

ABBREVIATIONS FOR CATALYST COMPILATION

ABD	Apparent bulk density	LCO	Light cycle oil
AGO	Atmospheric gas oil	LGO	Light gas oil
Arom.	Aromatic or aromatics	LP	Low pressure
Bott.	Bottoms	LSFO	Low-sulfur fuel oil
BTX	Benzene, toluene, xylenes (aromatics)	LSR	Light straight run
CGO	Coker gas oil	LT	Low temperature
Cyl.	Cylinder	MHC	Mild hydrocracking
DAO	Deasphalted oil	MS	Microsphere
De-N	Denitrogenated or denitrogenation	N	Nitrogen
De-S	Desulfurized or desulfurization	Oct.	Octane
Dist.	Distillate or distillates	Olef.	Olefin or olefins
DMO	Demetallized oil	P	Proprietary
DO	Diesel oil	Py	Pyrolysis
Ext.	Extrudate	RDS	Residual desulfurization
FCC	Fluid catalytic cracking	RE	Rare earth
FO	Fuel oil	REO	Rare earth oxide
Gasol.	Gasoline	Ref.	Reformer or reforms
GO	Gas oil	RON	Research octane number
HAGO	Heavy atmospheric gas oil	S	Sulfur
HC	Hydrocracker	SA	Surface area
HCO	Heavy cycle oil	Select.	Selective or selectivity
HDM	Hydrodemetallization	Sh. ext.	Shaped extrudate
HDN	Hydrodenitrogenation	Sph.	Sphere
HDS	Hydrodesulfurization	Stab.	Stable or stability
HFO	Heavy fuel oil	SR	Straight run
HGO	Heavy gas oil	UCS	Unit cell size
HP	High pressure	ULSD	Ultralow-sulfur diesel
HSFO	High-sulfur fuel oil	VBGO	Visbreaker gas oil
HT	High temperature	VGO	Vacuum gas oil
HVGO	Heavy vacuum gas oil	VI	Viscosity index
Jet	Jet fuel	Zeo.	Zeolite
Kero.	Kerosine		

OGJ International refining catalyst compilation—2009

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
Catalytic naphtha reforming catalysts							
AXENS							
AR 501	Arom. production	Naphtha	Arom.	Sph.	41	Al ₂ O ₃	Pt, Sn
AR 505	"	"	"	"	-	"	"
CR 301, -401	1	"	High oct. gaso.	"	41	"	"
CR 405	"	"	"	"	-	"	"
CR 701, -702	High stab. for cont. ref.	"	Gaso., GO, arom.	"	-	"	Pt, Sn
RG 532	Pt, prom. for cyclic units	"	"	"	41	"	Pt
RG 582	Max. H ₂ , C ₅ yield in semiregen. ref.	Naphtha, S<1,0ppm	"	"	42	"	Pt, Re, prom.
RG 682	Pt, Re for semiregen.	Naphtha, S<0,5ppm	"	"	43	"	"
AR 707	Arom. production	Naphtha	Arom.	"	-	-	Pt, Sn, prom.
AR 701	"	"	"	"	-	-	"
CR 601	Gaso. production	"	Gaso.	"	-	-	"
CR 607	"	"	"	"	-	-	"
BASF CATALYSTS LLC							
E-801	Bimetallic, semiregen.	Naphtha	Gaso., BTX	Ext.	40	Al ₂ O ₃	Pt, Re, Cl
E-802	"	"	"	"	"	"	"
E-803	"	"	"	"	"	"	"
CRITERION CATALYSTS & TECHNOLOGIES							
KX-120, -130, -160, -170, -190 (See Exxon Research & Engineering listing)							
P-15	High act., monometallic, low coke, improved stab., higher yields	Naphtha	Gaso. or BTX	Cyl.	P	P	Pt, Cl
P-93, -96	Monometallic	"	"	"	"	"	"
PR-9, -11	Bimetallic	"	"	"	"	"	Pt, Re, Cl
PR-15, -29, -30	"	"	"	"	"	"	"
PS-10	"	"	"	Sph.	"	"	-
PS-20, -30, -40	"	"	"	"	"	"	-
PS-80	"	"	"	"	"	"	"
EXXON RESEARCH & ENGINEERING CO.							
KX-120	Multimetallc semiregen. or cyclic units	Virgin, cr. naphtha	High oct. gaso., arom.	Cyl., ext.	43	Al ₂ O ₃	Pt, Re, Cl
KX-130	"	"	"	"	44	"	"
KX-160, -170	Multimetallc semiregen.	"	"	"	"	"	"
KX-190	Multimetallc cyclic	"	"	"	43	"	Pt, Sn
INDIAN PETROCHEMICALS CORP. LTD.							
IRC-1001	Monometallic, high stab.	Naphtha, S<5.0ppm	Arom. gaso.	Cyl., ext.	39	Al ₂ O ₃	Pt, Cl

Catalytic naphtha reforming catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
IRC-1002	Monometallic, low Pt., high stab.	"	"	"	"	"	"
IPR-2001	Bimetallic., high act., stab.	"	"	"	"	"	Pt., Re, Cl
IPR-3001	Multimetallic., high act., stab.	"	"	"	42	"	Pt., Re, prom.
SINOPEC CATALYST COMPANY							
CB 6	Good select., resistance to sulfide	Naphtha	Gasol. with high RON, arom.	Sph.	0.78*	Y, Al ₂ O ₃	Pt, Re
CB 7	Good resistance to coke	"	"	-	-	"	"
CB 60 (3932)	Good select., resistance to sulfide	"	"	Ext.	.72*	"	"
CB 70 (3933)	Good resistance to coke	"	"	"	"	"	"
PRT A	Improved C ₅ + and H ₂ yield	"	"	Cyl.	0.75	Al ₂ O ₃	Pt
PRT B	Lower coke prod., longer life, improved C ₅ + and H ₂ yield	"	"	"	"	"	"
PRT C	Improved C ₅ + and H ₂ yield	"	"	"	0.72	"	"
PRT D	Lower coke prod., longer life, improved C ₅ + and H ₂ yield	"	"	"	"	"	"
PS IV	Hydrothermal stab.	"	"	Sph.	0.57	"	Pt, Sn
PS V	High hydrothermal stab., low Pt content	"	"	"	"	"	"
PS VI	Lower coke, longer life, improved C ₅ + and H ₂ yield, lower Pt content	"	"	"	"	"	"
PS VII	"	"	"	"	"	"	"
CB-5	Good catalytic activity, good selection, good stability	"	"	"	.78*	"	Pb, Rh, Ti
CB-5B	"	"	"	"	"	"	Pb, Rh
CB-8	"	"	"	"	.77*	"	"
CB-11	"	"	"	"	"	"	"
UOP LLC							
R-56	Bimetallic for semiregen.	Naphtha	Gasol. or BTX	Ext.	48	Al ₂ O ₃	Pt, Re
R-85	Monometallic for semiregen.	"	"	"	41	"	Pt
R-86, -88	Bimetallic for semiregen.	"	"	"	"	"	Pt, Re
R-98	High yield semiregen.	"	"	"	"	"	Pt, Re, P
R-132, -134	High act. for cont. regen.	"	"	Sph.	35	"	Pt, P
R-162, -164	High density for cont. regen.	"	"	"	42	"	"
R-232, -234	Low coke for cont. regen.	"	"	"	35	"	"
R-262, 264	High density, high act., high yield	"	"	"	42	"	"
R-272, -274	Low coke, high yield for cont. regen.	"	"	"	"	"	"
RZ-100	Select. C ₆ , C ₇ conv. to benzene, toluene	"	BTX	Ext.	41	Zeol.	Pt

Dimerization catalysts

AXENS

LC 1252	-	Propylene, butylene	Gasol., hexenes, octenes	"	-	-	"
LC 1255	-	-	"	"	-	-	"
LC 2253	-	Ethylene	Butene	"	-	-	"

Isomerization (C₄) catalysts

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
DIS 111	-	-	-	"	-	-	"

Isomerization (C₄) catalysts

ALBEMARLE CATALYSTS CO. BV

AT-2	High act., water tol.	C ₄	Iso-C ₄	Ext.	48	Al ₂ O ₃	Pt, Cl
AT-10	Low Pt, high act., water tol.	"	"	"	"	"	"
ATIS-1L	High act., high contaminant tol., optimized low platinum content	nC ₄	"	Cyl. ext.	46	"	"

AXENS

ATIS 1L	-	"	"	Cyl. ext	-	-	Pt
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UOP LLC

I-12	Low platinum for n-butane isom.	C ₄	Iso-C ₄	Sph.	50	Al ₂ O ₃	Pd
I-84	High act., higher Pt, difficult feeds	"	"	Ext.	49	"	Pt
I-122	High act., moderate feeds	"	"	"	"	"	"
I-124	High act., low Pt, clean feeds	"	"	"	"	"	"

Isomerization (C₅ and C₆) catalysts

ALBEMARLE CATALYSTS CO. BV

ATIS-2L	High act., high contaminant tol., optimized low platinum content	C ₄ , C ₅ , C ₆ , light naphtha	Iso-C ₄ , Iso-C ₅ , Iso-C ₆	Cyl. ext.	46	"	"
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AXENS

ATIS-2L	Chlorinated	C ₅ , C ₆ paraffins	Low gaso.	Cyl. ext	-	Al ₂ O ₃	Pt
IS 463	-	C ₅ olefins	Iso-5	Sph.	-	-	-

SINOPEC CATALYST COMPANY

FI 15	High act., high catalytic stab.	Light naphtha	Gaso.	Ext.	0.63*	Zeo.	Nobel metal
RISO	High act. for isomerization and good select.	C ₅ , C ₆	C ₅ , C ₆ isomerization catalyst	"	.55-.65	"	Pa

SUD-CHEMIE INC.

