Cumulative Subject Index¹

Volumes 28-31

A	ethylene, reversible and irreversible, 29, 494
Absolute rate theory	formaldehyde on tungsten (100) and (111)
chemisorption, 29, 173	crystal planes, 30, 260
Abstraction reactivity	H on Fe, 28, 414
allylic hydrogen, 29, 60	on high surface area platinum, 31, (1)
Acetylene	hydrocarbons on decationized Y molecular
adsorption on Rh supported silica or alumina	sieve, 29 , 112
catalyst, 30, 372	hydrocarbon
carbon monoxide interaction on Rh/SiO ₃ cata-	and carbon dioxide on nickel oxide, 28, 124
lysts, 30, 378	on decationized Y molecular sieve, 29, 112
catalytic decomposition, 30, 86	measurements, multicomponent, 31, 243
catalytic transformation, 31, 419	nitric acid on copper oxides, 28, 1
Acid catalysis	nitric oxide on platinum black, 29, 138
general and specific, in sulfonic acid resin, 31, 27	nitrogen bases, alumina and molybdenum-con-
Acid strength distribution	taining catalysts, 31, 220
rare earth exchanged X and Y type zeolites, 30,	on organic ion exchangers, 30, 343
417	oxygen
Acrolein	and α -Cr ₂ O ₃ , 28, 139
ammoxidation, 31, 293	on silver catalyst, 29, 367
Acrylonitrile	physical, hydrocarbons on synthetic faujasites,
koechlinite catalyst for, 28, 496	29 , 112
Activation	pulse reaction, 31, 127
NiO/SiO ₂ catalysts, 30, 333	selective, carbon monoxide, 30, 187
Active nuclei	tetrahydrofurane, 30, 343
Zn vapor deposition, 29, 253	unimolecular decomposition, nitrous oxide on
Activity coefficient	Pt, 28, 459
absorbed hydrogen, 28, 414	water vapor, boron phosphate catalyst, 30, 66
Ammonia	weak bases from gas phase, 30, 343
removal, automobile exhaust, 31, 459	Alcohol
infrared study, 28, 92	<i>t-</i> butyl
secondary adsorption, 30, 372	dehydration catalyzed by sulfonic acid resin,
synthesis from ethylene, 30, 109	31, 27
Adams' catalyst	transport and reaction in mordenite pores, 29,
platinum bronzes, 31, 369	292
Adequacy test of models	dehydration
residual analysis, F-test, 28, 179	on alumina, 28 , 69
Adsorption	on hydroxyapatite, 29, 144
adsorbates, relative basicity, 30, 343	dehydrogenation on hydroxyapatite, 29, 144; 31,
argon on amorphous silica-alumina catalysts, 30,	65
467	ether formation from, 28, 69
benzaldehyde on alumina, 29 , 40	Aliphatic ketones
benzene on platinum, 30, 13	effect of structure, hydrogenation over metal
carbon monoxide, 29, 412; 31, 335	catalysts 29, 412
CO inhibition of C ₂ H ₂ , 29, 421	Alkali
CO, N ₂ , Ar, Kr on amorphous silica-alumina	promoted Ni-catalyst, 31, 173
catalysts, 30, 467	Alkaline hydrocracking
dimethyl ether, 30, 343	on iron, osmium, ruthenium, 29, 83

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

Alkanes	coupling reactions, isotope effect, 29, 92
isomerization on noble metals 30, 330	hydrogenation catalysts, 31, 469
molecular redistribution reaction, 31, 55	reactivity in palladium catalyzed coupling, 31, 8
Alkenes	Aromatization
hydrogenation	of isobutene, 30, 485
related reactions, 30, 139	on platinum black catalyst, 30, 343
Alkylation	Auger electron spectroscopy
benzene with ethylene or propylene, 28, 403	catalytic activity pattern and surface composi
Alkylnaphthalenes	tion Cu-Ni alloy, determined by, 29, 479
kinetics and selectivity of hydrogenation on	formic acid interaction with nickle single crysta
palladium, 29 , 404	catalyst, reaction studied, 30, 235
Alloys	surface compositions determined by, 28, 174; 30
carbon supported platinum-iron, surface com-	438
position, 29 , 278	Automobile exhaust
chemisorption on, 29, 278	ammonia removal, 31, 459
nickel and nickel-copper, reactions methylcy-	catalysis, 31, 41
clopentane on, 28, 376	copper chromite, CO oxidation, 31, 140
supported platinum-iron, surface composition	Ru supported nitric acid reduction, 30, 478
and chemistry of, 29, 278	nitrogen oxides removal, 31, 450, 459
surface compositions determined by AES, 28,	
174; 30, 438	В
Alumina	Polondin concert
adsorption of benzaldehyde on, 29, 40 amorphous, catalytic activity, 30, 298	Balandin concept
carbonyl sulfide reaction with sulfur dioxide on,	Volkenshtein concepts, connection in hetero
30, 451	geneous catalysis, 28, 329 Ball milling
dehydration of alcohol over, 28, 69	
iron synthetic ammonia by, 28, 477	TiCl ₃ catalyst activation of, 28, 351 Benzaldehyde
2-methyl-3-buten-2-ol dehydration over, 30, 155	infrared and Raman spectra of adsorbed, 29, 40
role in hydrodesulfurization and exchange, 30,	Benzene
218	adsorption on platinum, 30, 13
supported iridium, hydrazine decomposition, 29,	synthetic faujasites, 29, 112
31	alkylation of ethylene or propylene over H
platinum, benzene adsorption on, 30, 13	mordenite catalyst, 28, 403
AlBr ₃	cyclohexane dehydrogenation to, 29, 309
isomerization of saturated hydrocarbons, 30, 21	reaction product of, 30, 1
Ammonia	hydrogenation on Pt catalyst, 31, 466
exchange between deuterium and, 29, 319	oxychlorination, catalyst activity and selectivity
formation from nitric oxide, 30, 478	31, 257
nitric oxide in production of, 30, 478	Bimetallic cluster catalysts
promoting effect of alkali addition in, 30, 444	dehydrogenation cyclohexane to benzene, 29
synthesis catalyst, dipole-dipole interaction	308
model, 30, 444	hydrogenolysis of cyclohexane to methane, 29
synthesis catalyst,	308
distribution promoters, 28, 161	ethane to methane, 29, 308
morphology of, 28, 161	silica-supported ruthenium copper, 29, 308
reduction and poisoning of, 28, 161	Bimolecular ether formation
Ammoxidation	kinetics of, 28, 69
bismuth molybdate catalysts, 31, 293	Binary catalyst system
olefins, bismuth tungstates in, 31, 200 propene, 28, 496	tungsten hexachloride and n butyllithium, 28
Aniline	Bismuth molybdate
absorbed sites of, 29, 67	ammoxidation over, 31, 293
Argon	1-butene oxidation, 28, 496
adsorption on amorphous silica-alumina cata-	2-methylpropene oxidation, 30, 276
lysts, 30, 467	propene selective oxidation, 28, 337
Aromatic compounds	propylene oxidation, 28 , 489; 31 , 360
- 4	

