina support: chemical and physical characterization, 66, 424

- supported, aggregation of surface complexes, 62, 117
- surfaces, reduction of NO by CO on, 65, 318
- Rhodium/alumina
hydrogenation of carbon monoxide, 61, 87
- Rhodium-platinum
particles, graphite gasification by, 62, 221
- Rhodium-silica
primary and secondary alcohol reactions over, 61, 109
- Ring
enlargement, cycloalkanes on silica-supported Pt and Pt-Au, 64, 200
- Rubidium phosphomolybdate
methacrolein adsorption, ir patterns, 61, 285
- Ruthenium
alumina support
deactivation by H₂S, 61, 232
isotopic equilibration of carbon monoxide, 65, 16
benzene hydrogenation, pulse conditions at low contact times, 66, 465
carbon monoxide hydrogenation, effect of support, 63, 255
clusters, polymer bound: ethylene hydrogenation, 63, 175
-exchanged NaY zeolites, X-ray photoelectron spectroscopy, 61, 39
Fischer-Tropsch synthesis over, intermediates, 62, 19
ion-exchanged zeolite, carbon monoxide adsorption on, 64, 482
magnesium oxide support: carbon monoxide adsorption, ir spectra, 61, 19
migration with oxidation of RuY zeolite, 61, 39
silica
or alumina support, carbon monoxide hydrogenation, 61, 77
and magnesia support, cyclopropane hydrogenation, 61, 223
support, selective hydrogenation of ethylenic double bond, 64, 371
single crystal, carbon monoxide oxidation over, 63, 261
supported
ammonia synthesis: importance of ammonia pressure in kinetics, 62, 167
effect of γ -irradiation on carbon dioxide methanation over, 66, 101
isotopic oxygen exchange on, 63, 415
in zeolite Y, hydrogenation of unsaturated hydrocarbons, 66, 121
- Ruthenium carbonyls
clusters, alumina and silica support: Ru₅(CO)₁₂, α -H₄Ru₄(CO)₁₂, and Ru₆C(CO)₁₇, ir spectra, 65, 374
- Ruthenium-gold
clusters, magnesium oxide support: carbon monoxide adsorption, 61, 19
- magnesium oxide support, chemophysical properties and catalytic activity, 64, 405
- S
- SAXS, *see* X-Ray scattering, small angle
- Scandium oxide
hydrogen chemisorption, kinetics, 66, 222
- Schulz-Flory
model, extended: metal particle size distributions and Fischer-Tropsch selectivity, 65, 328
- Secondary ion mass spectrometry
iron-ruthenium alloys, carbon deposition during Fischer-Tropsch synthesis, 65, 253
- Second reducible function
influence on mechanism of hydrogenation of ethylenic double bond, 64, 371
- Segregation
silica-supported platinum-palladium clusters in oxidizing atmospheres, 64, 487
surface
Fe-Co alloys for graphite gasification, 62, 44
fluorine on platinum, 61, 336
- Selectivity
butanol dehydration over rare earth oxides, 66, 184
correlations with activity and surface composition: carbon monoxide hydrogenation over oxidized rhodium, 66, 257
ethylene oxidation over supported silver, influence of crystallite size and morphology, 66, 368
for Fischer-Tropsch on zeolites, 65, 328
formation of branched sugar alcohols in modified formose reaction, 62, 107
isopropanol decomposition over MgAl_{2-x}Cr_xO₄, 62, 195
methanol oxidation over MgAl_{2-x}Cr_xO₄ and α -Al_{2-x}Cr_xO₃, 62, 202
nitric oxide reduction over noble metals, 63, 53
oxidation, mechanisms: over bismuth molybdate, 63, 235
patterns: methylcyclopropane hydrogenolysis and cyclopentane exchange with deuterium on Pt/Al₂O₃, comparison with Pt/SiO₂, 64, 84
shape, molecular: in zeolite ZSM-5, 65, 486
- Shape
selectivity, molecular traffic control in zeolite ZSM-5, 65, 486
- Shape index
analysis, temperature-programmed desorption from porous catalysts, 66, 391
- Silica, *see also* Glass, Vycor
amorphous, morphology and redispersion of iridium on, 66, 301
gel
butene isomerization: poisoning of Brønsted acid sites by silylation, 66, 112
effect of NaOH impregnation of activity, 63, 72
support for molybdenum oxide: ethane oxidative dehydrogenation, 63, 505