Hysopar	High act.	C ₅ , C ₆	High oct.	Ext.	-	P	Pt
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UOP LLC

HS-10	Mod. act., water tol.	C ₅ , C ₆	Iso. C ₅ , C ₆	Ext.	42	Zeo.	Pt
I-8	Act. for C ₅ , C ₆ isom.	"	"	"	50	Al ₂ O ₃	"
I-8 Plus	High act. for C ₅ , C ₆ isom.	"	"	"	"	"	"
I-82	High act., higher Pt, higher severity	"	"	"	49	"	"
I-84	High act., moderate severity	"	"	"	"	"	"
I-122	High act., low Pt, low severity	"	"	"	"	"	"
PI-242	High act., high stab., water tolerant	"	"	"	P	P	Pt, P

Isomerization (xylenes) catalysts

AXENS

Oparis	-	EB, xylenes	Iso	Cyl. Ext.	-	-	-
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Isomerization (xylenes) catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
INDIAN PETROCHEMICALS CORP. LTD.							
Enclite-501	Zeo. based, high stab.	C ₈ reformate	P, o-xylenes	Cyl. ext.	37	P	Zeo.
KATALEUNA GMBH							
8832	Xylene isom.	Arom.	P, o-xylene, benzene	Ext.	0.6*	Al ₂ O ₃ , zeo.	Pt, zeo.
8835	Xylene isom., high dealky act.	"	"	"	0.65*	"	"
8836	"	"	"	"	"	"	"
SUD-CHEMIE INC.							
Isoxyl	Xylene isom.	Arom.	P, o-xylene	Ext.	-	-	Pt
UOP LLC							
I-300	Highly select. xylene isom.	Arom.	P, o-xylene	Sph.	34	-	Pt
I-400	Low ring loss xylene isom.	"	"	"	P	"	P
ZEOLYST INTERNATIONAL							
Z-771	High act. xylene and ethylbenz. isom.	Mixed xylenes, ethylbenzene	P, o-xylene	Ext.	41	P	Nobel metal
Z-8835	Dealky, high paraffin crack. act.	Arom.	"	Cyl.	P	Zeo.	"
Z-8836	High dealky act.	"	"	"	"	"	"
Fluid catalytic cracking catalysts							
ALBEMARLE CATALYSTS CO. BV							
Amber	High accessibility	Resid, very high N/V, Fe	Max. bott. upgrdg.	MS	0.70-0.85*	SiO ₂ , Al ₂ O ₃	Zeo., act. matrix
Aztec	Max. mid. dist.	All	Max. LCO, HCO, min. dry gas, wet gas	"	"	"	"
Centurion	Resid applications	Resids	Max. metals tol., min. coke, Hs	"	0.65 - 0.8*	"	"
Centurion Max	Bott. upgrdg., for regen. temp. limited units	High Ni resid	Max. Ni tol., min. coke, Hs	"	"	"	"
Cobra	Max. product value in oct. bbl mode	All	Max. oct. bbl, min. dry gas, max. LCO, HCO, metals tol.	"	"	"	"
Conquest	Max. conv., max. stab.	"	Max. gaso., LCO, min. dry gas, metals tol.	"	"	"	"
Conquest HD	High ABD, reduced opacity, high press.	"	Max. gaso., LCO, HCO, min. dry gas, metals tol.	"	0.85 - 0.90*	"	"
Coral	Improved accessibility	HVGO, resid, high N/V, moderate Fe	Low coke	"	0.70-0.85*	"	"
Eclipse	Max. isobutylene, max. branched amylenes	"	Max. i-C ₄ =, i-C ₅ = select., oct., bott. upgrdg., min. dry gas	"	-	-	-
Emerald	Increased accessibility	Resid, high N/V, Fe	Max. bott. upgrdg.	"	0.70-0.85*	SiO ₂ , Al ₂ O ₃	Zeo., act. matrix
FOC	Max. throughput with heavy resids	Heavy resids	Max. oct. bbl, metal tol.	"	0.70*	"	"
Opal	High accessibility	Resid, high N/V, Fe	Max. bott. upgrdg., low coke	"	0.70-0.85*	"	"
Ruby	Improved accessibility	HVGO, resid, high N/V, moderate Fe	High bott. cracking	"	"	"	"
Sapphire	Increased accessibility	Resid, moderate to high N/V, Fe	High bott. cracking, low coke	"	"	"	"
BASF CATALYSTS LLC							
ContrOlefin	DMS matrix, mod. Y zeo.	VGO, resid	Low olefin gasoline	MS	0.7-1.1*	Si/Al	Y zeo., DMS matrix
Defender	DMS matrix, max. metals tolerance	Resid	Gasoline, oct.-bbl.	"	"	"	Y zeo., DMS matrix, metals traps

Fluid catalytic cracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
Endurance	DMS matrix, metals tolerance	"	"	"	"	"	"
Engelhard maximum propylene solution (MPS)	Maximizes FCC propylene yield	VGO, resid	Max propylene	"	"	"	Y zeo., DMS matrix, ZSM-5
HDXtra	Prox-SMZ Matrix	VGO	Max. LCO	"	"	"	Y zeo., Prox-SMZ matrix
Flex-Tec	DMS matrix, metals tolerance	Resid	Gasoline, oct.-bbl.	"	"	"	Y zeo., DMS matrix, metals traps
NaphthaClean	DMS matrix, gasoline sulfur reduction	VGO, resid	Low S gasoline	"	"	"	Y zeo., DMS matrix, S reduction
Maxol	Pyrochem-plus zeo., active matrix	VGO	Max. C ₃ /C ₄ olefins	"	"	"	Y zeo., matrix
NaphthaMax	DMS matrix, pyrochem-plus zeo.	VGO, resid	Gasoline, oct.-bbl.	"	"	"	Y zeo., DMS matrix
NaphthaMax II	DMS matrix, pyrochem-plus zeo., lowest coke	"	"	"	"	"	"
NaphthaMax III	DMS matrix, pyrochem-plus zeo., enhanced stability	"	"	"	"	"	"
NaphthaMax-LSG, Naphtha Clean	DMS matrix with sulfur reduction	"	Low S gasoline	"	"	"	"
PetroMax	High activity	"	Gasoline, oct.-bbl.	"	"	"	Y zeo., matrix
PetroMax-DMS	High activity, DMS matrix	"	"	"	"	"	Y zeo., DMS matrix
PetroMax-MD	Active matrix, moderate activity	"	Max. LCO	"	"	"	"
Stamina	Prox-SMZ Matrix, metals tolerance	Resid	"	"	"	"	Y zeo., Prox-SMZ matrix, metals traps
CATALYSTS & CHEMICALS INDUSTRIES CO. LTD.							
ACZ	Mod. zeo., slurry reduc., metals tol., max. stab.	Heavy resid	Max. oct. bbl., metals tol.	MS	0.65-0.85	SiO ₂ , Al ₂ O ₃	Re-USY, active matrix
CRN	High act., stab., high RON	GO	Gasol. oct. bbl.	"	"	"	"
CVZ	CMT matrix, slurry reduc., metals tol., low gas and coke	GO, resid, high Fe	Max. oct. bbl., metals tol., low coke, gas	"	"	"	Re-USY/CMT
DCT	High liquid yield, high metals tol., stab., low coke	GO, resid	"	"	"	"	Re-USY, active matrix
HMR	High liquid yield, low gas and coke	"	Max. oct. bbl.	"	"	"	Zeo., USY, Re-USY
PRM	High matrix act., max. bott. upgrdg.	Heavy resid	Bott. upgrdg, metals tol.	"	"	"	Re-USY, active matrix
STW	High liquid yield, high metals tol., stab.	Resid	Max. oct. bbl., metals tol., low coke, gas	"	"	"	"
GRACE DAVISON							
Advanta	High act. per unit SA	All, esp. CGO	High conversion, low coke and gas, high olefinicity	MS	0.7-0.8*	Al ₂ O ₃	P
APEX	Maximum propylene without cracking activity dilution	All	C ₃ /C ₄ olefins	"	"	P	"
Aurora	Activity, stability, bottoms upgrdg.	"	High conversion, max gasoline, low coke and gas	"	"	Al ₂ O ₃	"
Aurora LLI	Premium attrition resistance	"	"	"	"	"	"
Brilliant	High act., stab., max. bottoms. upgrdg.	"	Coke select., bottoms upgrdg.	"	"	"	"
Futura	High act., stab., low coke and gas	"	Gasol. and dist. production	"	"	"	"
Genesis	Ultimate formulation flexibility	"	Coke selective bottoms cracking; high conversion	"	"	"	"

Fluid catalytic cracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
GFS	Gasol. sulfur reduction, high act., very high metals tol.	"	Low sulfur in gasol.	"	"	"	"
Goal	Min. gasol. olefins, high act., stab.	"	Low olefins in gasol.	"	"	"	"
Impact	Lowest delta coke, maximum stability and metals tolerance	All, esp. high severity or high V	Premium coke and gas selectivity with heavy feedstocks	"	"	"	"
Kristal	High act., stab., metals tol., low coke and gas	All	Max gasoline	"	"	"	"
Midas 100/200	Iron tolerance and bottoms upgrading.	All, esp. high Fe feeds	Max. bottoms upgrdg.	"	"	"	"
Midas 300	Max. bottoms upgrdg./LCO maximization	All	High distillate yield, max. bottoms upgrdg.	"	"	"	"
Nadius	Acidity modification, high activity, bottoms upgrading	Hydrotreated feeds	High conversion	"	"	"	"
Nektor	Coke selectivity	All	High conversion, low coke and gas	"	"	"	"
Nektor-ULCC	Minimum Delta Coke in high metals apps.	Heavy, resid, high metals	Premium coke selectivity with high metals	"	"	"	"
Neptune	Premium gasoline sulfur reduction	All	Maximum gasoline sulfur reduction	"	"	"	"
Nexus	High act., low coke and gas, metals tol., moderate to low zeolite UCS	"	Light olefins, octane bbls.	"	"	"	"
Nomus	Max. bottoms upgrading in high metals, concarbon applications	"	Bottoms upgrdg.	"	"	"	"
Nomus-DMAX	Max. LCO yield in high metals, high concarbon feeds	Heavy, resid, high metals	Maximum bottoms upgrdg. with high metals feeds	"	"	"	"
Orion	Max gasoline with low coke and gas	All	Minimum coke and gas yields, high conversion	"	"	Silica	"
Pinnacle XLC	Minimum Delta Coke with high activity in high metals apps.	Heavy resid esp. high Ni	Premium coke select., with heavy feedstocks	"	"	Al ₂ O ₃	"
ProtAgon	Maximum propylene, with no cracking activity dilution penalty	All	-	"	"	"	"
ResidMax	High act., stab., metals tol., low coke and gas	HVGO, resid	Coke select. bottoms upgrdg. with heavy feedstocks	"	"	"	"
RFG	Gasoline olefins reduction	All	Maximum gasoline olefins reduction, octane retention	"	"	SiO ₂ , Al ₂ O ₃	"
SuRCA	Flexible gasoline sulfur reduction	"	Gasoline sulfur reduction	"	"	"	"
Spectra	Activity and stability, bottoms upgrdg.	Hydrotreated, VGO	High conversion, low coke and gas	"	"	Al ₂ O ₃	"
Ultima	Coke selec. bott. cracking, moderate to low zeolite UCS	All	Light olefins, octane bbls.	"	"	"	"
Vanguard	Coke selectivity and stability with metals tolerance	HVGO, resid	High conv., low coke and gas	"	"	Silica	"
Spectra	Vanadium tolerance	VGO, HVGO	Gasoline	"	"	Al ₂ O ₃	REUSY + Al-Sol/SAM-100
Ultima	Nickel tolerance	"	"	"	"	"	REUSY + SAM-200
Futura	High activity and low delta coke	"	Gasoline with low coke	"	"	"	CSSN + Al-Sol
Brilliant	Bottoms cracking with vanadium tolerance	Resid (with high V content)	Gasoline	"	"	"	CSSN + SAM-100
Kristal	Bottoms cracking with nickel tolerance	Resid (with high Ni content)	"	"	"	"	CSSN + SAM-200
ResidMax	Bottoms cracking	Resid	"	"	"	"	CSX + TMA
Nexus	High stability	VGO, HVGO, HTVGO	Gasoline + increased LPG olefins	"	"	"	Z-21 + SAM-100
Nektor	Low delta coke	Resid	Gasoline with low coke	"	"	"	EnhanceR Technology