Bismuth tungstates	migration, silver catalyst, 28, 39
ammoxidation of olefins, 31, 200	promoted ethylene oxidation, 28, 455
oxidation of olefins, 31, 200	Ca oxide
Bismuth uranate	inclusions, silver catalyst, 28, 39
kinetics of reduction by toluene, 31, 149	Campbell-Wojciechowski mechanism
Bonds	cumene cracking, effects of intraparticle diffu-
Balandin concept, 28, 329	sion in aging catalyst, 31, 74
on supported metals, 30, 309	Carbon
Bond energy bond order (BEBO)	desorption product formaldehyde, 30, 260
interaction of nitrous oxide on clean and carbon	formation of filamentous, 30, 86
covered Pt, 28 , 459	on nickel, 29, 15
Boron phosphate	in porous catalyst, 31, 1
high-surface-area, 31, 274	nickel oxide, 28, 124
morphology, 30, 66	supported platinum-iron alloys surface composi-
Boron sulfate	tion of, 29, 278
catalytic activity, and selectivity, 28, 157	Carbon monoxide
Butadiene	acetylene interaction on Rh/SiO ₃ , 30, 378
acetic acid oxidation, 30, 362	Carbon molecular sieve
malic anhydride from, 29, 191; 30, 393	catalyst for hydrogenation, 31, 287
oxidation, 31 , 27 8	Carbonyl sulfide
by oxidative dehydrogenation over MgCrFeO ₄	catalytic thermal decomposition, 30, 451
and ZnCrFeO ₄ , 30, 128	Carrier effects
product of butene dehydrogenation, 29, 200	NiO reduction, 30, 333
but-1-ene isomerization, 29, 99	Catalysis
vapor-phase catalytic oxidation, 29, 191; 30,	oxidation propylene, 31, 360
393	surface, 28 , 45 9
2-Butanol	depletion of reactants on, 31, 243
dehydrogenation, hydroxylapatite catalyzed, 31,	Catalyst
65	aging, cumene cracking, 31, 74
Butenes	auto exhaust, 31, 41
acetic acid oxidation, 30, 362	copper-nickel alloy, 28, 174
chemisorption on CuO and Cu ₂ O, 29, 1	decomposition, NO on metal-oxide semicon-
dehydrogenation kinetics, 29, 200	ductors, 31 , 51
interaction with tin oxide, 29, 99	electric field effect on, 28, 200
isomerization, 30, 362	isomerization, ethylenic hydrocarbons, 31, 136
on amorphous alumina, 30 , 298	oxidation carbon monoxide, hydrocarbons over
isotope effects in the isomerization labeled in	α -chromic oxide, 28, 139
allylic, vinylic position over alumina, and	nickel oxide, 28, 124
silica-alumina, 31, 136	oxidation, sulfur dioxide, 31, 90
maleic anhydride from, 30, 393	poisoning, alkane disproportionation, 31, 55
oxidation, bismuth tungstate catalysts, 31, 200	solid, determination of proton acidity, 28, 176
vapor-phase catalytic oxidation, 30, 393	supported platinum, deactivation of, 28, 150
t-Butyl alcohol	temperature, coke burn-off, 29, 507
dehydration catalyzed by sulfonic acid resin, 31,	Catalytic acidity
27	adsorption of 2,6-dimethyl pyridine, 28, 176
transport and reaction in mordenite pores, 29,	Catalytic activity
292	alumina, isomerization of butene-1, 30, 298
n-Butyllithium	defects in α -Cr ₂ O ₃ , 30, 387
and tungsten hexachloride binary catalyst sys-	measurement of temperature of sample, 28, 116
tem, 28 , 300	organic semiconductors, 29, 49
n-Butylvinylether	particle size dependence, 29, 253
polymerized by hydrogen mordenite, 30, 460	Catalytic coke
	burn-off, 29, 507 Catalytic cracking
· C	gas, oil, REX, REY zeolites, 30, 417
Calcium	Catalytic hydrogenation
inclusion in silver catalyst, 29 , 169	CO ₂ and H ₂ over Rh/alumina catalysts, 30 , 423
	202 and 122 0 tot 1011/ mullima cavalysts, 30, 423

isobutylene, 28 , 179 olefins, 28 , 179	parahydrogen conversion rate measurement
propylene, 28, 179	over, 30, 255
Catalytic oxidation	Chromic oxide
exo-electronic emission, 28, 200	macrocrystalline and microcrystalline form
Catalytic poison	compared, 30, 255
picoline and water on γ -alumina, 30, 218	nitric oxide reduction, 31, (16)
sulfur dioxide, HCl on nickel oxide, 28, 124	α-chromic oxide
Catalytic screening	carbon monoxide, hydrocarbons oxidation over
Stone DTA apparatus, 28, 116	28, 139
Catalytic selectivity	morphological structure, effect on catalysis 28, 139
γ irradiation upon, 28, 455	
Catalytic surface changes	Chromium
supported platinum in automotive exhaust, non	supported on silica gel, 28, 76
leaded, 28, 245	Chromium oxide
Catalytic thermal decomposition	alakli additives, 30, 387
carbonyl sulfide, 30, 451	carbon monoxide adsorbed on, 29, 20
Catalytic yield	ethylene polymerization on, 29, 20
inter-intraphase diffusion affected by, 28, 33	CH stretching bands
Cation-exchange	surface alcoholates, 28, 335
zeolites, 29 , 500	Cobalt
Cerium dioxide	adsorption, 30, 467; 31, (2)
carbon monoxide oxidation by, 28, 54	amorphous silica-allmina, 30, 467
Chelates	Rh, 29, 412; 30, 372
metal	catalytic oxidation, 28, 54
N ₄ -complexes, catalytic activity, 28, 8	on copper chromite, 29, 352; 31, 140
N ₂ O ₂ -complexes, catalytic activity, 28, 88	over α -Cr ₂ O ₃ , 28, 139
N ₂ S ₂ -complexes, catalytic activity, 28, 88	over nickel oxide crystals, 28, 124
Chemisorption	on SnO ₂ , 29, 441
absolute rate theory, 29, 173	surface species during, 31, 231
alloys, 29 , 278	catalytic poisoning, 28, 46
carbon monoxide on platinum, 29, 160	chemisorption of, 28, 289
Ni and Cu, 29 , 173	on platinum, 29, 160 decomposition, chromium catalysis, 30, 86
conductivity, dehydrogenation of ethanol, 28,	ethylene inhibition, 29, 421
183	on γ -Al ₂ O ₃ , ERS spectra investigation, 29 , 463
electrochemical vs. gas phase, 29, 160	hydrogenation catalyst for aromatics, 31, (19)
entropy of activation, 29, 173	role in hydrodesulfurization and exchange, 30
formaldehyde, 30, 260	218
gases, iron catalyst, 28, 428	shift, lead promoted, 31, 346
H ₂ , CO, C ₂ H ₄ , on Rh, 29 , 421, 433	selective adsorption, 30, 187
oxygen, two types, 29, 494	CoH ₃ (PPh ₃) ₃ catalyst
promoted iron catalyst, 29, 319	
propylene and oxygen on cupric oxide and	cyclohexene hydrogenation, 30, 72
cuprous oxide catalysts, 28, 341	Cobalt-metal-oxide
quantum-mechanical method, nature of bonds	toluene oxidation. 28, 116
in, 30, 309 sulfur, poisoning of catalysts, 31, 459	Cobalt molybdenum
supported metals, 30, 309	hydrosulfurization catalysts, 31, 264
Chlorobutane	hydrotreatment catalysts, 31, 264
catalytic dehydrochlorination of, 29, 385	Cobalt oxide
Chlorotris-(triphenylphosphine)rhodium(1)	CO and hydrocarbon oxidation on, 31, 231
hydrogenation and dehydrogenation, 30, 30	dispersion measurement in silica-supported, 31,
Chromatographic adsorption	335
sterically hindered amines, 28, 176	Cobalt oxide
Chromiagel	hydrogenation and related reactions compared
amorphous, macrocrystalline, microcrystalline forms compared, 30, 255	with catalysis by rhodium(I) complexes, 30, 139
torino comparca, oo, 200	3