- inhibition of filamentous carbon growth on nickel-iron surfaces, **64**, 464
- interaction with gold, **63**, 415
- molecular orbital calculations, **61**, 103
- platinum, iridium and rhodium on: reactions of primary and secondary alcohols over, **61**, 109
- support for
- chromium ions, **66**, 200
 - copper oxide, carbon monoxide adsorption, **65**, 437
 - Fe₂O₃-MoO₃/SiO₂, **62**, 13
 - molybdenum ions, selective photoreduction, **64**, 426
 - nickel, adsorption of NO and NO₂, **62**, 294
 - nickel, carbon monoxide chemisorption, **62**, 94
 - nickel: exchange of methane, ethane, and propane with deuterium on, **63**, 138
 - nickel, hydrogen and carbon monoxide chemisorption, **65**, 390
 - nickel, nitric oxide reaction with carbon monoxide, **62**, 304
 - nickel, reactions of sulfur compounds, **63**, 355
 - nickel-copper, hydrogenolysis of ethane, propane, and *n*-butane, **66**, 214
 - palladium-silver alloys, preparation and activity, **61**, 57
 - platinum, carbon monoxide oxidation, **62**, 173
 - platinum-palladium, **63**, 313; **64**, 487
 - rhodium, aggregation of surface complexes, **62**, 117
 - rhodium crystallites, **64**, 232
 - ruthenium and iron, carbon monoxide hydrogenation, **61**, 77
 - ruthenium carbonyl clusters, ir spectra, **65**, 374
 - vanadium pentoxide-potassium sulfate system, **63**, 271
- Silica-alumina
- acid sites, concentration measurement by ¹³C NMR, **66**, 294
 - n*-butene isomerization, kinetics, **66**, 1
 - catalytic cracking of *n*-hexadecane, effect of water, **66**, 463
 - mole ratio, mordenite: optimization for *n*-pentane isomerization, **66**, 290
 - molecular orbital calculations, **61**, 103
- Silicalite
- comparison with ZSM-5, **61**, 390
- Silica-magnesium oxide
- synthesis of indole derivatives, **66**, 49
- Silver
- Ag(I), Y zeolite: ethylene complexes in, **61**, 461
 - on doped aluminas, ethylene oxidation: effects of metal-support interaction, **66**, 147
 - polycrystalline films, supported on stabilized zirconia: ethylene oxide oxidation, **64**, 18
 - powder, carbon monoxide and carbon dioxide interactions with oxygen on, **64**, 68
 - silica support, propylene oxidation over, **65**, 311
 - supported
 - influence of crystallite sized and morphology on selectivity of ethylene oxidation, **66**, 368
 - and unsupported, stereochemistry of ethylene-1,2-*d*₂ epoxidation over, **65**, 297
- Silver(I)-ethylene
- complexes, in Y zeolites, **61**, 461
- Silylation
- poisoning of Brønsted acid sites by, in butene isomerization on silica gel, **66**, 112
- Simulation
- computer, adsorption on ideal surfaces, **62**, 176
- Sintering
- of particles, platinum-alumina, **63**, 167
 - silica-supported nickel, particle size distribution, **64**, 303
 - supported metal, kinetics, **63**, 129
- Sites
- acid
 - number and strength relationship: on solid surfaces using ammonia adsorption, **62**, 157
 - surface, silica-alumina cracking catalyst: concentration measurement by ¹³C NMR, **66**, 294
 - reduction, role in vapor-phase hydrolysis of carbonyl sulfide over alumina, **62**, 84
 - III, copper cations in zeolite, **61**, 493
- Size
- effect in catalysis, platinum-alumina, **63**, 167
- Sodium hydroxide
- impregnation in silica gel, **63**, 72
- Solid electrolyte potentiometry
- measurement of oxygen activity in ethylene oxidation on platinum, **66**, 36
- Solid solutions
- α-Al_{2-x}Cr_xO₃, methanol oxidation over, **62**, 202
 - MgAl_{2-x}Cr_xO₄
 - isopropanol decomposition over, **62**, 195
 - methanol oxidation over, **62**, 202
- Solid state
- reaction: copper carbonate and chromium carbonate, copper chromite formation, **65**, 25
- Solvents
- polar and nonpolar, high-pressure homogeneous hydrogenation of CO in, **61**, 359
- Spillover
- hydrogen, mechanism: role in deuterium exchange on PtY zeolite, **65**, 105