Fluid catalytic cracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
Nomus	High bottoms cracking	"	Gasoline	"	"	"	"
Nadius	High conversion	Low metal feeds	"	"	"	"	"
Nektor-ULCC	Improved delta coke performance	Resid	Gasoline with low coke	"	"	"	"
Nomus-DMAX	Increased LCO yield	All	Gasoline + increased LCO	"	"	"	"
Nacer	High activity, bottoms cracking	Low metal feeds	Gasoline + increased C4 olefins	"	"	"	"
ResidCracker	Highest intrinsic bottoms cracking	Resid	Gasoline + increased LCO	"	"	"	"
DieseliseR	Maximum LCO yield	All	LCO maximisation	"	"	"	"
ProtAgon	Maximum propylene with no activity dilution	"	Propylene maximisation	"	"	"	"
INSTITUTO MEXICANO DEL PETROLEO							
IMP-FCC-05	Gasol. select.	GO	High gasol. production	MS	.90*	Amorphous aluminosilicate	Zeol. REY
IMP-FCC-06	Oct. select.	"	High oct. gasol.	"	"	"	"
IMP-FCC-10	High oct.	"	High oct. gasol., high olef., LPG	"	"	"	Zeol., RE-USY
IMP-FCC-11	Oct. bbl	GO, resid	High oct. bbl	"	"	"	"
IMP-FCC-12	Oct. bbl, low delta coke, high metals tol.	"	"	"	"	"	Zeol., USY, RE-USY
IMP-FCC-14	Gasol. select.	GO	High gasol. production	"	"	"	Zeol. REY
IMP-FCC-16	"	GO, resid	"	"	"	"	"
IMP-FCC-32	High metals tol., oct. bbl	GO	High oct. bbl	"	0.73*	"	Zeol. REHY
IMP-FCC-51	Oct. bbl, high metals tol.	"	"	"	0.74*	"	Zeol. REUSY-USY
IMP-FCC-53	Resid	Resid	Gasol. production	"	0.78*	"	Zeol. REUSY
IMP-FCC-54	Oct. bbl	GO, resid	High oct. bbl	"	0.77*	"	"
IMP-FCC-55	Oct. and olef. select.	GO	High oct. and olef.	"	0.76*	"	"
SINOPEC CATALYST COMPANY							
CC-20D	Bott. conv.	All types	Max. LCO	"	.65-.80*	Clay, Al ₂ O ₃	Zeol., matrix
CDC	Low olef. gasol.	Resid	High liquid yield	"	0.65-.75	SiO ₂ , Al ₂ O ₃	"
CDOS	Bott. conv., high liquid yield	All types	Flexible	"	0.65-.77	Clay, Al ₂ O ₃	"
CEP	High stab., C ₂	HVGO, resid	Max. C ₂ =/C ₃ =	"	0.86	"	"
CGP-1	Low olef. gasol., high C ₃ =	All types	High C ₃ =	"	0.65-.80	SiO ₂ , Al ₂ O ₃	"
CGP-2	Low S and olef. gasol., high C ₃	"	"	"	"	"	"
CHP	High stab.	VGO	Max. C ₃	"	>0.8	Clay, Al ₂ O ₃	"
CHV-1	Vanadium tol., act.	All types, especially high V	High conv.	"	.65-.80*	-	-
CHZ 1-4	Various improved USY	All types, especially resid	High oct. bbl	"	>0.66	Al ₂ O ₃	SRNY, SRY
CIP	Metals resistance	HVGO, resid	Max. C ₃ =	"	0.73	Clay, Al ₂ O ₃	Zeol., Y, P
Comet 400	High conv., coke select.	All types	LPG, high oct.	"	0.65-0.8	"	P
COKC1-3	High conv., gasol.	"	"	"	"	"	Zeol., Y, RE-USY
CR-005	"	Resid	Max. liquid yield	"	"	"	RE-USY

Fluid catalytic cracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
CR-022	High gaso., iso-paraffins	All types	Low olef. gaso.	"	0.65	"	REY
CRC	High act., stab.	VGO, resid	Max. gaso.	"	0.78-0.80	"	"
CRP	High stab., olef. select.	HVGO	Act. C ₃	"	0.86	"	P
DMC	Bott. conv.	All types	Max./ LCO	"	0.7	"	Zeo. Y, P
DMMC	High C ₃ = yield	All types, especially resid feeds	Max. C ₃ =select.	"	0.65-0.75	"	"
DOCR	Low coke and gas	All types	High oct. gaso.	"	0.68	"	SRY, RE-USY
DOS	Low S gaso.	"	High liquid yield	"	0.65-0.75	"	Modified zeo. Y
DVR	Max. bott. upgrdg.	Daqing VR	Min. bott.	"	0.63*	"	Zeo. matrix
GOR-C	Select. HT	All types	Low olef. gaso.	"	>0.66*	"	Modified zeo. Y
HGY	High conv., coke select., LPG	"	Max. gaso. oct.	"	-	"	RE-USY
HGYP	High gaso. and gas yield	"	High gaso., C ₃ =yield	"	0.65-0.75	SiO ₂ , Al ₂ O ₃	Zeo. matrix
HPY	High liquid yield	"	High gaso. yield	"	"	"	"
MLC-500	Acid modified zeo.	Heavy feeds	Max. LCO	"	>0.65	Clay, Al ₂ O ₃	"
MMC-2	Metals resistance	HVGO, heavy feeds	High C ₃ = select.	"	0.76	"	Zeo., Y, P
MP051	High LPG, C ₃ =	FCC catalyst additives	High LPG, C ₃	"	.68-85	"	Optional zeo.
DMMC	High C ₃ = yield	All types, especially resid feeds	Max. C ₃ =select.	"	.65-.75	"	"
Orbit series	Max. conv., high V tol.	All types, especially V feed	Max. liquid yield	"	0.72-0.78*	"	RE-USY
OEP-1	High C ₂ =yield	Heavy feeds	High light olefins	"	.80-95	"	Optional zeo.
RAG1-9	High conv., LPG	All types	High oct., LPG	"	0.65-0.75*	"	Zeo., Y, P
RAG1-11	High conv., olefin select.	Heavy feeds	Max. iC ₄₋₅	"	0.72	"	Optional zeo.
RFC	High conv., olef., select.	"	Max. iC ₄₋₅	"	"	"	"
RGD	High conv., olef., LPG select.	"	LPG, LCO	"	0.70*	"	Zeo. matrix
RICC1-3	High conv., gaso.	"	High gaso.	"	.65-.80	"	Zeo. Y, RE-USY
RMMC-1	"	"	"	"	"	"	DASY, Zeo. Y, RE-USY
RSC	High conv., low coke, gas	"	High gaso. select.	"	0.65-0.75	SiO ₂ , Al ₂ O ₃	DASY
VRCC-1	High conv., gaso.	"	High conv., gaso.	"	.68-78	Clay, Al ₂ O ₃	RE-USY
ZC-7000	High conv., high liquid yield	"	Act.	"	0.70-0.76	"	"
ZC-7300	"	"	"	"	"	"	"
ZCM 7	High conv., low coke, gas	Resid	High oct. bbl	"	0.72	"	DASY

Hydrocracking catalysts

ADVANCED REFINING TECHNOLOGIES LLC

NDXi	Highest HDN, arom. sat.	All mid. distillates	ULSD	Sh. ext.	P	P	P
AT580	High HDN, HDA activity	HVGO	HC pretreat	"	"	"	Ni, Mo
NDXi	Highest HDS, Saturation	All mid. distillates	ULSD	"	"	"	P

Hydrocracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
590DX	"	"	HC-pt	"	"	"	"
ALBEMARLE CATALYSTS & NIPPON KETJEN CO., LTD							
KC-2301	Max. mid. dist., jet	LCO, CGO, AGO, HGO	Mid. dist.	Cyl.		P P	P
KC-2601	"	"	Mid. dist., jet	"		" "	"
KC-2610	Mid. dist.	"	Jet, heavy naphtha	"		" "	"
KC-2710, -2715	Max. gaso., jet mid. dist.	"	Gaso., jet, mid. dist.	"		" "	"
KC-3210	Max. diesel	VGO, LCO, DAO, CGO, AGO	"	"		" "	"
KC-3211	"	"	"	"		" "	"
KF-1300	Ebullating bed, improved HDS, conv.	"	VR	"		" "	Ni, Mo
KF-1302	Ebullating bed, low sedim., high conv.	"	"	"		" "	"
KF-1303	Ebullating bed, high HDS	"	"	"		" "	"
KF-1310	Ebullating bed, improved HDS, conv.	-	"	"		" "	"
KF-1311, -1312	Ebullating bed, low sedim., high HDS	Vac. resid	"	"		" "	"
AXENS							
HYC 642	Dist. select	GO, VGO, lubes	Kero., GO	Ext.		51 Special	Ni, Mo
HYC 652	"	"	GO	"		50 "	"
HRK 558	-	-	-	Trilobal ext.		- -	"
HDK 776	HDC	-	-	"		- -	-
HYK 742	-	-	-	"		- -	Ni, Mo
CATALYSTS & CHEMICALS INDUSTRIES CO. LTD.							
NCH-97-13	Stability, hydrocracking	VGO	Gaso., mid. dist.	Ext.		P P	P
R-HYC	Max. gaso., mid. dist.	Resid	"	"		" "	"
V-HYC	"	VGO	"	"		" "	"
CHEVRON LUMMUS GLOBAL LLC							
ICR 175	Medium activity	VGO, AGO, cracked stocks	Hydrocracker pretreat	-		- -	-
ICR 178	"	"	"	-		- -	-
ICR 174	High activity	"	"	-		- -	-
ICR 179	"	"	"	-		- -	-
ICR 142	Low activity, base metal	"	Max diesel	-		- -	-
ICR142v2	"	"	Max middle	-		- -	-
ICR 162	medium activity, base metal	"	Max middle distillate	-		- -	-
IXR 177	"	"	Max diesel	-		- -	-
ICR 180	"	"	Max middle distillate	-		- -	-
ICR 183	High activity, base metal	"	Max naphtha/jet	-		- -	-
ICR 160	"	"	"	-		- -	-
ICR 139	"	"	"	-		- -	-

Hydrocracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
ICR 141	"	"	"	-	-	-	-
ICR 240	Low activity, base metal	"	Max diesel/middle distillate	-	-	-	-
ICR 245	"	"	"	-	-	-	-
ICR 210	High activity, base metal	"	Max naphtha/jet	-	-	-	-
ICR 220	Medium activity, noble metal	"	Max middle distillate	-	-	-	-
ICR 211	High activity, noble metal	"	Max naphtha/jet	-	-	-	-
ICR 209	"	"	"	-	-	-	-
CRITERION CATALYSTS & TECHNOLOGIES							
DN-3100	HDN, HDS, arom. sat.	LCO, HCO, coker GO, AGO, VGO, DAO	Naphtha, kero., diesel, lubes	Sh. ext.		P P	P
DN-3120	"	"	"	"		" "	"
DN-3300	"	"	Naphtha, kero., diesel, HC pretreat	"		" "	"
Z-series	See Zeolyst International list	-	-	-		- -	-
HALDORTOPSOE AS							
TK-925	Max. mid. dist. low prod. arom.	HGO, VGO, LCO, CGO, VBGO	Mid. dist.	Cyl.		P Amorphous	Ni, W
TK-926	"	"	"	"		" "	"
TK-931	"	"	"	"		" Low zeo.	"
TK-941	"	"	"	"		" Zeo.	"
TK-943	Max. mid. dist., cold flow properties	"	"	"		" Low Zeo.	"
TK-951	Max. mid. dist. ultrahigh act	"	"	"		" Zeo.	"
KATALEUNA GMBH							
KL 8380	Select.	-	-	Ext.	0.80*	Al ₂ O ₃	Ni, W
KL 9514	HP	HVGO	-	"	0.70*	SiO ₂ , Al ₂ O ₃	Ni, Mo
SINOPEC CATALYST COMPANY							
FC-12	Good hydrogenation, good flexibility, strong nitrogen resistance and can be operated at medium/high pressure	VGO, CGO, LCO	Naphtha, jet fuel, diesel, unconverted oil	Cyl.	.88-.96*	Zeo., Al ₂ O ₃	W, Ni
FC-14	Max. mid. dist., especially diesel with high activity, diesel and unconverted oil with low solidification point	VGO, CGO, LCO, DAO	Diesel, jet fuel, naphtha, lube oil	"	.87-.93*	Zeo.	"
FC-16	High activity, good mid distillate selection, low solidification point diesel	VGO, CGO, LCO	"	"	.86-.96*	"	"
FC-20	Good high/middle distillate selection, more low solidification point diesel	VGO	Jet fuel, low solidification point diesel	"	.87-.97	Si, Al, Zeo.	"
FC-24	High activity, good selection	VGO, HGO	Reforming feed, jet fuel, diesel, unconverted oil	"	.77-.85*	Zeo.	Mo, Ni
FC-26	High activity, selection and stability, max. mid. dist	VGO	Good quality jet fuel, clean diesel, naphtha, unconverted oil, steam cracking feed	"	.90-1	"	"
FC-32	Good hydrogenation, good flexibility, strong nitrogen resistance and can be operated at medium/high pressure	VGO, CGO, LCO, DAO	Naphtha, jet fuel, diesel, unconverted oil	"	>.90	Zeo., Al ₂ O ₃	W, Ni

Hydrocracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
FC-50	Good mid. dist. selection, good stability	VGO	Diesel, jet fuel, unconverted oil	"	.90-1.00*	"	"
MCI (3963)	Max increasing cetane no., improve diesel product quality	LCO	Diesel with increased cetane no.	Tri.	.77-85*	Al ₂ O ₃	"
MCI (FC-18)	"	"	Low S	"	.85-95*	"	"
RIC-1	Increasing cetane no., reduce density, high HDS	LCO	Diesel with increased cetane no., reduced density, low S	"	0.75*	Zeo.	"
RT-1	High N tol., select. cracking	VGO, AGO, CGO, LCO	Dist. SCR feed	"	0.80*	"	"
RT-5	High N tol., select. cracking, low dry gas	"	"	"	"	"	"
UOP LLC							
DHC-2	High hydrogenation for lube oil	VGO, DAO, CGO, LCO, etc.	Lubes, max. mid. dist.	Sph.		P Amorphous	P
DHC-8	High act. and select. for max. dist.	"	Max. mid. dist., diesel	"		" "	"
DHC-32	"	"	Max. diesel, jet	Ext.		" Zeo.	"
DHC-39	"	"	"	"		" "	"
DHC-41	High act. and flex. products	"	"	"		" "	"
HC-24	Flex. for naphtha, jet	"	Naphtha, jet	"		" "	"
HC-26	N tol., first stage catalyst	"	"	"		" "	"
HC-28	High act. for max. naphtha	"	Max. naphtha	"		" "	"
HC-29	N tol., high act. for first stage	"	Naphtha, jet	"		" "	"
HC-34	Select. for naphtha, jet	"	"	"		" "	"
HC-35	Select. for second stage	"	"	"		" "	"
HC-38	High act., for max. naphtha	"	Max. naphtha	"		" "	"
HC-43	High select. for naphtha, jet, diesel	"	Naphtha, jet, diesel	"		" "	"
HC-53	"	"	"	"		" "	"
HC-80	Dewaxing	"	Dist.	"		" "	"
HC-115	High select. and product quality	"	Max. mid. dist., diesel	"		" "	"
HC-120	High act. and select. for max. dist.	"	"	"		" "	"
HC-150	High select. for naphtha, jet, diesel	"	Naphtha, jet, diesel	"		" "	"
HC-185	Flex. for naphtha, jet	"	Naphtha, jet	"		" "	"
HC-215	High act., select. for mid. dist.	"	Max. mid. dist., diesel	"		" "	"
HC-K	High HDS, HDN	VGO, CGO, LCO	Naphtha, jet, diesel	Quadralobe		" Al ₂ O ₃	"
HC-T	"	"	"	"		" "	"
UF-210 Stars	"	HC feed	HC feed	Ext.		" "	"
ZEOLYST INTERNATIONAL							
Z-503, -513	Mid. dist. select., heavy feed, strong hydrogen.	LCO, HCO, coker GO, AGO, VGO, DAO	Naphtha, kero., diesel	Sh. ext.		P P	Base metal
Z-603	Mid. dist. select., high act. ASA catalyst	"	"	"		" "	"
Z-623	Mid. dist. select.	"	"	"		" "	"
Z-673	"	"	"	"		" "	"
Z-723	Flex. for naphtha, kero., diesel	"	"	"		" "	"

Hydrocracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
Z-733	Naphtha, kero., jet select.	"	"	"	"	" "	"
Z-743	Naphtha, jet select.	"	"	"	"	" "	Noble metal
Z-753	Naphtha select.	"	"	"	"	" "	Base metal
Z-773	"	"	"	"	"	" "	Noble metal
Z-803	Naphtha, kero., jet select.	"	"	"	"	" "	Base metal
Z-853	Naphtha select.	"	"	"	"	" "	"
Z-863	High N tol.	"	"	"	"	" "	"
Z-2513	Dist. select., high act. ASA catalyst	"	"	"	"	" "	"
Z-3723	Mid. dist. select., min light ends	"	"	"	"	" "	"
Z-3733	Flex., naphtha/dist. select. high. act.	"	"	"	"	" "	"
Z-5723	Mid. dist. select., very robust, flex.	"	"	"	"	" "	"

Mild hydrocracking catalysts

ADVANCED REFINING TECHNOLOGIES LLC

KC-2301	Max. mid. dist.	VGO, LCO, DAO, CGO, AGO	Mid. dist.	Cyl.		P P	P
KC-2601	Max. mid. dist., jet	"	Mid. dist., jet	"		" "	"
KC-2602	Max. mid. dist.	VGO, LCO, DAO	Mid. dist.	"		" "	"

ALBEMARLE CATALYSTS & NIPPON KETJEN CO., LTD

KF-1014	Conv. and HDS	HAGO, VGO	Mid. dist.	Cyl.		P P	P
KF-1015	"	"	"	"		" "	"
KF-1015-MD	Max. mid. dist.	VGO, LCO, DAO, CGO, AGO	"	"		" "	"
KF-1022	Max. mid. dist. and HDS	"	"	"		" "	"
KF-1023	"	"	"	"		" "	"

AXENS

HTH 548	Good stab., high mid. dist. select.	HVGO	HC feed	Ext.		54 Special	Ni, Mo
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CATALYSTS & CHEMICALS INDUSTRIES CO. LTD.