iso-octane, catalytic properties of faujasite-type IR study of steady-state intermediates on, 31, zeolite in, 30, 288 n-hexane over LaX catalysts, 30, 409 oxidation, infrared spectroscopy of, 30, 175 Cr₂O₃/Al₂O₃ catalyst Co-Mo/Al₂O₃ n-hexane dehydrocyclization, 29, 316 cis-2-pentene disproportionation over, J1, 408 Crystal structure Co-Mo-γ-Al₂O₃ catalyst zeolite A, stability of, 29, 270 ERS spectra of oxidized, sulfided and reduced, Cumene 29, 463 cracking on diffusion-limited aging catalyst, 31, Coke formation catalyst deactivation due to, 30, 155 heterogeneous catalytic oxidation of, 28, 236 Complete neglect of differential overlap (CNDO) hydroperoxide oxidation of cumene on silver, catalysis by metal clusters, molecular orbital 29, 367 calculations for, 29, 129 liquid-phase oxidation, 28, 236 Composite state oxidized to cumene hydroperoxide, catalyzed by outer localized states, 30, 309 silver, 29, 367 Copper reaction mechanism, rate expression for oxidapromoter effects, NiO/SiO₂ catalysts, 30, 333 tion of, 28, 236 supported on silica gel, 28, 76 silver catalyzed oxidation of, 28, 493 Copper aluminate Cuprous-amines chemisorption of nitric oxide on, 28, 1 complex formation in Cu(1)Y Zeolites, 30, 187 Copper chloride Cyclic dienes study by electron paramagnetic resonance and homogeneous catalytic hydrogen transfer in, 28, X-ray diffraction, 31, 257 500 Copper chromite Cyclization automobile exhaust pollutants, 31, 140 mechanism of, 29, 398 carbon monoxide oxidation, 31, 140 Cyclohexane carbon monoxide and hydrocarbon oxidation on, dehydrogenation to benzene, 29, 308 29, 352 dehydrogenation, Pd-alumina catalyst, 31, 384 Copper-germanium alloys hydrogenation, 30, 72 methyl chloride reactivity with, 28, 20 of benzene using platinum-polyamide catalyst, Copper-nickel alloy hydrogenolysis, yields methane, 29, 308 activity pattern of, 29, 479 on Pt/H₂/HT, 30, 96 catalytic activity, 28, 174 Cyclopropanes composition of clean surfaces, determined by catalytic transformation of, 31, 419 AES, 28, 174 hydrocracking reactions, 28, 376 Copper oxides hydrogenation, 28, 150, 376; 29, 83 chemisorption of butene, 29, 1 reactions on nickel, nickel-copper alloys, 28, 376 nitric oxide on, 28, 1 propylene and oxygen, 28, 341 D infrared spectra of CO, CO2, NO, NO2, N2O Deactivation adsorbed on, 31, 32 $Pt-\eta-Al_2O_3$ catalyst, 28, 150 kinetics obtained during reduction of NO by Decationized Y molecular sieve CO, 31, 96 adsorption of hydrocarbons on, 29, 112 nitric acid adsorption on, 28, 1 Decomposition propylene oxidation, 28, 341 acetylene, iron, cobalt, chromium catalysis, 30, Cu-phthalocyanine catalytic propanol (2) oxidation on, 29, 515 formaldehyde on tungsten (100) and (111) crys-Copper(I) Y zeolites tal planes, 30, 260 copper(II) Y with carbon monoxide; preparaformic acid, selectivity, 30, 235 tion of, 30, 187 hydrazine, iridium supported catalyst, 29, 31 cuprous-amines in, 30, 187 nitrous oxide, 28, 428 Coupling reaction Defective structures aromatic compounds with palladium, 31, 8 α-Cr₂O₃, alkali additives, 30, 387 Cracking catalysts Dehydration amorphous silica-alumina, 30, 467 activity for butene and butadiene, 30, 362

alcohol alcohol dehydrogenation on hydroxyapatite, 29, 144 on alumina, 28, 69 t-butyl in mordenite pores, 29, 292 hydroxyapatite catalyzed, 31, 65 2-methyl-3-buten-2-ol over alumina, 30, 155	Dibenzotetrazaannulenes Co-complexes, carbon supported, 28, 8 Fe-complexes, carbon supported, 28, 8 Dichloroethylenes hydrodechlorination of, 31, 243 Diene hydrogenation trans-[IrCl(CO)(Ph ₂ P) ₂]catalysts, 30, 490
secondary saturated alcohol reactions in presence hydrogen over NiO/Cab-O-Sil catalysts, 31, 110	Diffusion effects in cumene cracking, 31, 74 inter-intraphase catalytic yield effects on, 28,
zeolites, 29 , 500	33
Dehydration rate constants	limited reactions in supported liquid-phase ca-
non-stoichiometric catalyst, correlation with Taft equation, 29 , 144	talysis, 31, 119 normal paraffins in zeolite T, 31, 13
Dehydrochlorination	Diffusion coefficient
catalytic, chlorobutane, 29, 385	carbon dioxide in porous catalyst, 31, 1
Dehydrocyclization	Dimethyl ether
hexadienes and hexatrienes, 30, 343	adsorption, 30, 343
n-hexane, hydrogen effect, 29, 316	Dimethylamincborane
mechanism of, 29, 398	catalyzed decomposition of, 29, 253
Dehydrogenation	Dimethyldichlorogermane
alcohol dehydration on hydroxyapatite, 29 ,	synthesis of, 28, 20
144	2,6-dimethyl pyridine catalyst acidity, adsorption of, 28, 176
ethanol on thin-film zinc oxide, 28, 183	Diolefins
hydroxyapatite catalyzed, 31, 65	catalytic transformation, 31, 419
cyclohexane, 31, (8)	Diphenylamine synthesis
to benzene, 29 , 308	mechanism of, 29, 67
chlorotris-(triphenylphosphine)rhodium(1), 30,	Dipole-dipole interaction model
30	ammonia synthesis catalyst, 30, 444
ethylbenzene, 31, (15)	Disproportionation
oxidative, over MgCrFeO ₄ and ZnCrFeO ₄ , 30, 128	alkanes and olefins, dual-functional catalyst sys- tem, 31, 55
Dehydrohalogenation	Dow Type B Ca-Ni-PO ₄ catalyst
2-bromobutane, 2,3-dihalobutane, 30, 226	butadiene production, 29, 200
Delocalizability	Dual-functional catalysts
heterogeneous catalysts, 29, 60	alkane disproportionation, 31, 55
Desorption	Dyprosium oxide
alkene, on Pt and Pd, 30, 79	nitrous oxide decomposition on, 28, 428
iron catalyst, temperature programmed, 28, 442 mechanism, H from Fe, 28, 414	E
Desulfurization	Ebrium oxide
thiophene over Co/Mo/γ-alumina, 30, 218	nitrous oxide decomposition on, 28, 428
Determination	Effectiveness factor
errors in specific area, 28, 296	estimation of reforming catalyst, Pt catalyst,
Deuterium	31, 243
$\mathrm{NH_{3}}$ exchange, 29 , 319	Electrocatalysts
Deuterium-hydroxyl	organic macrocylic metal chelates, 28, 8
exchange on nickel-silicon dioxide catalysts, 28, 254	Electron probe microanalyzer use in catalysis, 28, 161
Deuterium oxide	Electron paramagnetic resonance
methane, hydrogen exchange, 30, 250	Cu ²⁺ , 31, 257
Deuteriumation	cumen oxidation with silver as free radical
methylcylohexenes, 30, 79	(ROO) detected by, 29, 367
Deuterobenzene palladium catalyzed aromatic coupling, 29, 92	Electron Spectroscopy Chemical Analyses (ESCA) silver catalyst, 28, 39; 29, 169

Electron spin resonance (ESR) metallic potassium effect on nickel catalyst, aluminum migration, deep and shallow beds, 31, 309 Y zeolites, 29, 120 over supported platinum, 28, 338 Electronegative atoms on Pt/H₂/HT, 30, 96 on metal, 29, 213 oxidation, Ag catalyzed, 28, 39, 455; 29, 169; Electronic interaction 30, 430 iridium and alumina, 29, 31 Ethylene oxide Electroreduction yield enhancement, 28, 455; 29, 169 oxygen on phthalocyanines, 29, 8 Ethylenic hydrocarbons catalytic isomerization, 31, 136 Elimination reactions alkyl halides, stereochemistry of, 30, 226 Exchange reaction hydrodesulfurization of thiophenes, 30, 218 Energy levels tungsten oxide, propylene disproportion catalyst, hydrogen, D₂O, CH₄ over nickel, 30, 250 modification by polyolefins, 31, 304 methylcyclopentane with D2, 28, 381 Exo-electron emission Entended Hückel measure of rate of catalytic reaction, 28, 200 molecular orbital calculations for metal clusters, 29, 129 Experimental catalytic reactors diagnostic criteria for, 30, 283 Entropy of activation chemisorption, 29, 173 F **Epoxidation** $CoO-Al_2O_3$, $MoO_3-Al_2O_3$, $CoO-MoO_3-Al_2O_3$, **29**, Faujasites adsorption of hydrocarbons on, 29, 112 chromium oxide-alkali metal oxide systems, 30, Faujasite-type zeolites X, Y zeolites, aluminum-deficient ultrastability determination of absolute concentration Mo(V), of, 30, 288 30, 195 Fermi manganese in zeolites, 29, 105 level of oxides, 28, 329 metal-catalyzed olefins, 31, 427, 438 Ferromagnetic properties titania, silica, alumina, magnesia carrier for Rancy nickel, 29, 328 molybdena catalysts, 29, 191 Flash desorption zeolites, 29, 500 dissociative adsorption of formaldehyde, 30, 260 H on Fe, 28, 414 determination of, in specific surface area, 28, 296 Formaldehyde Etching adsorption on tungsten(100) and (111) crystal planes, 30, 260 silver catalyst, 28, 39 Formic acid Ethanol flash decomposition on Ni, determined by AES, catalytic decomposition to ethylene, 28, 157 30, 235 dehydrogenation of, 28, 183 hydrogen from decomposition of, 31, 316 Ethane Frontal chromatographic technique hydrogenolysis to methane, 29, 308 ethylene adsorption on oxygenated silver, 29, 494 formation from alcohols, 28, 69 Ethylbenzene G dehydrogenation, 31, (15) Gas oil cracking Ethylene REX, REY zeolites in catalytic, 30, 417 adsorption Gas recirculation pump on oxygenated silver catalyst, 29, 494 inexpensive noncontaminating, 31, 471 on Rh. 29, 421; 30, 372 reversible and irreversible, 29, 494 Н benzene alkylation, 28, 403 carbon monoxide inhibition, 29, 421 Halogen catalyzed vapor-phase oxidation to acetaldemolecule scattering, 28, 316 hyde, 30, 109 Halogen-silicon-germanium dissociative chemisorption, retardation by poreactions, 28, 316 tassium on nickel, 31, 309 HCl-Al₂O₃