- Spinel
- solid solutions, MgAl_{2-x}Cr_xO₄
 - isopropanol decomposition over, **62**, 195
 - methanol oxidation over, **62**, 202
- Stability
- copper-exchanged zeolites, **61**, 485
- Steady state
- of catalysis on molybdenum trioxide, dynamic bal-

- ance between reduction rate by CO and oxidation rate by O₂, **64**, 437
- Steam
dealkylation, alkyl phenols over γ -alumina-supported noble metals, **61**, 528
- Stereochemistry
ethylene-1,2-*d*₂ epoxidation over silver, **65**, 297
oxirane hydrogenolysis and isomerization on Pt, Pd, and Ni, **63**, 364
- Steric strains
effect on hydrogenation of olefins and acetylenes on Pd/SiO₂ and Pt/SiO₂, **63**, 11
- Stoichiometry
hydrogen
and carbon monoxide chemisorption on alumina- and silica-supported nickel, **65**, 390
oxygen titration on Rh, **61**, 443
- Structure
influence on selectivity and activity of ethylene oxidation over supported silver, **66**, 368
- Structure-property
relations of solid polymeric catalysts, **63**, 372
- Structure sensitivity
propane hydrogenolysis over Ni/SiO₂, **62**, 235
- Styrene
semicrystalline, sulfonated polyethylene-grafted: isopropyl alcohol dehydration in, **63**, 372
- Sugar alcohols
branched, selective formation in modified formose reaction, **62**, 107
- Sulfiding
of hydroprocessing catalysts, **66**, 162
molybdena-alumina, effect of cobalt, **64**, 332
- Sulfonic resin
cation exchanged: Fe-form, Ni-form, and Hg-form, **62**, 275
- Sulfoxides
deoxygenation over CoO-MoO₃/Al₂O₃, **61**, 277
- Sulfur
compounds
deactivation of alumina-supported nickel and ruthenium, **61**, 232
oxidized: hydrodesulfurization, over CoO-MoO₃-Al₂O₃, **61**, 115
reactions on Ni/SiO₂, **63**, 355
deposition on spent hydrodesulfurization catalysts, **61**, 146
ensemble effect in reforming, **63**, 112
poisoning
carbon monoxide chemisorption on rhodium/alumina model, **63**, 487
supported metals, **61**, 192, 204
role in reforming, **63**, 112
- Sulfur dioxide
deactivation of supported metals, in NO reduction by NH₃, **61**, 192, 204
- Superacids
solid, heterogeneous catalysis by, **61**, 96
- Superoxide
ion, photoformation on porous Vycor glass, **61**, 267
on supported metal surfaces, EPR, **61**, 551
- Support
doped, silver on α -alumina doped with germanium oxide or magnesium oxide, effect on ethylene oxidation, **66**, 147
effects
in carbon monoxide hydrogenation on nickel, **65**, 335
in ethene hydrogenation over platinum, **65**, 31
- Support-metal
interactions, **65**, 31
- Surface
area
molybdena-alumina, **66**, 65
specific, molybdena in MoO₃-SiO₂, **65**, 263
specific, reduced molybdena-alumina: oxygen chemisorption, **61**, 282
chemistry, models: carbon monoxide oxidation on supported platinum, **65**, 281
composition
correlations with activity and selectivity: carbon monoxide hydrogenation over oxidized rhodium, **66**, 257
nickel-copper alloys in zeolite Y, **66**, 73
single crystal nickel, effect in methanation kinetics, **63**, 226
ensemble effects, supported platinum-gold: neopentane reactions over, **61**, 140
homogeneity, assumption: *o*-xylene oxidation over vanadium oxide, **61**, 430
ideal, computer simulation of competitive adsorption on, **62**, 176
nickel-iron, filamentous carbon growth on, **64**, 464
reactions
bimolecular, stability of kinetic model for, **66**, 130
thermochemical oscillations in, **66**, 130
recombination reactions, **63**, 355
solid, number and strength of acid sites, **62**, 157
species in iron-alumina catalysts for ammonia synthesis, **66**, 326
state
effects in kinetics of activated chemisorption: hydrogen on scandium oxide, **66**, 222
and kinetic oscillations in hydrogen oxidation on nickel, **66**, 11
structure
and activity of sulfided MoO₃/Al₂O₃, thiophene hydrodesulfurization and butene hydrogenation, **66**, 93