HT-D7	Good stab., max. mid. dist., high HDS	VGO	Max. diesel	Ext.		P P	P
NCHO3-35	Stability, mild hydrocracking	"	"	"		" "	"

CHEVRON LUMMUS GLOBAL LLC

ICR 106	Max. diesel, jet, lube, ethylene feed	VGO, CGO, LCO, AGO, DAO	Diesel, jet	Cyl., sh. ext.		61 P	P
ICR 126	Max. diesel, jet, ethylene feed, high conv.	"	Diesel, naphtha, FCC feed, LSFO	"		" "	"
ICR 134	Max. diesel, low. conv., HDN, HDS	VGO, CGO, LCO, AGO, DAO, raffinate	Diesel, naphtha, FCC feed, LSFO, lubes	"		57 "	"
ICR 141	Max. naphtha, flex., low. conv., high stab.	VGO, CGO, LCO, AGO, DAO	Diesel, FCC, LSFO	"		45 "	"
ICR 142	Max. diesel, ethylene feed, lubes	VGO, AGO, DAO, raffinate	Mid. dist. lubes	"		50 "	"
ICR 147	High stab., conv., jet, naphtha	VGO, CGO, LCO	Jet, naphtha	"		45 "	"
ICR 150	Max. diesel, jet, conv.	"	Jet, diesel, lubes	"		54 "	"
ICR 154	Max. diesel, low conv., HDN, HDS	VGO, CGO, LCO, AGO, DAO, raffinate	Diesel, FCC, LSFO, lubes	"		59 "	"

Mild hydrocracking catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
ICR 160	High conv., stab.	"	Jet, naphtha	"	44	"	"
ICR 162	Max. diesel, conv.	HVGO	Mid. dist., lubes	"	49	"	"
ICR 174 STARS	Act., sat., HDN, HDS, low conv.	VGO, LCGO, LCO, AGO, DAO	All products including lubes	"	57	"	"
CRITERION CATALYSTS & TECHNOLOGIES							
RN-412	Metals removal	High metals VGO, AGO	Naphtha, kero., diesel, lubes	Sh. ext.		P P	Base metals
RM-430	"	"	"	"		" "	"
DN-200	HDN, HDS, arom. sat.	LCO, HCO, coker GO, AGO, VGO, DAO	Naphtha, kero., diesel, lubes, HC pretreat	"		" "	P
DN-3100	"	"	"	"		" "	"
DN-3120	"	"	"	"		" "	"
DN-3300	"	"	Naphtha, kero., diesel, HC pretreat	"		" "	"
Z-503, -513	Mid. dist. select., heavy feed, strong hydrogen	"	"	"		" "	"
EXXON RESEARCH & ENGINEERING CO.							
RT-3	Tailored for GO	Virgin, cr. GO	Naphtha, diesel	Cyl. ext.	48	Tailored pore size	Co, Mo
RT-228	Tailored for resids	Resid	"	"	"	"	Ni, Mo
RT-621	"	"	"	"	45	"	Co, Mo
TN-8	Tailored for GO	Virgin, cr. GO	"	Sh. ext.	44	"	Co, Ni, Mo
HALDORTOPSOE AS							
TK-961	Max. mid. dist.	HGO, VGO, LCO, CGO, VBGO	Mid. dist.	Cyl.		" P	Ni, W
TK-962	Max. diesel	"	"	"		" "	"
TK-965	Max. jet, diesel	"	"	"		" "	"
UOP LLC							
DHC-2	Mod. act., bifunctional	VGO, CGO	Dist. HDS, lubes	Sph.		P Amorphous	P
DHC-32	High act. and select. for max. dist.	"	Max. diesel, jet	Ext.		" Zeo.	"
HC-24	Flex. for naphtha, jet	"	Naphtha, jet	"		" "	"
HC-26	N. tol., first stage catalyst	"	"	"		" "	"
ZEOLYST INTERNATIONAL							
MHC-210	Mid. dist. select.	AGO, VGO, CGO, LCO	Naphtha, kero., jet, diesel	Cyl., sh. ext.	45	P	P
Z-503	Mid. dist., select., heavy feed, strong hydrogen	LCO, HCO, coker GO, AGO, VGO, DAO	Naphtha, kero., diesel	Sh. ext.		P "	"
Z-513	Max. mid. dist., high act., stab.	"	Max. mid. dist.	"		" "	"
Z-603	Max. mid. dist., high act.	"	Max. dist., kero, jet	Cyl., sh. ext.	49, 50	Zeo.	"
Z-623	"	"	"	Sh. ext.	51	"	"
Z-673	Mid. dist., select. high conv.	"	"	"	47	"	"

Hydrotreating/hydrogenation/saturation catalysts

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
Z-723	Flex. select., high conv.	"	Naphtha, kero, jet, diesel	Cyl., sh. ext.	49, 51	"	"

Hydrotreating/hydrogenation/saturation catalysts

ADVANCED REFINING TECHNOLOGIES LLC

AR-1	DeMet	AR & VR	LSFO, FCC/HC Feed, Coker Feed, Distillate	Cyl.		P Al ₂ O ₃	P
GR-14	Resid Conversion, DeMet, Desulf, HDCCR	"	"	"		" "	"
GR-21	Resid Conversion, DeMet, Desulf, HDCCR, Sediment Control	"	"	"		" "	"
GR-31	"	"	"	"		" "	"
LS	Resid Conversion, DeMet, Desulf, HDCCR, Good Sediment Control	"	"	"		" "	"
ULS	Resid Conversion, High DeMet, Desulf, HDCCR, Good Sediment Control	"	"	"		" "	"
GR-8XX	Resid Conversion, High DeMet, Desulf, HDCCR, Superior Sediment Control	"	LSFO, FCC/HC Feed, Coker Feed, Distillate	"		" "	"
ICR 122	HDM, grading catalyst	DOA, topped crudes atm. and vac. resids	LSFO, FCC, RFCC, coker resid HDS feed	-		- -	-
ICR 130	High HDN, high CCR removal	"	FCC, RFCC, coker feed	-		- -	-
ICR 131	High HDS, CCR removal, HDM	"	LSFO, FCC, RFCC coker feed	-		- -	-
ICR 132	High HDN, high metals tolerance	"	"	-		- -	-
ICR 137	HDS, HDM, metals tolerance	"	"	-		- -	-
ICR 138	HDM for up-flow reactors, on-stream catalyst replacement reactors	"	"	-		- -	-
ICR 153	High HDS, high CCR removal	"	"	-		- -	-
ICR 161	High HDM, high metals tolerance	"	"	-		- -	-
ICR 167	HDM, HDS, high metals tolerance	"	"	-		- -	-
ICR 170	High HDS, moderate HDM	"	"	-		- -	-
ICR 171	Deep HDS, high MCR removal	"	"	-		- -	-
ICR 181	High HDS, CCR removal, metals tolerance	"	"	-		- -	-
ICR 182	High HDM for up-flow reactors, on-stream catalyst replacement reactors	"	"	-		- -	-
HOP 802	High HDS, CCR removal	DAO, topped crudes, AR, VR	"	Cyl./Sh ext.		P Al ₂ O ₃	P
HOP 813	"	"	"	Sh ext.		" "	"
HOP 811	High HDS, HDN, CCR removal	Atm. and vac. resids	"	Cyl./Sh ext.		" "	"
NDXi	Highest HDN, arom. sat.	All mid. distillates	ULSD	Sh. ext.		" P	"
HOP 473	High HDS	CGO, HVGO, VGO, DAO, resid blends	FCC and HC feed pretreat	"		" Al ₂ O ₃	Co, Mo
HOP 492	High HDN, HDS	CGO, HVGO, VGO, DAO, resid blends, AR, VR	FCC and HC feed pretreat, Iso	"		" "	Ni, Co, Mo
HOP 603	High HDM, high metals tolerance	DAO, topped crudes, AR, VR	LSFO, FCC, RFCC, coker feed	Cyl./Sh ext.		" "	P
HOP 606H	"	"	"	Cyl.		" "	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
HOP 608	"	"	"	Sh ext.	"	"	"
HOP 702	HDS, CCR removal, high, metals tolerance	"	"	"	"	"	"
HOP 805	HDS, CCR removal, high, medium metals tolerance	"	"	"	"	"	"
475	HDS, olefins	Naphthas	Naphthas	"	42	"	Co, Mo
506	Arom. sat.	Dist to HVGO	Specialty	Cyl.	55	P	Ni, Mo
520	HDS, olefins	Naphthas	Naphthas	Sh. ext.	39	Al ₂ O ₃	"
599	Arom. sat.	Dist to HVGO	Specialty	"	55	P	"
AT405	High HDS, HDN	All mid. distillates	Low S diesel	"	50	Al ₂ O ₃	Co, Mo
AT505	Arom. sat.	"	Mid. distillates	"	P	P	Ni, Mo
ICR 132	High HDM, HDS	Through HVGO	FCC and HC pretreat	"	45	"	P
AT535	High HDS, HDN	Naphthas	Cat reformer feed	"	"	Al ₂ O ₃	Ni, Mo
AT575	"	VGO, HVGO, HCGO	FCC and HC pretreat	"	P	P	"
AT580	High HDN, HDA activity	HVGO	HC pretreat	"	"	"	"
AT724G	Si trap	Si containing	All types	"	"	"	P
AT775	High HDS, HDN	VGO, HVGO, HCGO	FCC pretreat	"	"	"	Co, Mo
AT792	Higher HDS, HDN	"	"	"	"	"	Ni, Co, Mo
CDXi	Highest HDS	All mid. distillates	ULSD	"	"	"	P
NDXi	Highest HDS, Saturation	"	"	"	"	"	"
GSK-6A	Active support, bed grading	All types	All types	Ring	34	"	Ni, Mo
GSK-9	Particulate and iron trap	"	"	"	40	"	P
GSK-19	Hold-down material	"	"	"	55	"	"
420DX	Highest HDS	All mid. distillates	ULSD	Sh. ext.	P	"	"
GSK-3A	Active support, bed grading	All types	All types	Ring	34	"	Ni, Mo

ALBEMARLE CATALYSTS & NIPPON KETJEN CO. LTD

HC-DM, UF-110, UF-310 (See UOP listing)

KF-124	HDS	Tail gas	-	Cyl.	P	Al ₂ O ₃	Co, Mo
KF-200	Arom. sat., S tol.	Dist.	Ultra clean dist.	"	"	P	Noble metal
KF-542	Active support	All feeds	-	Ring, sh. ext.	"	Al ₂ O ₃	Ni, Mo
KF-647	HDM, Si removal, As removal	"	Naphtha to heavy VGO	Cyl.	"	"	"
KF-648	HDM, HDS	Heavy VGO, resid	-	"	"	"	"
KF-742	HDS	Naphtha to dist.	-	"	"	"	Co, Mo
KF-752	"	"	-	Sh. ext.	"	"	"
KF-756	Deep HDS	"	-	"	"	"	"
KF-757 STARS	Ultradeep HDS	"	<50 ppm S diesel	Sh. ext., cyl.	"	"	"
KF-760 STARS	"	Diesel to HVGO	-	Cyl.	"	"	"
KF-767 STARS	"	"	-	"	"	"	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
KF-841	HDN, metals tolerant	Naphtha to HVGO	-	Sh. ext.	" "	" "	Ni, Mo
KF-843	Deep HDN	"	-	"	" "	" "	"
KF-844	Si removal, HDS, HDN	Naphtha	-	"	" "	" "	"
KF-846	Deep HDN, arom. sat.	HC feed	-	"	" "	" "	"
KF-848 STARS	Ultradeep HDN, arom. sat.	"	-	"	" "	" "	"
KF-851	HDN, metals tolerant	Naphtha to HVGO	-	"	" "	" "	"
KF-857 STARS	HDS, HDN, HDA	VGO	FCC-PT	"	" "	" "	"
KF-859	"	Naphtha to HVGO	-	"	" "	" "	"
KF-860 STARS	Ultradeep HDN, arom. sat.	HC feed	HVGO with high N	"	" "	" "	"
KF-901	HDS, HDN, MHC	VGO, HVGO	-	Cyl.	" "	" "	"
KF-902	HDS, HDN	"	-	Sh. ext., cyl.	" "	" "	"
KF-905 STARS	"	VGO, HVGO	-	-	-	-	Ni, Co, Mo
KF-INT-R1	HDM, HDS	HVGO resid	-	"	" "	" "	Ni, Mo
KFR-10	HDM	Resid	-	Sh. ext., cyl.	" "	" "	"
KFR-20, -22, -23	"	Resid, DAO, HVGO	-	"	" "	" "	"
KFR-30, -33	HDM, HDS	"	-	"	" "	" "	"
KFR-50,-53	HDS	"	-	"	" "	" "	"
KFR-70,-70B,-72	HDS, HDN, HDCCR	"	-	"	" "	" "	"
KG-1	Descaling, fe trap	All	-	Sph.	" "	P P	"
KG-5	HDM, asphaltene control	Resid., DAO	-	Sh. ext.	" "	" "	"
KG-6	As removal	Naphtha to HVGO	-	"	" "	" "	"
KG-55	High void fraction, hold down	All	-	Penta ring	SiO ₂ , Al ₂ O ₃	" "	"
N-200 (See UOP listing)	-	-	-	-	-	-	-
Nebula-20	Ultrahigh HDS, HDN, HDA	Naphtha toVGO	-	Sh. ext.	" "	P P	P
RF-200 (See UOP listing)	-	-	-	-	-	-	-