diphenylamine synthesis over, 29, 67

hydrogenation catalyzed by palladium, 28, 46

H-D equilibration	over MgCrFeO ₄ and ZnCrFeO ₄ , 30, 128
organic semiconductors, 29, 49	nickel oxide crystals, 28, 124
Heat of adsorption	surface species during, 31, 231
degree of dehydrogenation, 28, 381	saturated, AlBr ₃ isomerization of, 30, 21
n-Heptane	Hydrocracking
dehydrocyclization over Pt on nonacidic alu-	cyclopropane, 28, 376
mina, 29 , 398	n-heptane, effect of oxidation state on tungsten
hydrocracking of, 29, 296	on, 29 , 296
Heterocycles	n-paraffins, 29, 361
hydrogenolysis and exchange of, 30, 218	Hydrodesulfurization
Heterogeneous catalysis	γ-alumina role in, 30 , 218
alternative kinetic equations, discrimination by	Hydrogen
competitive experiments, 31, 313	absorbed, activity coefficient, 28, 414
comparison with homogeneous, 30, 139	adsorption on iron, 28, 414
electronic theory of, 28, 329	on high surface platinum, 31, 325
intraparticle and interphase transport effect in,	on Pt/Al ₂ O ₃ , 28 , 368
30 , 283	allylic, abstraction reaction, 29, 60
Hexadienes	catalytic aromatic-alkali metal ion salts, 29, 49
dehydrocyclization on Pt, 30, 343	chemisorption on platinum, 29, 160; 30, 96
n-Hexane	conversion on triphenylene-alkali metal ion
adsorption on synthetic faujasites, 29, 112	radical salts, 29, 49
cracking over LaX catalysts, 30, 409	desorption, catalyst surfaces, 28, 275 from iron, 28, 414
dehydrocyclization, tellurium-loaded zeolites, 29,	exchange
316	D_2O , CH_4 over nickel, 30, 250
Hexatrienes dehydrocyclization on Pt, 30, 343	formic acid decomposition product, using
n-Hex-1-ene	Ni(110) C(2x1) catalyst, 31, 316
	retention on Pt-black, 30, 96
on $Pt/H_2/HT$, 30, 96 High pressure	titration, determination for total metal disper-
effect on AlBr ₃ catalyzed isomerization saturated	sion, 29, 278
paraffins, 30, 21	transfer
H-Mordenite catalyst	alcohol-ketone, hydroxyapatite catalyzed, 31,
benzene alkylation with ethylene and propylene,	65
28 , 403	Hydrogen-covered metal powders
<i>n</i> -butylvinylether polymerized by, 30, 460	hydrogenation of cyclopropane on, 29, 83
pores, transport and reaction of t-butyl alcohol	Hydrogen-oxygen titration method
in, 29, 292	measurement of supported palladium surface
Homogeneous catalysts	areas, 30, 146
Group VI metal compounds	Hydrogen uptake equilibria
olefin metathesis reactions by, 30, 118	solvent effects on, 30, 30
hydrogen transfer in cyclic dienes, 28, 500	Hydrogenation
Hougen-Watson method	aliphatic ketones, effect of structure over metal
adsorption 2-methylpropene, rate-controlling	catalysts, 29, 412
step mechanism, 30, 276	alkenes and related reactions, 30, 139
Hydrazine	alkylnapthalenes on palladium, 29, 404
decomposition	aromatics catalysts, 31, 469
iridium supported catalyst, 29, 31	benzene on Pt catalyst, 31, 466
mechanism, 30, 327	platinum-polyamide catalyst reactions in, 30,
Hydrocarbon	1
adsorption on decationized Y molecule sieve,	carbon dioxide, 28 , 391; 30 , 423
29, 112	catalyst classification, 28, 503
catalytic oxidation	catalysts, d-electrons in, 28, 503
over α -Cr ₂ O ₃ , 28, 139	chlorotris-(triphenylphosphine) rhodium(1), 30,
to CO ₂ and water, 30, 175	30
catalytic transformation, 31, 419	cyclohexadienes, 30, 490
gas phase and electrocatalytic oxidation, 31, 319	cyclohexene, 30, 72
oxidation on copper chromite catalyst, 29, 352	cyclopropane, 28 , 150, 376; 29 , 83

isobutylene, 28 , 179 ketones of, 29 , 412	Inner localized states homopolar bond, 30, 309
metal-carbon catalysts, 31, 287	Intraparticle transport
platinum and palladium catalyzed, 30, 79	criteria, 30 , 283
pyridine to piperidine, 31, 220	Intraphase transport
RhCl- $(P\phi_3)_3$, homogeneous catalyst, 30, 30	criteria, 30, 283
selective, cyclohexadienes catalyzed by trans-	Inter-intraphase diffusion
[IrCl(CO)Ph ₃ P) ₂], 30 , 490	catalytic yield, 28, 33
Hydrogenolysis	Ion exchangers
cyclohexane yields of methane, 29, 308 ethane to methane, 29, 308	acid strength of active sites number, variation of, 30, 343
heterocycles over Co/Mo/γ-alumina, 30, 218	Iridium
methylcyclopentane, 28, 381	n-alumina supported, hydrazine decomposition,
Ni-catalyst, 31, 173	29, 31
pyridine, molybdenum-containing catalysts, 31,	Iron
209, 220	alkaline hydrocracking, 29, 83
thiophene, 31, 264	chemisorption of gases, H ₂ , N ₂ , CO, CO ₂ , 28 , 428
Hydroperoxide	cyclopropane hydrogenation on, 29, 83
effect of solvent and structure of, 13, 438	decomposition, chromium catalysis, 30, 86
metal-catalyzed epoxidations, 31, 427, 438	FeAl ₂ O ₄
Hydroxyapatite	ammonia synthesis, 28 , 477 ammonia synthesis, 28 , 471
alcohol decomposition over, 29, 144; 31, 65 Hydrosulfurization	Fe/Al ₂ O ₃
heterocycles over Co/Mo/γ-alumina, 30, 218	SO ₂ reduction with CO, 29 , 264
neurocycles over Co/Mo/ p-aidinna, 60, 216	Fe/SiO ₂
	SO ₂ reduction with CO, 29, 264
l	$\mathrm{Fe/SiO_2/Al_2O_3}$
Indium catalysts	hydrogen adsorption on, 28, 414
isobutene oxidation, 30, 485	promoted, chemisorption of gases on, 29, 319
Infrared radiometric study	SO ₂ reduction with CO, 29, 264
temperatures of catalysts, 29, 507	Iron ammonia synthesis catalyst
thermal effects of oxidation of silica-supported	electron probe studies of, 28, 161
Ni, 30, 40	Iron-based bismuth molybdate
Infrared and Raman spectra	partial oxidation of propylene by, 29, 475
adsorbed benzaldehyde, 29, 40	Iron oxide
Infrared spectroscopy	nitric oxide reduction, 31, 450
acetylene, 28 , 92	water-gas shift reaction, 30, 488
benzene adsorption on alumina-supported plati-	Iron synthetic ammonia
num, 30 , 13	alumina promoter, 28, 477
butene chemisorption on CuO and Cu ₂ O, 29, 1	trans-[IrCl(CO)Ph ₃ P ₂]catalysts
CO on chromium oxide, 29, 20	cyclohexadienes selective hydrogenation by, 30,
CO, CO ₂ , NO, NO ₂ , N ₂ O on copper oxide, 31, 32	490
CO on Pt/Al ₂ O ₃ , 29 , 213	Irradiation studies
catalytic oxidations reactions over cobalt oxide under steady-state conditions, 31, 231	aluminum migration, deep and shallow beds, Y zeolites, 29, 120
chemisorption on CuO and Cu ₂ O by, 29, 1	γ-irradiation, silver catalyst, 28, 39
copper oxides, chemisorption of butenes by,	Isobaric diffusion measurements
29, 1	nonreacting systems, liquid-loaded porous
kinetic study, simultaneous, NO reduction by	media, 31, 119
CO over copper oxide, 31, 96	Isobutene
hydrogen on Pt/Al_2O_3 , 28, 368	oxidative dehydrodimerization and aromatiza-
titania, silica, alumina, magnesia carrier for	tion of, 30 , 485
molybdena catalysts, physical and chemical	Isobutylene
properties studied by, 29, 191	catalytic hydrogenation, 28, 179
ultrastable zeolites, 28, 101	Isomerization
Inhibition	acetylene, 28 , 92
CO of C₂H₄ adsorption, 29, 421	activity and selectivity of butene-1, 30, 298