CoO-MoO₃/Al₂O₃, X-ray photoelectron spectroscopy, **65**, 448
oxidic precursor of CoMo/ γ -Al₂O₃, **66**, 469
- Syngas, *see* Synthesis gas
- Synthesis gas
reactions over Ni-ThO₂, **65**, 127

T

- Tellurium dioxide
silica-alumina based, propylene ammoxidation to pyridines over, **65**, 470
- Tellurium-molybdenum oxide
propylene ammoxidation to acrylonitrile, structure and activity, **64**, 356
- Temperature
effects in kinetics of activated chemisorption, hydrogen on scandium oxide, **66**, 222
pretreatment, activity of alumina in alkene isomerization, **61**, 326
rate maximizing, in heterogeneous catalysis, **61**, 270
surface, dynamical variable, **66**, 130
- Temperature-programmed desorption, *see* Desorption, temperature programmed
- Temperature-programmed reaction spectroscopy
methanol decomposition on tungsten and tungsten carbide, **62**, 264
methyl formate decomposition over tungsten, tungsten carbide, and tungsten-carbon monoxide, **62**, 329
reactions of
alcohols on Fe(100), **65**, 36
hydrocarbons and carboxylic acids on Fe(100), **65**, 49
- Temperature programmed reduction, *see* Reduction, temperature programmed
- Temperature programmed reoxidation, *see* Reoxidation
- Tetrairidium carbonyl
clusters, polymer-bound phosphine-substituted: olefin hydrogenation, **62**, 149
- Tetraruthenium
clusters, polymer bound: ethylene hydrogenation, **63**, 175
- Thermal deactivation, *see* Deactivation, thermal
- Thermal desorption, *see* Desorption, thermal
- Thiophene
compounds: hydrodesulfurization, mechanism, **61**, 128
hydrodesulfurization over
Ni-Mo, **66**, 82
sulfided MoO₃/Al₂O₃, effect of surface structure, **66**, 93
- Thiosalt
oxidation over poly(4-vinylpyridine)-copper(II) chelate, **61**, 533
- Thoria, *see* Thorium oxide
- Thorium
Ni-ThO₂ mixtures, synthesis gas reactions over, **65**, 127
- Thorium oxide
ether formation on, mechanism, **66**, 281
phenols and alcohols, reactions over, **63**, 433; **66**, 281
xanthene formation from phenols over, **63**, 433
- Tin
comparison of -Snφ₃ and -SnCl₃ as cocatalyst groups for Pt(Pφ₃)₂ClQ in 1,5-cyclooctadiene isomerization, **62**, 389
role in PtSn catalysts, **63**, 119
V₂O₅/SnO₂, alkylpyridine oxidation, **64**, 51
- Tin-antimony
mixed oxides, propylene oxidation over, mechanism, **63**, 307
- Tin bronzes
propene oxidation to acraldehyde over, **61**, 256
- Tin-palladium
electroless plating catalysts, preparation, **65**, 95
- Titania, *see* Titanium dioxide
- Titanium dioxide
2-methylbutane photooxidation over, **62**, 99
support for
nickel, carbon monoxide hydrogenation reactions over, **66**, 242
platinum, support effects in ethene hydrogenation, **65**, 31
V-Ti-O, activities: 3-picoline ammoxidation, **65**, 9
- Toluene
alkylation, **61**, 96
oxidation over V₂O₅-K₂SO₄-silica system, **65**, 481
side-chain alkylation with methanol, over alkali-cation-exchanged X and Y zeolites: mechanism, **64**, 284
- Tracer studies
carbon 13, in carbon monoxide oxidation over Pd and Rh, **64**, 38
- Tracing
isotope, transient: methanation over nickel, modeling by computer, **65**, 59
- Transformation
catalytic, monomolecular: mechanism, **66**, 1
cyclohexanol, on Pt/SiO₂, **66**, 191
hydrocarbons on zeolite Y
containing palladium, platinum, and ruthenium, **66**, 121
paraffin cracking rate, **65**, 221
- Transient method
reaction of hydrogen and carbon monoxide on fused iron, **64**, 163
- Transition metals
clusters, two-dimensional supported: bonding capabilities, **66**, 237
exchanged zeolites, ion migration, **65**, 179
Group VIII, catalytic behavior in deuterium-acrolein reaction, **65**, 110
- Transition *d*-metals
chemisorption of diatomic molecules (H₂, N₂, CO), **65**, 84
- Transmission electron microscopy