AXENS

ACT 077	"	"	"	"	" "	- "	-
ACT 108	"	"	-	Cyl.	" "	- -	-
ACT 645	-	Active top bed	Naphtha	Sph.	" "	- Al ₂ O ₃	Ni, Mo
ACT 931	Rings for delta P mgmt.	"	"	Ring	" "	37 "	"
ACT 951	"	"	"	"	" "	34 "	"
ACT 068	Iron scale trap	-	-	"	" "	- -	-
ACT 069	"	-	-	"	" "	- -	-
ACT 070	"	-	-	"	" "	- -	-
ACT 072	"	-	-	"	" "	- -	-
ACT 078	"	-	-	"	" "	- -	-
ACT 139	-	-	-	Sph.	" "	- -	-

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
ACT 961	-	-	-	Ext.	-	-	Ni, Mo
ACT 935	Grading	-	-	Ring	-	-	"
ACT 971	-	-	-	Tri. Cyl.	-	-	"
ACT 981	-	-	-	"	-	-	"
AX 744	Arom. hydrogen.	High resistance to poisons	-	Ext., multilobe	-	Special	Ni
AX 745	"	"	-	"	-	"	"
AX 746	Olef., arom. hydrogen.	"	-	"	-	"	"
HC 1023	Benzene hydrogen	Benzene to cyclohexane	-	Liquid	-	P	-
HC 1025	"	"	-	"	-	"	-
HMC 841, -845,	-	-	-	-	-	-	-
-868, -945	HDM resid	GO, VGO. atmos. resid	-	Sph.	31	"	"
HR 306, -406	HDS, HDN	Naphtha thru VGO	GO, heating oil, gaso.	"	46	"	"
HR 406	HDS naphtha to VGO	Naphtha to VGO	"	Ext., trilobe	"	"	Co, Mo
HR 448	Ultradeep HDS, HDN, naphtha to VGO	"	S, N free prod.	"	48	"	Ni, Mo
HR 526	High act. HDS for ULSD to VGO	-	-	"	-	"	Co, Mo
HR 538	Ultradeep HDS, HDN, naphtha to VGO	-	FCC feed pretreatment	"	-	"	Ni, Mo
HR 548	High act. Ultradeep HDS, HDN for diesel, VGO	-	-	"	-	"	"
HR 568	"	-	-	"	-	"	Co, Mo, Ni
HR 806	HDS for Prime G+	FCC gaso.	HC pretreat	Sph.	-	"	P
HR 841	"	"	-	"	-	"	"
HR 845	"	"	HC pretreat	"	37	"	"
HR 945	Diolef sat. in naphtha	Naphtha	"	"	-	"	Ni, Mo
HR 516	HDS	"	-	Ext., trilobe	-	-	Co, Mo
HR 626	"	ULSD	-	"	-	-	"
HT 438	HDS of demet. resid	"	-	"	-	"	Ni, Co, Mo
HT 838	HDS, HDN, HD CCR	Resids	-	Tri. cyl.	-	-	"
HTS 358	HDS, HDN for IFP T-Star process	Naphtha, GO	-	Ext.	-	Al ₂ O ₃	"
HTS 458	"	"	-	Cyl. ext.	"	P	-
LD 143	Benzene hydro. to cyclohexane	Liquid phase	Benzene	"	50	Al ₂ O ₃	Ni
LD 145	Diolef., olef. select. hydro	Pygas	Gaso.	"	"	P	Ni, Mo
LD 241	"	"	Sweet gaso.	"	48	"	Ni
LD 265	"	Cracker, FCC, C ₃ , C ₄	C ₃ , C ₄	"	41	"	Pd
LD 267R	Butadiene hydro. for max. 1-butene isom.	"	"	"	40	Al ₂ O ₃	"
LD 269	"	"	C ₄ alkyl pretreatment	Sph.	-	"	"
LD 271	"	Steam cracker propylene	Propylene, butene-1	Cyl. ext.	44	"	Pd, prom.
LD 273	MAPD removal from C ₃	FCC C ₃	Propylene	"	"	"	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
LD 2773	Select. hydrogen. of methylacetylene, propadiene	FCC C ₄	-	Sph.	-	"	"
LD 277	Acetylene removal from butadiene	C ₄ strm. Crack.	Butadiene rich C ₄	"	43	"	"
LD 341	Diolef., olef. select. hydro	Pygas	Sweet gaso.	"	33	"	Ni
LD 441	Select. hydrogen. of diolef	-	-	"	-	"	"
LD 465	"	-	-	"	-	"	Pd
LD 2773	MAPD, acetylene removal from FCC C ₃ , C ₄ , C ₅	FCC C ₃ , C ₄ , C ₅	C ₃ , C ₄ , C ₅	"	44	"	Pd, prom.
LD 485	-	-	-	Sph.	-	-	Pd.
LD 541	-	-	-	Tri. cyl.	-	-	"
TA 801	OATS	-	-	Sph.	-	-	P
BASF CATALYSTS LLC							
REDAR	High aromatic saturation/cetane	Middle	Jet fuel	Sph.	0.7*	P	Precious metal
H 0-25 S3	Select. hydrog. of C ₂	C ₂ cut	Ethylene	Ext.	.68*	Al ₂ O ₃	Pd
H0-25 K3-5	"	"	"	Sph.	.82*	"	"
H 0-31	Select. hydrog. of C ₃	C ₃ cut	Propylene	Ext.	.65*	"	"
H 0-32	"	"	"	"	"	"	"
H 0-35	"	"	"	"	"	"	"
H 0-40	Full hydrog. of C ₃ /C ₄ /C ₅	C ₃ /C ₄ /C ₅ streams	Saturated products	Sph.	.70*	"	"
H 0-41	Select. hydrog. of C ₄	C ₄ streams	Butenes	Ext.	.65*	"	"
H 0-42	"	"	"	"	"	"	"
H 0-43	"	"	"	"	"	"	"
H 0-22	Select. hydrog. of C ₅	C ₅ , C ₅ + cuts	TAME, C ₅ alky, aromatics recovery	Sph.	.70*	"	"
H 0-55	"	"	"	"	"	"	"
H 0-55/35	"	"	"	"	"	"	"
M 8-12	HDS + olefin conversion, vapor phase	C ₅ + cuts	Aromatic recovery	Ext.	.71*	"	Co, Mo
M 8-15	"	"	"	"	.66*	"	"
M 8-21	HDS + diolefin + nitrogen conversion, vapor phase	"	"	"	.73*	"	Ni, Mo
CATALYSTS & CHEMICALS INDUSTRIES CO. LTD.							
CDS-D21	Good stab., high HDS	VGO	VGO	Ext.		P P	P
CDS-LX5	Good stab., deep HDS, max. HDN	Naphtha, kero., diesel	Naphtha, kero., diesel	"		" "	"
CDS-LX6	Good stab., ultradeep HDS	"	"	"		" "	"
CDS-VP2	Good stab., max. HDS, high HDN	VGO	VGO	"		" "	"
NHS-105	Ultradeep HDS	Kero.	Kero.	"		" "	"
NHS-204	S free	Diesel	Diesel	"		" "	"
NHS-231	"	"	"	"		" "	"
NHS-304	"	"	"	"		" "	"
NHS-264	Good stab., max. HDS, high HDN	VGO	VGO	"		" "	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
CHEVRON LUMMUS GLOBAL LLC							
ICR 122	HDM, grading catalyst	DOA, topped crudes atm. and vac. resids	LSFO, FCC, RFCC, coker resid HDS feed	-	-	-	-
ICR 130	High HDN, high CCR removal	"	FCC, RFCC, coker feed	-	-	-	-
ICR 131	High HDS, CCR removal, HDM	"	LSFO, FCC, RFCC coker feed	-	-	-	-
ICR 132	High HDN, high metals tolerance	"	"	-	-	-	-
ICR 137	HDS, HDM, metals tolerance	"	"	-	-	-	-
ICR 138	HDM for up-flow reactors, on-stream catalyst replacement reactors	"	"	-	-	-	-
ICR 153	High HDS, high CCR removal	"	"	-	-	-	-
ICR 161	High HDM, high metals tolerance	"	"	-	-	-	-
ICR 167	HDM, HDS, high metals tolerance	"	"	-	-	-	-
ICR 170	High HDS, moderate HDM	"	"	-	-	-	-
ICR 171	Deep HDS, high MCR removal	"	"	-	-	-	-
ICR 181	High HDS, CCR removal, metals tolerance	"	"	-	-	-	-
ICR 182	High HDM for up-flow reactors, on-stream catalyst replacement reactors	"	"	-	-	-	-
ICR 122	HDM, grading catalyst	"	LSFO, FCC, RFCC, coker resid HDS feed	-	-	-	-
ICR 130	High HDN, high CCR removal	"	FCC, RFCC, coker feed	-	-	-	-
ICR 131	High HDS, CCR removal, HDM	"	LSFO, FCC, RFCC coker feed	-	-	-	-
ICR 132	High HDN, high metals tolerance	"	"	-	-	-	-
ICR 137	HDS, HDM, metals tolerance	"	"	-	-	-	-
ICR 138	HDM for up-flow reactors, on-stream catalyst replacement reactors	"	"	-	-	-	-
ICR 153	High HDS, high CCR removal	"	"	-	-	-	-
ICR 161	High HDM, high metals tolerance	"	"	-	-	-	-
ICR 167	HDM, HDS, high metals tolerance	"	"	-	-	-	-
ICR 170	High HDS, moderate HDM	"	"	-	-	-	-
ICR 171	Deep HDS, high MCR removal	"	"	-	-	-	-
ICR 181	High HDS, CCR removal, metals tolerance	"	"	-	-	-	-
ICR 182	High HDM for up-flow reactors, on-stream catalyst replacement reactors	"	"	-	-	-	-
CRITERION CATALYSTS & TECHNOLOGIES							
DC-2118	Deep HDS, HDN, hydrogen.	Mid. dist., coker GO, LCO, VGO, naphtha	ULSD, FCC feed pretreat	-	-	P P	-
DC-2318	Max. HDS, HDN	Mid. dist., coker GO, LCO	ULSD	Sh.	-	" "	P
DC-2531	Deep HDS	"	Low S diesel, ULSD, ULSK	"	-	" "	"
DC-2551	"	VGO, DAO, CGO	FCC pretreat	"	-	" "	Co, Mo
DN-140	Coker naphtha, Si, HDN	Coker naphtha	High act. with Si uptake	"	-	" "	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
DN-200	High act. HDS, HDN	VGO, CGO, DAO, dist. Naphtha, lubes, wax	FCC feed pretreat, HDS prod., ref. pretreat.	"	"	"	"
DN-3100	Max. HDN, 1st stage HC	CGO, GO, VGO, lubes, LCO	HC feed, lube oils	"	"	"	"
DN-3110	Deep HDS, HDN, hydrogen.	Mid. dist., coker GO, LCO, VGO, lubes, naphtha	ULSD, FCC feed pretreat, lube oil	"	"	"	"
DN-3120	Max. HDN, 1st stage HC	CGO, GO, VGO, LCO	HC feed	"	"	"	"
DN-3300	HDN, HDS, arom. sat.	LCO, HCO, coker GO, AGO, VGO, DAO	Naphtha, kero., diesel	"	"	"	"
DN-3330	Max. HDS, hydrogen.	Mid. dist., heavy SRGO, coker GO, LCO	ULSD	"	"	"	P
DN-3531	High act. HDS, HDN	DHT, naphtha	DHT, naphtha	-	-	-	-
DN-3551	"	VGO, DAO, CGO, lubes, wax	FCC pretreat, lubes, wax	-		P P	Ni, Mo
Interlayer (Co, Mo)	Strong, high act. layer grading	All HDT	-	Sh. ext.	"	"	P
Interlayer (Ni, Mo)	"	"	"	"	"	"	"
LF series	Lic. lube hydroprocessing tech.	VGO, DAO, wax	Lube oils, wax	"	"	"	"
LH series	Shell Global Solutions lic. lube. tech.	VGO, DAO	"	"	"	"	"
LN series	Lyondell lube hydroprocessing	"	Lube oils, white oil	"	"	"	"
MaxTrap (As)	Arsenic removal plus HDS, HDN	Naphtha dist., GO, VGO	Naphtha dist., GO, VGO	"	"	"	"
MaxTrap (Ni, V)	Contaminant metals trapping	Heavy GOs/resid	-	"	"	"	"
MaxTrap (Ni, V) VGO	"	Heavy GOs	"	"	"	"	"
MaxTrap (Si)	Silicon trapping catalyst	Naphtha, dist.	Various	"	"	"	"
OptiTrap Series	Grading materials	All HDT	-	"	"	"	"
RM-5030	HDM	VGO, DAO	-	"	"	"	"
RN-412	VGO, HDM	"	"	Cyl.	"	"	"
RN-650	Resid, tail end HDS	"	"	"	"	"	"
RN-5210	Resid, high act., HDM, HDS, metals tol.	"	"	"	"	"	"
SENTRYSupport (Active)	Active top bed grading	All HDT	-	Ring	"	"	"
SENTRYSupport (Inert)	Inactive, support material	"	-	Sph.	"	"	"
SynCats 1-39, -1-51	For use in Lummus/Criterion Syn tech.	Mid. dist.	ULSD, arom. sat., cold flow improve.	P	"	"	"
TEX-2700 series	Resid, ebullating bed	Resid	RFCC, FCC feed, LSFO	Cyl.	"	"	"
TEX-2800 series	"	"	"	"	"	"	"
TEX-2900 series	"	"	"	"	"	"	"