alkanes on noble metals, 30, 330 butene, 30, 362 Lanthanum Y zeolite catalyst isotope effects, butenes over alumina and silicacumene cracking, 31, 74 alumina, 31, 136 Lattice oxygen olefin on silica gel at Al3+ impurity sites, 29, oxidation mechanism by, 30, 393 LaX catalysts saturated hydrocarbons, AlBr₃ catalyzed, 30, 21 cracking n-hexane over, 30, 409 saturated paraffins, effect of high pressure on, Lead 30, 21 carbon monoxide shift, 31, 346 substituted olefins, 30, 403 Lewis bases Isocvanate effect on metal, 29, 213 intermediates, carbon monoxide and nitrous Light hydrocarbons oxide reactions over noble metals, 31, 459 nickel, carbon formation from, 29, 15 Iso-octane Linde 13X zeolite cracking activity and selectivity, 30, 288 synthetic faujasites, 29, 385 Isoprene Linear free energy relationships oxidative dehydrogenation over MgCrFeO4 and ketone hydrogenation in, 29, 412 ZnCrFeO₄, 30, 128 Liquid-loading porous media Isopropanol diffusion-limited reacting systems, 31, 119 photocatalytic oxidation of, 31, 398 Lutetia catalyst Isothermal catalytic activity ortho-parahydrogen conversion by magnetic analysis in terms of diffusional intrusion, 28, 33 mechanism, 28, 422 Isotope effect 2-D in 2-butanol dehydrogenation on hydroxyapatite, 31, 65 Isotope exchange reaction Maleic anhydride diffusion coefficient of carbon dioxide in porous butadiene oxidation, 29, 191 catalyst, 31, 1 butadiene product, 30, 393 oxygen, silica-supported vanadium pentoxide, butadiene vapor-phase oxidation, 29, 191 28, 230 butenes oxidation, 30, 393 hydrocarbon species selectivity for formation, Κ 31, 278 Magnetics Ketones aliphatic, effect of structure, hydrogenation over crystalline size, 29, 338 metal catalysts, 29, 412 hydrogen content, 29, 338 Ranev nickel, 29, 328, 338 Kinetics biomolecular ether formation, 28, 69 Magnetization-field data butene dehydrogenation, 29, 200 Raney nickels, 29, 328, 338 catalytic oxidation carbon monoxide over α-Manganese in zeolites, ESR spectra of, 29, 105 chromic oxide, 28, 139 CO oxidation on SnO₂, 29, 441 Manganous oxide oxygen and nitrous oxide surface interaction isotopic effect, catalytic oxidation, 28, 124, 139 with, 31, 377 mesitylene isomerization, 28, 304 methanation of CO2 in H2 on nickel catalyst, 28, Mass spectrometry C₂H₄, CO on Rh, 29, 433 391 propylene, disproportionation of, 28, 63 interactions acetylene, carbon monoxide, on Rh/silica, catalysts, 30, 378 simultaneous homogenous-heterogenous, sepa-Mesitylene ration in rates in, 28, 221 transients in propylene disproportionation, 29, 304 disproportionation over a tungsten oxide on isomerization, kinetics of, 28, 304 silica-alumina catalyst, 28, 304 silica catalyst, 28, 83 Koechlinite Metals acetylene decomposition, 30, 86 acrylonitrile, 28, 496 activators, NiO/SiO2 catalysts, 30, 333 preparation, 28, 496 adsorbate interactions, 29, 213 Krypton adsorption on amorphous silica-alumina catacatalysts classification, 28, 503 lysts, 30, 467

MgO-supported iron catalysts chelates decomposition nitrogen-15 labeled hydrazine on, N₄-complexes, catalytic activity, 28, 8 ¹⁴C tracer study, dehydrocyclization mechanism, 30, 327 Microcalorimetry dispersion of, 29, 278 ceris surfaces toward CO oxidation by, 28, 54 electronegative atoms on, 29, 213 Migration double bond, methylcyclohexene, 30, 79 hydrogenation over, 29, 412 interaction between metal crystallites and silica Mixed oxide catalysts hydroxyl groups, 28, 254 active centers in oxidation of olefins on, 28, 489 stability of highly dispersed state, 29, 224 Molecular oxygen isotopic exchange, 28, 230 supported, chemisorption on, 30, 309 surface, d-electrons on, 28, 503 Molybdenum transition catalysts, 31, 427, 438 on γ-Al₂O₃; ESR spectra investigation, **29**, 463 Metal clusters Molybdena catalyst molecular orbital calculations for, 29, 129 active sites and adsorbed oxygen species, 29, 191 Metal crystallites MoO₃-SiO₂ catalyst selectivity, for maleic anhydride production, 29, time decay, exposed surface area of metal and size distribution of, 29, 224 191 MoO₃-TiO₂ catalyst nitrous oxide decomposition, 30, 55 selectivity, for maleic anhydride production, 29, Metathesis olefin, catalysis of, 30, 118 Mössbauer spectroscopy surface composition of C-supported platinumtemperature effects on, 28, 300 Methaerolein iron alloys, 29, 278 oxidative dehydrogenation over MgCrFeO4 and Monolith supported catalysts ZnCrFeO₄, 30, 128 non-isothermal catalytic effectiveness factor, 31, Methanation 41 CO₂ in H₂ on nickel catalyst, 28, 391 Mn molybdate Ni catalyst, 31, 173 oxidation catalysts, 30, 393 Methane Molecular sieve catalysts CO2 and H2 over Rh/alumina catalysts, formapropylene hydrogenation over Pt/C, 31, 287 tion of, 30, 423 Monolayer MoO₃-Al₂O₃ catalyst desorption product formaldehyde, 30, 260 preparation and catalytic properties, 31, 209 deuterium oxide, hydrogen exchange, 30, 250 Molybdena-alumina catalyst exchange over supported nickel, 28, 260 preparation of monolayer, 31, 209 hydrogenolysis of cyclohexane to, 29, 308 Molvbdenum oxide ethane to, 29, 308 monolayer on alumina of, 31, 209 Methanol Molybdenum sulfide-cobalt sulfide absorbed on silica, 28, 332 mixed catalysts, 31, 264 vapor-phase oxidation of, 28, 282 Mo(V) 2-Methyl-3-buten-2-ol formation in reduced MoO₃-Al₂O₃ systems, 30, dehydration of, 30, 155 195 Methyl chloride Molybdenum copper germanium alloy reactivity with, 28, 20 role in hydrodesulfurization and exchange, 30, Methylcyclohexane 218 fate in naptha reforming, 29, 395 Molybdena-alumina catalysts hydrogenation with H₂ and D₂, 30, 79 formation in MoO₃-Al₂O₃ systems, 30, 195 partial hydrogenation with D₂O₂, 30, 79 reduction, 30, 204 Methylcyclopentane Mordenite pores hydrogenolysis, 28, 381 t-butyl alcohol transport and reaction in, 29, 292 reactions on nickel and nickel-copper alloys, 28, 376 Mössbauer spectra Al₂O₃ in iron catalyst, determined by, 28, 477 2-Methylpropene CO shift, lead promoted, 31, 346 oxidation over bismuth-molybdate catalysts, 30,