contrast effects of supported crystalline Pd particles, **63**, 265
redispersion of alumina-supported platinum, **62**, 59
- Tungsten
low-valent, alumina support: synthesis and nature of heterogeneous catalysts, **61**, 216
methanol decomposition on, **62**, 264

- methyl formate decomposition, effect of surface composition on reactivity, **62**, 329
 supported, nitric oxide interaction with, **63**, 447
 surface passivation by carbon, **64**, 132
 W(100) and W(100)-(5 × 1)C, reactions of formaldehyde on, **64**, 132
- Tungsten carbide
 methanol decomposition on, **62**, 264'
 methyl formate decomposition, **62**, 329
- Tungsten-carbon monoxide
 methyl formate decomposition, **62**, 329
- Tungsten oxides
 on γ -alumina catalysts, aluminum tungstate in, **61**, 559
 3-methyl-3-pentanol dehydration over, **61**, 298
 supported, olefin isomerization and disproportionation, **65**, 442
 ternary, propene oxidation to acraldehyde over, **61**, 256
- Tunneling spectroscopy
 effect of D₂S on carbon monoxide chemisorption on supported rhodium, **63**, 487
 inelastic electron, unsaturated hydrocarbons adsorbed on plasma-grown aluminum oxide, **64**, 101
- U
- Ultraviolet
 activation of oxygen, in photooxidation of 2-methylbutane over titanium dioxide, **62**, 99
 irradiation, selective photoreduction of molybdenum ions, **64**, 426
- Ultraviolet photoelectron spectroscopy
 oxidation of Ir(111), influence of carbon monoxide, **62**, 180
- Ultraviolet-visible spectroscopy
 chromia/silica, characterization of reduced and oxidized forms, **66**, 200
- V
- Vanadium
 deposition on spent hydrodesulfurization catalysts, **61**, 146
 V₄O₉, production from Pd-V₂O₅ reduction, **63**, 182
 V-Ti-O, activities: 3-picoline ammoxidation, **65**, 9
- Vanadium pentoxide
 oxygen and propylene interaction with, ESR investigation of redox processes, **66**, 316
 reaction of nitric oxide and ammonia, mechanism, **62**, 140
 reducibility enhanced by palladium, **63**, 182
- Vanadium pentoxide-potassium sulfate
 silica support, system
 structure and activity, **63**, 271
 toluene oxidation over, **65**, 481
- Vanadium pentoxide-stannic oxide
 alkylpyridine oxidation, activity measurements and X-ray photoelectron spectroscopy, **64**, 51
- Vibrational spectra
 carbon monoxide
 chemisorption on silica-supported Ni, **62**, 94
 with deuterium sulfide on rhodium, **63**, 487
 μ -ethylidene on rhodium, **61**, 87
 nitric oxide adsorption on Pt, **65**, 271
 unsaturated hydrocarbons adsorbed on aluminum oxide, **64**, 101
- 4-Vinylcyclohexene
 formation from butadiene cyclodimerization over copper-exchanged zeolites, **61**, 485, 493
- W
- Washcoat
 material, rhodium interaction with: in automotive exhaust catalysts, **61**, 547
- Water
 effect on catalytic cracking, **66**, 463
 vapor, in graphite gasification by alloys, **62**, 44
- Water-gas
 shift reaction on molybdenum, **63**, 438
- Wetting
 effect on morphology of supported platinum, **63**, 523
- Wolfatit SBW
 ion-exchange resin, kinetics and mechanism of phenol interaction with ethylene oxide over, **62**, 231
- Work function
 of electrons at surface of metal: silver on α -alumina doped with germanium oxide or magnesium oxide, effect on ethylene oxidation, **66**, 147
 measurements, copper-ruthenium system, **61**, 397, 412
- X
- Xanthenes
 from phenols over thoria, **63**, 433
- X-ray, *see also* Extended X-ray absorption fine structure
 determination of faujasite content, cracking catalysts, **62**, 374
- X-Ray photoelectron spectroscopy
 bismuth molybdate, surface structure, **63**, 152
 CoMo/ γ -Al₂O₃ hydrodesulfurization catalysts, structure, **63**, 201
 CoO-MoO₃/Al₂O₃, surface structure, **65**, 448
 fused iron surface, reaction of H₂/CO, **64**, 163
 identification of surface intermediates on Fe(100), **65**, 36, 49