DEGUSSA AG

H14183	High select. hydrogen.	C ₃ , C ₄ , C ₅	Olef.	Sph.	0.80*	Al ₂ O ₃	Pd
H14197	High act. hydrogen.	"	Diolef.	Ext.	0.70*	"	"
H14213	"	"	"	"	"	"	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
EXXON RESEARCH & ENGINEERING CO.							
RT-3	Good act., regenerability	Virgin, cr. naphtha, dist.	Ref., jet, diesel	Cyl. ext.	48	Tailored pore size	Co, Mo
RT-225	Select. naphtha HDS	Cracked naphtha	Low S gaso.	Sh. ext.	30	"	"
RT-601	Deep HDS act.	Diesel, VGO	Low S diesel	"	45	"	"
TN-8	Good act., regenerability	Virgin, cr. naphtha, dist.	Ref., jet, diesel	"	44	"	Co, Ni, Mo
TN-10	Deep HDS act.	Diesel, VGO	Low S diesel	Cyl. ext.	48	"	"
HALDOR TOPSOE AS							
TK-339	HDO of biofuels	Diesel, biofuels	ULSD	Ext.	P	Al ₂ O ₃	P
TK-341	"	"	"	"	"	"	"
TK-431	Silica absorbing	Coker naphtha	Naphtha	"	"	P	"
TK-437	"	"	"	Ring, ext.	"	"	"
TK-439	"	"	"	Ext.	"	"	"
TK-553	Colour removal	Diesel	ULSD	"	"	Al ₂ O ₃	Ni, Mo
TK-570 BRIM	HDS of diesel fractions	"	"	"	"	"	Co, Mo
TK-575 BRIM	HDS, HDN of diesel fractions	"	"	"	"	P	Ni, Mo
TK-576 BRIM	HDS of diesel fractions	"	"	"	"	Al ₂ O ₃	Co, Mo
TK-907	Arom. reduc. mod. S tol.	"	Low arom. diesel	"	-	P	P
TK-911	Arom. reduc. high S tol.	"	"	"	-	"	"
TK-915	Arom. reduc. high S tol., high act.	"	"	"	-	"	"
TK-928	Dewaxing, cold flow improvement	"	ULSD	Cyl.	P	"	"
TK-560 BRIM	High HDS, HDN of FCC feed	VGO, HVGO, cracked feed	FCC feed pretreatment	Ext.	"	Al ₂ O ₃	Co, Mo
TK-562 BRIM	Highest HDS, HDN of FCC feed	"	"	"	"	"	"
TK-605 BRIM	HC pretreatment	HGO, VGO, LCO, CGO, VBGO	HC feed	"	"	"	Ni, Mo
TK-607 BRIM	Diesel, HC pretreatment	SRGO, VGO, LCO, CGO, VBGO	HC feed, ULSD	"	"	P	P
TK-558 BRIM	High HDN, HDS, FCC feed	VGO, HVGO, cracked feed	FCC feed pretreatment	"	"	Al ₂ O ₃	Co, Mo
TK-527	HDS, HDN of lighter fractions	Naphtha, kerosene	Naphtha	"	"	"	Ni, Mo
TK-559 BRIM	Highest HDN, arom. sat., FCC feed	Naphtha, VGO, HVGO, cracked feed	Naphtha, diesel, FCC feed, lube oil	"	"	"	"
TK-561 BRIM	Highest HDN, arom. sat of FCC feed	"	"	"	"	"	"
TK-719	Fixed bed resid, high HDM, metals tol.	Atm., vac. resid	Resid	Ring, ext.	-	P	Mo
TK-733	"	"	"	"	-	"	Ni, Mo
TK-743	"	"	"	"	-	Al ₂ O ₃	"
TK-753	"	"	"	Ext.	-	P	"
TK-773	Fixed bed resid, high. HDS	"	"	"	-	"	"
TK-10	Inert	Guard catalyst	Naphtha to resid	7 hole cylinder	P	"	Inert
TK-15	"	"	"	Butterfly-shaped	"	"	"
TK-25 TopTrap	"	"	"	QL ring	"	"	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
TK-30	"	"	"	Ring, ext.	"	"	"
TK-45	Arsenic guard catalyst	"	"	Ext.	"	Al ₂ O ₃	P
TK-47	"	"	"	"	"	"	"
TK-453	Silica absorbing	"	"	"	"	P	"
TK-709	Fixed bed resid, high HDM, metals tol.	"	"	Ring, ext.	-	"	Mo
TK-710	"	"	"	Ring	"	P	Co, Mo
TK-711	"	"	"	Ring, ext.	"	"	Ni, Mo
TK-743	"	"	"	"	-	Al ₂ O ₃	"
TK-831	"	"	"	"	-	"	"
KATALEUNA GMBH							
2010	-	-	Alcohol	Tablet	1.0*	SiO ₂	Promoted Cu
6460	Toluene dealky	-	-	Sph.	0.80*	-	K ₂ O, Cr ₂ O ₃
6656	High act., select. hydro.	Pygas, alky feed pretreat.	-	Sh. ext.	0.65*	Al ₂ O ₃	Ni
6660	"	Pygas, solvents, BTX	-	"	0.70*	"	"
6662	-	White oils	-	"	0.78*	"	"
6664	-	"	-	"	0.86*	"	"
7741B	High select. conv.	C ₂ -, C ₃ -, C ₄ , raw cracked	-	Tablet, ring	0.80*, 0.62*	"	Pd
7762	-	Pygas, C ₃ -, C ₄ -, C ₅ -, alky feed pretreat.	Gasol., C ₃ -, C ₄ -, alky feed	Ext.	0.60*	"	"
7763	High act., select. diene hydro.	Pygas, C ₄ diene, acetylene	-	Tablet, ring	0.56*	"	"
7730	High S tol.	Arom. hydrogen.	-	Sh. ext.	0.50*	P	P
7765	C ₃ , C ₄ select. hydro, max. isom.	-	-	Sph., sh. ext.	0.60*	Al ₂ O ₃	Pd
7767	-	Poly-alpha-olef.	-	Sh. ext.	0.52*	"	"
8203	-	Pygas, 2nd stage	-	Sh. ext., ring	0.70*	"	Ni, Mo
8404	-	"	-	"	"	"	Co, Mo
8213	As trap, H ₂ S service	-	-	Sh. ext.	0.60*	"	P
8231	-	Pygas second stage	Sweet gasol., arom.	"	0.85*	"	Ni, Mo
8323	-	"	"	"	0.75*	"	"
8405	-	"	"	"	"	"	Co, Mo
9050	-	Pygas	-	Ring	0.55*	"	Ni
SINOPEC CATALYST COMPANY							
FDO-1	Selective diolefin removal, HDS, decrease olefin by aromarization	FCC gasoline with high S and olefin	Clean gasoline with low S and olefin	Cyl.	.50-.60*	Alumina Zeo.	W, Mo, Ni
FDS-4A	High HDS, good select. and regeneration, good mechanical strength, low loading density, low hydrogen consumption	Naphtha with high s, SR kerosene	Reforming feed, jet fuel	Spe.	.75-.85*	Al ₂ O ₃	Mo, Co
FDW-3	Good iso-dewaxing activity, selection and stability	Diesel, unconverted oil	Lube base oil, diesel with low solification point	Cyl.	.65-.75*	Alumina Zeo.	Noble metal
FF-14	Good sulfur and nitrogen removal ability	VGO, CGO, DAO, HCO	Catalytic cracking feed	Tri.	.94*	Al ₂ O ₃	Mo, Ni, Co