276 MgCrFeO₄ catalyst

oxidation over, 30, 128

Ziegler catalyst, 28, 322

cis-2-pentene disproportionation over, 31, 408

Mo/Al₂O₃

MoO/Al₂O₃ Nitric acid hydrocarbon transformation, 31, 419 adsorption on copper oxides, 28, 1 Nitric oxide adsorption on platinum black, 29, 139 N ammonia formation, 30, 478 Naptha chemisorption on copper, 28, 1 conversion over Pt-Al₂O₃ catalyst, 29, 395 reduction in automotive exhaust, 30, 478 Napthene by carbon monoxide over copper oxide, 31, 96 conversion, carbon-14 tracer study, 29, 395 Nitrogen adsorption on amorphous silica-alumina cata-Neodymium oxide nitrous oxide decomposition on, 28, 428 lysts, 30, 467 NHA catalyst on nickel surface, 31, 173 Taft equation, correlation of, 29, 144 catalytic compounds, activity, 28, 8 Nickel isotopes, exchange in hydrazine, 30, 327 Nitrous oxide carbon formation on, 29, 15 hydrocarbons, steam reforming, 31, 173 adsorption on platinum, 28, 459 hydrogen exchange over, 30, 250 catalytic decomposition, Sabatier-Balandin inkinetics of methanation of CO₂ in H₂ on, 28, 391 terpretation, 31, 51 decomposition, 28, 221, 428 methanation, 31, 173 potassium metal effect on hydrogenation of oxygen inhibition in, 30, 55 ethylene, 31, 309 manganous oxide, surface interaction, 31, 377 Raney, magnetics, 29, 328, 338 on platinum, unimolecular decomposition and surface heterogenecity, 31, 173 adsorption, 28, 459 Nickel acetylacetonates-lithium aluminum hydride reaction with silver, 28, 209 hydrogenation catalysts for aromatics, 31, 469 reduction, promoter effects, 30, 333 Noble metals Nickel-copper alloy cyclopropane reactions on, 28, 376 1,2-bond shift isomerizations of alkanes on, 30, methylcyclopentane reactions on, 28, 376 carbon monoxide, isocyanate intermediates, 31, Nickel-gold alloys surface composition of, 30, 438 Nickel complex catalysts nitrous oxide, isocyanate intermediates, 31, 459 isomerization of olefins and substituted olefins Nonequilibrium process ortho, para conversation, hydrogen adsorption. by, **30**, 403 29, 49 Nickel oxide Non-isobaric porous catalyst particles adsorption oxygen, hydrocarbons, water, carbon dioxide, 28, 124 viscous and diffusive transport, chemical reacdeep oxidation, lower olefins, 29, 49 tion in, 29, 451 Nucleation Ni(110) C(2x1) supported NiO reduction, 30, 333 formic acid decomposition, 31, 316 Ni(diphosphine)2/acid homogenous systems 0 double bond and cis-trans isomerization of ole-**Olefins** fins. 30, 403 Ni(O)/CF₃COOH system active centers in oxidation using mixed oxide catalysts, 28, 489 σ -allyl mechanism, 30, 403 aromatization of, 30, 485 Ni(0)/HCN system bismuth tungstates in oxidation and ammoxi- π -allyl mechanism, 30, 403 dation, 31, 200 NiO/SiO₂ activation, 30, 333 catalytic copper promoting, 30, 333 hydrogenation of, 28, 179 transformation of, 31, 419 metal activators, 30, 333 disproportionation of, 31, 408 reduction of, 30, 333 hydrogenation, kinetics, metal-carbon catalysts, Ni-SiO₃ 31, 287 temperatures during coke burn-off, 29, 507 interaction with oxygen absorbed on zinc oxide, Nickel single crystal catalyst interaction with formic acid; Auger electron 28, 471 spectroscopy technique of observation, 30, isomerization, 29, 486 catalyzed by nickel complexes, 30, 403 235

metal-catalyzed epoxidation of, 31, 427, 438 selective oxidation on mixed oxide catalysts, 28, 489	Oxidation state tungsten oxide, 29 , 296 Oxidative dehydrodimerization
Olefinic intermediates	of isobutene, 30 , 485
determination of kinetically controlled concen-	Oxidative demethylation
trations, 29, 361	toluene, 31, 149
Organic ion exchangers	Oxidative mechanism
adsorption weak bases from gas phase on, 30,	by absorbed oxygen, 30, 393
343	Oxidizing-reducing properties
Organic semiconductors	alumina catalyst, 30, 298
catalytic activity of, 29, 49	Oxygen
Osmium	adsorbed, oxidative mechanism, 30, 393
alkaline hydrocracking, 29, 83	adsorption
Osmium catalyst	and α chromic oxide, 28, 139
cyclopropane hydrogenation on, 29, 83	on nickel oxide, 28, 124
Osmium-copper catalyst	electroduction by acid electrolyte, 28, 8
hydrogenolysis of ethane to methane, 29, 308	electroreduction and chemisorption on phthalo
Oxidation	cyanines, 29 , 8
butadiene to maleic anhydride, 29, 191	inhibition, NO decomposition on metal oxide
butene	and platinum, 30, 55
bismuth tungstate catalysts, 31 , 200 butadiene, 30 , 393 ; 31 , 278	interaction with olefins absorbed on zinc oxide 28, 471
to maleic anhydride on MnMoO ₄ based cata-	manganous oxide, surface interaction, 31, 377
lysts, 30, 393	mobility, catalytic oxidation, 28, 337
carbon monoxide	photoadsorption of, 31, 389
copper chromite catalyst, 31, 140	platinum surface composition in high tempera
	ture system, 31, 145
and hydrocarbons on copper chromite cata-	
lyst, 29, 352	propylene interactions, adsorbed on metal oxide
over nickel oxide crystal catalyst, 28, 124	catalysts, 31, 167
quadrupole interaction on surface catalysts,	reaction with silver, 28, 209
30, 467	Oxygen species
catalytic	selective, production maleic anhydride, 29, 191
cobalt oxide during, 30, 175	Oxygen/hydrogen titration
CO on SnO_2 , 29 , 441	platinum black, poisoned by mercury, 29, 346
silica-supported Ni, 30, 40	
β-Cu-phthalocyanine catalyst for, 29, 515	Р
cumene	
on silver catalyst, 29, 367	n-Paraffins
with silver-on-silica catalyst, 28, 493	diffusion in zeolite T, 31, 13
electrocatalytic, gas phase of hydrocarbons, 31,	hydrocracking on Pt/Ca-Y-zeolite catalyst, 29
319	361
ethylene over Ag catalyst, 30, 430	Parahydrogen
hydrocarbons, 30, 128	conversion
mechanism by lattice, adsorbed oxygen, 30, 393	on X zeolites, 29, 246
MgCrFeO ₄ catalyst, 30, 128	rate measurements over chromiagel, 30, 255
MoO ₃ -P ₂ O ₅ catalysts, activity and acidity of, 30 ,	
362	yttria and luteita catalysts for conversion of
	28, 422
2-methylpropene over bismuth-molybdate cata-	2-Pentene
lysts, 30 , 276	temperature effects on, 28, 300
olefins	cis-2-Pentene
adsorbed on ZnO, 28, 471	disproportionation over Mo/Al ₂ O ₃ and Co-Mo/
bismuth tungstates in, 31, 200	Al_2O_3 , 31, 408
propylene, 31, 167, 360	Phillips catalyst
state of cobalt oxide catalyst, IR transmission	interaction of carbon monoxide with, 29, 20
changes due to, 31 , 231	Photoadsorption
tetralin, 31, 372	oxygen, 31, 389
ZnCrFeO ₄ catalyst, 30, 128	Photocatalysis