 iron-ruthenium alloys, carbon deposition during Fischer-Tropsch synthesis, **65**, 253
 molybdenum distribution in MoO₃/Al₂O₃ extrudates, **64**, 491
 nickel
 (boride, phosphide, Raney, Urushibara, and decomposed), electronic properties, **64**, 397
 borides, acrylonitrile hydrogenation: correlation of surface states with reaction products, **65**, 195

- pretreated RuY zeolites, 61, 39
 rhodium(III)-exchanged zeolites, 65, 227
 V_2O_5/SnO_2 , for vapor-phase oxidation of alkyldi-
 pyridines, 64, 51
- X-Ray scattering
 small angle, bimodal particle size distributions of
 supported Pd and Pt, 65, 348
- o*-Xylene
 oxidation over vanadium oxide, assumption of sur-
 face homogeneity, 61, 430
- Y
- Yttrium oxides
 3-methyl-3-pentanol dehydration over, 61, 298
- Z
- Zeolites
 alkali-cation-exchanged X and Y: side-chain alkyla-
 tion of toluene with methanol, mechanism, 64,
 284
 ammonium X, deamination reaction, 61, 454
 calcium X-type
 butenes, isomerization on, 64, 417
 catalytic activity, enhancement by preadsorption
 of nitrogen dioxide, 64, 417
 Co(II)NaY, benzyl alcohol oxidation over, 64,
 260
 copper-exchanged
 faujasite, structure: butadiene cyclodimerization,
 61, 493
 stability and regenerability, butadiene cyclodi-
 merization, 61, 485
 cyclopropane isomerization, 63, 501
 high silica, 61, 390
 ion-exchanged RuY, carbon monoxide adsorption,
 64, 482
 molybdenum
 cyclohexene oxidation, 64, 184
 preparation and characterization, 64, 173
 $NaNH_4$ -Y, calcined: reaction of 1-butene on, 65,
 416
 natural and synthetic, surface and bulk composi-
 tions, 65, 174
 PtY, deuterium exchange on, 65, 105
 rare earth and transition metal exchanged, Auger
 electron spectroscopy: ion migration, 65, 179
 rhodium(III) exchanged, ESCA study, 65, 227
 single crystal of faujasite, copper-exchanged: X-ray
 analysis of structure, 61, 493
 X: pyridine adsorption, Raman spectra, 62, 316
 Y
 carbon monoxide adsorption ir spectra, 66, 121
 containing palladium, platinum, and ruthenium,
 66, 121
 copper(I) and silver(I), ethylene complexes in, 61,
 461
 electronic state of metals in, 66, 121
 hydrogenation of unsaturated hydrocarbons, 66,
 121
 metal dispersion and localization, 66, 121
 nickel loaded: pentane isomerization, kinetics, 64,
 241
 nickel-copper alloy formation in, 66, 73
 paraffin catalytic cracking, promoting effect of
 olefins on rate, 65, 221
 ruthenium in, photoelectron spectroscopy, 61, 39
 ruthenium loaded: hydrocarbon synthesis over,
 mechanism, 66, 401
 strongly dealuminated: properties, 61, 435
 support for platinum, chemisorptive properties,
 61, 553
- ZSM-5
 activation for ethanol reaction, 63, 510
 conversions over, mechanism, 61, 477
 methanol conversion to olefins, 61, 155
 physical, chemical, and catalytic properties:
 structural and compositional dependence, 61,
 390
 shape selectivity, molecular, 65, 486
 substitutional series, effect of aluminum on prop-
 erties, 61, 390
 water sorption, variation with aluminum content,
 61, 390
 H-ZSM-5, methanol and olefins reactions on, 63,
 331
- Zinc aluminate
 zinc deficient, supports: in hydrodesulfurization of
 petroleum residues, 62, 211
- Zinc chloride
 -metal cocatalyst system, dibenzyl ether hydrogen-
 olisis, 64, 494
- Zinc oxide
 aromatic acetylene adsorption, ir and Raman spec-
 tra, 61, 503
n-butene isomerization, kinetics, 66, 1
 Cu/ZnO, kinetics and mechanism of CO shift on,
 63, 83, 94
 ethynylbenzene adsorption, Raman and ir spectra,
 61, 515
 pure and doped (Li^+ or Ga^{3+}), ethylene adsorption
 and hydrogenation, 62, 341
- Zirconia
 stabilized, support for polycrystalline silver films:
 ethylene oxide oxidation, 64, 18
- Zirconium phosphate
 acidity, relation to activity in cyclohexanol dehydra-
 tion, 65, 185
- ZSM-5, *see* Zeolite