isopropanol, 31, 398 titanium dioxide, 31, 389, 398	Palladium-charcoal catalysis ethylene hydrogenation, 28, 46
Phthalocyanines	distribution of Pd crystallites over charcoal, 28
co-complexes, 28, 8	46
oxygen chemisorption of, 29, 8	Palladium-doped vanadium catalyst
Piperidine	oxidation ethylene to acetaldehyde, 30, 109
pyridine hydrogenation, 31, 220	Platinum (II) complex
Platinum	active reagent in Pt/polyamide catalysts, 30, 1
alumina-supported, benzene adsorption on, 30,	Platinum crystallites
13	chemisorbed carbon monoxide and hydrogen
benzene	on, 29 , 160
adsorption on, 30, 13	Platinum-iron alloys
hydrogenation, 31, 466	carbon supported, surface composition and
carbon monoxide chemisorption on, 29, 160	chemistry of, 29, 278
dehydrocyclization catalyst, 29, 398	Platinum-polyamide catalysts
heated in oxygen, surface composition, 31, 145	hydrogenation reaction of benzene, 30, 1
hydrogen adsorption, 31, 325	Poisoning studies
microfocused X-ray, 28, 245	hydrogen-oxygen titration of surface platinum,
NO decomposition on, 30, 55	31, 143
supported, ethylene hydrogenation, 28, 338	Polymer
surface, hydrogen-oxygen titration in zinc, and	organic, synthesis over polynaphthoquinone, 31,
phosphorus poisoning, 31, 143	(15)
Platinum-alumina catalyst	surface free radicals, tetralin oxidation, 31, 372
hydrogenation of olefins, 28, 179	Polymerization
naptha conversion over, 29, 395	n-butylvinylether by H-mordenite powder, 30,
Platinum black	460
nitric oxide adsorption on, 29, 138	ethylene on chromium oxide catalyst, 29, 20
oxygen-hydrogen titration, 29, 346	zeolite catalysts, 30, 460
Platinum black catalyst	Polynaphthoquinone
chemisorption H ₂ , HT on, 30, 96	styrene synthesis over, 31, 444
mechanism of aromatization on, 30, 343	Polyolefins
Platinum bronzes	influence on propylene disproportion, 31, 304
Adams' catalyst, 31, 369	Pores
Platinum catalyst	mordenite, transport and reaction of t-butyl
hydrogenation, racemization, exchange, double	alcohol in, 29 , 292
bond migration, 30, 79	Pore concentration gradients
optimum impregnation depth, 3, 243	measurements of, 31, 243
reforming of naptha, 29, 395	Porous catalyst
supported	clogged by deposits, 29, 75
nitric oxide reduction, 30, 478	coking of, 30, 155
structure and surface properties of, 29, 374	poisoning, mathematical models, 30, 155
Platinum/Ca-Y-Zeolite catalyst	Porous material
hydrocracking of n-paraffins on, 29, 361	random-spheres model, 29, 75
Palladium	Porphyrins
catalytic oxidative coupling of aromatic com-	carbon supported, Fe-complexes, 28, 8
pounds, 31, 8	Potassium
hydrogenation of alkynapthalenes on, 29, 404	Ni catalyst, effect, 31, 309
supported, nitric oxide reduction, 30, 478	Promoter effects
surface areas, hydrogen-oxygen titration	NiO reduction, 30, 333
method, 30, 146	Propargyl
Palladium acetate catalyst	surface intermediates, 28, 92
aromatic coupling under oxygen, 29, 92	Propene
Palladium-alumina	ammoxidation, 28, 496; 31, 293
dehydrogenation cyclohexane, 31, 384	selective oxidation, 28, 337
site density for dehydrogenation, 31, 384	Propylene
Palladium catalyst	ammoxidation of, 31, 200
electroless Ni deposition, 29, 253	benzene alkylation, 28, 403

catalytic Reduction hydrogenation, 28, 179 bismuth uranate by toluene, 31, 149 oxidation of, 29, 475; 31, 369 NiO/SiO₂ catalyst promoter and carrier effect in, disproportionation influence of polyolefins, 31, 304 nitric oxide in automotive exhaust, 30, 478 over tungsten oxide-silica system, 28, 63 tungsten oxide, 29, 296 mechanism of oxidation on Bi/Mo catalysts, 28, Reforming ¹⁴C tracer study of, 29, 395 oxygen interactions, adsorbed on metal oxide naphtha conversion in, 29, 395 catalysts, **31**, 167 Reforming catalysts transient kinetics of the disproportionation of, effectiveness factors, 31, 243 **28**, 83 Resin Pulsed microanalytic reactor sulfonic acid, catalysis in, 31, 27 rate coefficients from, 30, 430 Retention [14C]-C2H4 on Rh, 29, 421 Pulse reaction technique pulse reaction kinetics coupled with adsorbed $RhCl-(P\phi_3)_3$ reactant, 31, 127 hydrogenation, 30, 30 Pvridine 1 4 1 RhCl(PR₃)₃ hydrogenation to piperidine, 31, 220 hydrogenation of, 30, 30 hydrogenolysis, effect on Mo-containing cata-RhH2Cl(PR2)3 lysts, 31, 209 dehydrogenation of, 30, 30 Rhodium O chemisorption H₂, CO, C₂H₄, 29, 421, 433 Quantum-mechanical method Rhodium(I) complexes nature of bonds in chemisorption on supported model for catalysis by cobalt oxide and chromia, metals, 30, 309 30, 139 Ruthenium-alumina catalysts R adsorption acetylene, ethylene, carbon monox-Racemization ide, 30, 372 (+)-1-paramenthene and (+)-4-methylcyclohydrogenation of carbon dioxide to methane, 30, hexene, 30, 79 423 Radiochemical studies Ruthenium catalyst chemisorption and catalysts, 30, 372, 378 alkaline hydrocracking, 29, 83 Raman and infrared spectra cyclopropane hydrogenation on, 29, 83 adsorbed benzaldehyde, 29, 40 supported, reduction of nitric oxide over, 30, Random-spheres model for porous materials, 29, 75 Ruthenium(II) complex catalyst. Raney nickel cyclic dienes isomerization by, 28, 500 crystallite size, 29, 338 Ruthenium metals hydrogen content, 29, 338 ruthenium-silica catalysts, 28, 289 structure of, 29, 328 Ruthenium-silica catalysts Raney nickel catalysts adsorption acetylene, ethylene, carbon monoxmagnetic study of, 29, 328, 338 ide. 30, 372 Rare earth IR spectra, 28, 289 X and Y type zeolites exchange, acid strength Rutile distribution, 30, 417 cobalt on, 28, 275 Rate constant Rutile surfaces nitrous oxide decomposition, 28, 428 photoadsorption and photocatalysis at, 31, 389, Rate-determining step locus of change in, 30, 488 Rate model S development, oxidation sulfur dioxide, 31, 90 dissociative, associative, multi-site, 28, 179 Sabatier-Balandin Reactive silica interpretation catalytic decomposition, 31, 51 simple gases, reactions with, 28, 265 Sabatier reaction Reactor catalytic hydrogenation of carbon dioxide to

methane, 30, 423

stirred tank in oxidation reaction, 30, 393

Saturated hydrocarbons	oxygen adsorption on, 29, 367
isomerization, effect of high pressure on AlBr3	spheroidization, 28, 39
catalyzed, 30 , 21	Silver-on-silica catalyst
Scanning electron microscopy (SEM)	cumene oxidation in liquid phase, 28, 493
catalyst boron phosphate on adsorption of water	Single-pellet diffusion reactor
vapor, 30, 66	hydrogenation cyclopropane to propane in, 28,
SCO intermediate	150
Fe, Al ₂ O ₃ catalyze SO ₂ reduction, 29, 264	SO ₂ and ferrite catalyst
Secondary adsorption	styrene from ethylbenzene, 30, 128
acetylene, 30, 372	SO ₂ reduction
Secondary saturated alcohol	with CO reductant, 29, 264
dehydration over NiO/Cab-O-Sil catalysts, 31,	Solid acids and bases catalysts
110	elimination reactions over, 30, 226
Selective double bond migration	Specific surface
Ru(II) complexes, 28, 500	errors in determination of, 28, 296
Selective H-transfer	Spectra
mechanism of, 28, 500	Mössbauer, soluble catalyst, 28, 322
Selective oxidation	Spectroscopy
propene, 28, 337	near infrared, ion environmental changes, 28, 76
Self-hydrogenation	Spheroidization
C ₂ H ₂ on Rh, 29 , 433	silver catalyst, 28, 39
Silica	Spillover
methanol absorbed on, 28, 332	comments on, 30, 96
Silica-alumina	hydrocarbon on supported catalyst, 29, 412
amorphous	Stability
adsorption CO, N ₂ , Ar, Kr on, 30, 467	structural, NaHa and CaHA zeolite, 29, 270
argon adsorption on, 30, 467	Steam reforming
Silica-alumina catalyst	Ni-catalyst, 31, 173
mesitylene, 28, 304	Stereoselectivity
Silica catalyst	anti or syn mode elimination reactions of alkyl
olefin isomerization on, 29, 486	halides, 30, 226
Silica gel	Steric effects
catalytic activity of, 29, 486	in hydrogenation of alkylnapthalenes, 29, 404
dehydrohalogenation over, 30, 226	Styrene
supported ions, Co(11), Cu(11), Cr(111), 28, 76	from ethylbenzene using SO2 and ferrite cata-
Silica-supported Ni	lysts, 30, 128
oxidation of, 30, 40	synthesis over polynaphthoquinone, 31, 444
Silica-supported ruthenium-copper catalyst	Sulfonic acid resin
hydrogenolysis of ethane to methane, 29, 308	t-butyl alcohol dehydration catalyzed by, 31, 27
Silver	Sulfur
determination of free surface areas of catalysts,	catalytic poisoning, 31, 459
28, 209	SO ₂ reduction with CO to yield, 29, 264
Silver catalyst	Sulfur compounds
calcium	influence on Cu-phthalocyanine catalyst, 29, 515
inclusion, 29 , 169	Sulfur dioxide
migration, 28, 39	carbonyl sulfide reaction, 30, 451
oxide inclusion, 28, 39	catalytic oxidation, 31, 90
promoted ethylene oxidation, 28, 455	Supported catalysts
carbonyl sulfide and sulfur dioxide reaction, 30,	Rh/SiO ₂ , Rh/Al ₂ O ₃ , 29 , 421, 433
451	Supported liquid-phase catalysis
electron microscope, 28, 39	diffusion-limited reaction in, 31, 119
Electron Spectroscopy Chemical Analysis, 28,	Supported metal crystallites
39; 29, 169	growth kinetics and size distribution of, 29, 224
etching, 28, 39	Surface alcoholates
ethylene adsorption, 29, 494	CH stretching bands, 28, 335
oxidation, 28, 39	Surface area
v-irradiation, 28, 39; 29, 169	errors in determination of, 28, 296

Tin(IV) oxide Surface composition CO oxidation on, 29, 441 Cu-Ni alloy by Auger electron spectroscopy, 29, Titanium dioxide nickle-gold alloys, 30, 438 photoadsorption and photocatalytic catalysis on, supported platinum-iron alloys, chemistry of, 31, 389, 398 29, 278 Toluene Surface diffusion bismuth uranate reduction by, 31, 149 molecular sieve carbons, 31, 287 oxidative demethylation, 31, 149 Surface heterogenecity oxidation over 10 cobalt-metal-oxide catalyst, 28, 116 Ni-catalyst, 31, 173 Surface microcatalysis Transitional metal complexes selectivity of Ni(110) $C(2 \times 1)$ for hydrogen comparison with cobalt oxide and chromia, for formation, **31**, 316 alkene hydrogenation, 30, 139 Surface poisoning Transport platinum by mercury, 29, 346 viscous and diffusive, chemical reaction in non-Surface reactions isobaric porous catalyst particles, 29, 451 halogen, silicon, and germanium, 28, 316 Transport effects heat and mass, 30, 283 Surface structures formed on cobalt oxide during catalytic oxida-Triphenylene-alkali metal complex hydrogen conversion on, 29, 49 tion, 30, 175 Tritium chemisorption on Pt, 30, 96 Tellurium-loaded zeolites Tungsten catalysts n-hexane dehydrocyclization, 29, 316 formaldehyde thermal desorption products, 30, Temperature of catalysts, infrared radiometric study, 29, 507 Tungsten hexachloride and n-butyllithium binary Temperature effects catalyst system, 28, 300 Tungsten oxide catalyst 2-pentene, 28, 300 Te/NaX catalyst hydrocracking on n-heptane over, 29, 296 supported, X-ray photoelectron spectroscopy, n-hexane dehydrocyclization, 29, 316 Tetrahydrofurane 30, 169 Tungsten oxide on silica adsorption, 30, 343 Tetralin propylene disproportionation, break-in period, influence of polyolefins, 31, 304 oxidation in presence of polymers, 31, 372 Theoretical model Tungsten oxide-silica system higher conversion data of sulfur dioxide oxidapropylene disproportionation over, 28, 63 Tungsten-silica catalyst tion, 31, 90 Theory disproportionation, transients in propylene, 28, of catalysis, 28, 459 83 of chemisorption, 28, 459 Two-component catalyst Thermal behavior role of SCO gas, catalytic reduction SO₂, 29, 264 monolith supported catalysts, 31, 41 Thermal desorption U aniline on HCl-Al₂O₃, 29, 67 C₂H₄/Rh, 29, 433 Unimolecular decomposition and adsorption; nitrous oxide on Pt, 28, 459 Thermal effects during catalytic oxidation, 30, 40 Thiophenes ٧ hydrodesulfurization and exchange of, 30, 218 hydrogenolysis, 31, 264 Vanadium pentoxide-molybdenum trioxide TiCl₃ catalyst catalyst activity vs crystallite and particle dimensions, vapor-phase oxidation methanol, 28, 282 28, 351 Vapor-phase oxidation effect of ball milling on activity and structure, of methanol, 28, 282 28, 351 Volkenshtein concepts Balandin concept, connection in heterogeneous Tin oxide

catalysis, 28, 329

interaction of n-butenes with, 29, 99

W

Wacker synthesis fixed bed, 30, 109

Water

adsorption on nickel oxide, 28, 124

inhibition reduction nitric oxide over supported Cr and Fe oxides, 31, 450

Water-gas shift reaction

iron oxide catalyst, rate-determining steps, 30, 488

Window effect

diffusion in zeolites, 31, 13

WO3/SiO2 catalyst

reaction mechanism, 31, 55

Х

X-ray

analysis

titania, silica, alumina, magnesia carrier for molybdena catalysts, physical and chemical properties studied, 29, 191

diffraction

CuCl₂ supported, 31, 257

photoelectron spectroscopy

study of supported tungsten oxide, 30, 169

p-Xylene

isobutene oxidation to, 30, 485

Υ

Yttria catalyst

preheated in H, for ortho-parahydrogen conversion by magnetic mechanism, 28, 422

Z

Zeolites

adsorption of hydrocarbons on types X and Y decationized sieve, 29, 112 catalysts, polymerization, 30, 460 cation-exchange, 29, 500 copper(I) Y, copper(II) Y, 30, 187

dehydration of, 29, 500

ERS spectra of, 29, 500

H-mordenite, benzene alkylation with ethylene or propylene, 28, 403

hydrated, cation-exchange in, 29, 105

lanthanum Y, cumene cracking, 31, 74

Linde 13X, synthetic faujasites, 29, 385

REX, REY, catalytic cracking gas, oil, 30, 417 ultrastable, infrared spectra of, 28, 101

Zeolite A

stability, function of cation equivalent Al, 29,

REX, REY Zeolites

catalysts

gas oil cracking, 30, 417

structure and catalytic properties of thermally and hydrothermally treated, 30, 417

Zeolite T

diffusion normal paraffins in, 31, 13

Zeolite X

parahydrogen conversion of, 29, 246

Zeolites X, A catalysts

dependence upon electrostatic field of cations, 29, 385

selectivity for isobutene formation, 29, 385

X, Y Zeolites

acid strength distribution of, 30, 417

aluminum deficient, 30, 288

Zeolites, type Y

ultrastable zeolites derived from, 28, 101

Ziegler catalyst

type, hydrogenation, 28, 322

Zinc

vapor deposition, 29, 253

Zinc oxide

acid-base concept for, 28, 92

dehydrogenation of ethanol, 28, 183

interaction of oxygen with olefins absorbed on,

28, 471

ZnCrFeO₄ catalyst oxidation over, 30, 128