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
FF-18	Good sulfur removal ability Concentrated pore dispersion, large pore volume and surface area, suitable bulk density, high strength, good metal dispersion, high HDN, good stability	"	"	"	1.00*	"	W, Ni
FF-16		VGO, CGO, DAO, LCO, HCO	Feed for hydrocracking	"	.88-.94*	Al ₂ O ₃	Mo, Ni
FF-20	"	"	"	"	1.00*	"	W, Mo., Ni
FF-24	"	"	"	"	0.82	"	Co, Mo, Ni
FF-26	"	"	"	"	1.00*	"	Mo, Ni
FF-36	"	"	"	"	.88*	"	"
FGH-11	Good selective HDS	FCC gasoline with high S	Clean gasoline with low S	Sph.	.60-.70*	"	Mo., Co.
FGH-20	"	"	"	Cyl.	.70-.80*	"	"
FH-40A	High HDS and HDN, low loading density	Naphtha with high S, SR kerosene	Reforming feed, jet fuel	Tri.	.75-.85*	"	Mo, Ni, Co
FH-40B	"	"	"	"	"	"	"
FH-40C	"	"	"	"	.90-1.00*	"	W, Mo, Ni, Co
FH-98	High HDS and HDN, low loading density, good mechanical strength and good refined oil stability	Secondary processing gasoline/diesel, coker full distillate	Naphtha, diesel	"	"	"	W, Mo, Ni
FH-98A	"	"	"	"	"	"	W, Ni
FH-5A	High HDS and HDN	SR diesel, catalytic, coker and blended diesel	Superior clean diesel	Sph.	"	"	Mo, Ni
FH-DS	High HDS and HDN, low loading density, good mechanical strength and good refined oil stability	Diesel with high S	Low S diesel	Tri.	"	"	W, Mo, Ni, Co
FH-UDS	"	"	"	"	.87-.97*	"	"
FH-FS	Low sulfur diesel, largely increase cetane no. of secondary processing diesel	Diesel	Ultra low S diesel	"	1.20-1.40*	Special	W, Mo, Ni
FV-10	Large pore volume, high surface area, good hydrodecolored and aromatics saturation	Full refined wax and part refined wax, microcrystalline wax	Refined wax	"	.82-.88*	Al ₂ O ₃	"
FV-20	"	"	"	"	.79*	"	Mo, Ni
FHJ-1	Good low temp. hydrogenation	Prehydrogenation low S, solvent oil	Solvent with low S and aromatics	Sh.	.95-1.05*	"	Noble metal
FHDA-10	"	"	"	Ext.	.80-1.00*	"	"
FIW-1	Good iso-dewaxing activity, selection and stability	Unconverted oil, hydrorefined wax oil	Lube base oil, white oil and rubber extender oil	"	.68-.75*	Al ₂ O ₃ , Zeo.	"
RA-1	Arom. sat.	Base oil refined	White oils	Tri.	0.90*	Al ₂ O ₃	Ni
RA-3	High arsenic removal, high arsenic capacity	SR naphtha, SR naphtha and coker naphtha mixture, and SR light diesel	Low As naphtha	"	-	-	"
RA-10	High arsenic removal, As tol.	Naphtha and blend, LSR diesel	Low As naphtha	"	0.65*	Al ₂ O ₃	"
RDD-1	Di-olef. removal	SCR gaso.	Low di-olef. dist.	Sph.	0.90*	"	"
RDM-2	HDM, high metals tol.	Atmos. and vac. resid	Feed for RFCC	Tri.	0.60*	"	Ni, Mo
RDM-3	"	"	"	"	0.52*	"	"
RDW-1	Select. cracking, high melting point paraffin	Diesel lube fraction	Low pour point diesel or base oil	Tri., butterfly	0.90*	Zeo.	Ni
RIDOS-1	HDS, olef. sat., low oct. loss	FCC naphtha	Low S and olef. naphtha	Tri.	0.63*	P	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
RJW-1	High HDS, HDN, arom. sat., no cracking	Wax	All grades of wax	"	0.80*	Al ₂ O ₃	Ni, W
RJW-2	"	Microcrystalline wax, VGO	All grades microcrystalline wax	"	"	"	"
RL-1	High HDN, HDS arom. sat.	Light VGO to DAO	High quality base oil	"	0.95*	"	"
RLF-10W	High arom. sat.	Low S, low N	Food grade white oil	Butterfly	0.50*	P	Nobel metal
RMS-1	High HDM, HDS	Atmos. and vac. resid	Feed for RFCC	Tri.	0.60*	Al ₂ O ₃	Co, Mo
RN-32	Ultradeep HDN, arom. sat.	HC feed, VGO, AGO, CGO, LCO	HC feed pretreat	Butterfly	0.91*	P	Ni, Mo, W
RN-32V	Very high HDS, HDN, arom. sat.	FCC feed, VGO, CGO, DAO or blends	FCC feed pretreat	"	"	"	"
RS-1	High HDS, HDN, low arom. sat.	Naphtha and blend	Cat. ref.	Tri.	0.80*	"	Ni, Co, W
RS-1M	-	-	High light oil	Butterfly	0.95	SiO ₂ , Al ₂ O ₃	Ni, W
RS-1000	Ultradeep HDS, HDN, arom. sat.	SRGO, LCO, coker diesel, coker naphtha, or blends	ULSD, low S diesel	"	0.93*	P	Ni, Mo, W
RSDS-1	Select. HDS, low olef. sat., low oct. loss	FCC naphtha	Low S naphtha	Tri.	0.60*	Al ₂ O ₃	Co, Mo
RSN-1	High HDS, HDN, CCR removal	Atmos. and vac. resid	Feed for RFCC	"	0.85*	"	Ni, W
RSS-1A	Mercaptan removal at LP	SR jet	Low mercaptan jet	"	0.80*	"	Ni, Co, W
SHT-1	Selective diolefin removal, HDS, decrease olefin by aromarization	FCC gasoline with high S and olefin	Clean gasoline with low s and olefin	"	.80-.85*	Al ₂ O ₃ , Zeo.	W, Mo, Ni
3936	Concentrated pore dispersion, large pore volume and surface area, suitable bulk density, high strength, good metal dispersion, high HDN, good stability	VGO, CGO, DAO, LCO, HCO	Feed for hydrocracking	"	.88-.94*	"	Mo, Ni
3996	"	-	"	"	.94-.99*	-	"
SUD-CHEMIE INC.							
C-46-7-03	High hydro. sat.	Arom. sat.	Cyclohexane	"	40, 48	SiO ₂	"
C-46-8-03	"	"	-	"	"	Al ₂ O ₃	"
G-68C	Select. hydrogen. of butadiene, isom. of B-1, B-2	C ₃ , C ₄	Alky feed	Tablet	64, 69	"	Pd
G-87	Total hydrogen. of benzene	Benzene	Benzene	Sph.	52, 58	"	Ni
G-97	High hydrogen. act., iso-octene	Arom. sat., iso-octene	Iso-oct.	"	45	"	Pt
G-98B	"	Benzene with S	"	"	48, 52	SiO ₂	Ni, Cu, Co
T-2464	Sat. of C ₄ , C ₅	MTBE, TAME	Dehydrog. feed, alky feed	Ext.	30	"	Pd
T-2647	HDS	FCC gaso.	Gaso.	CDS	36	P	P
UNICAT CATALYST TECHNOLOGIES INC.							
AFS-1010HA	High void	All	Bedgrading	Disc	27.1	-	-
AFS-1025HA	"	"	"	"	28.9	-	-
AFS-1050HA	"	"	"	"	33.3	-	-
AFS-1060HA	"	"	"	"	-	-	-
AFS-HPA Series	"	"	"	"	-	-	-
AFS-MX Series	"	"	"	"	-	-	-
AFS-ST series	Silica guard/high void	"	"	"	-	-	-

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
AFS OCT Series	Ultra high void	"	"	Ocatagon	-	-	-
AFS-Mini	Distribution	"	"	Disc	-	-	-
HT-10R	Inert rings	"	Grading material	Inert	52-68	-	Inert
HT-75	-	Gas, light HC	Hydrogenation and HDS	Ext.	42-48	Al ₂ O ₃	CoMo
HT-75HSA	COS conversion	Light HC service	"	"	36-38	"	"
HT-76	-	Light HC, gas	HDS, HDN, HDM	"	48	"	MoO ₃
HT-80R	Active ring	All	Grading material	Ring	36	"	"
HT-82,83,84R	Olefine saturation	Naphtha	Olefine saturation	"	"	"	NiMo
HT-85	-	Kero, jet, naphtha, light	HDS	Ext.	48	"	-
HT-85R	Active ring	"	Grading material	Ring	36	"	CoMo
HT-86	-	"	HDS, HDN, HDM	Ext.	45-48	"	NiMo
HT-86R	Active ring	All	Grading/hydroprocessing	Ring	36	"	"
HT-88R	High pore vol. As removal	"	Demet ring	"	35-36	"	Ni
HT-95	HDS	Diesel, gas, HC streams	Hydrodesulfurization	Ext.	45	"	CoMo
HT-96	High HDS/HDN	"	Naphtha, hydrocracking pre-treating units, or FCC	"	48	"	NiMo
MR-1P	Ultra high pore volume	All	Metal guard catalyst	"	35	"	"
NSR-119	-	"	As and demet	"	>55	"	Ni
NSR-120	Si high surface	All-coker naphtha	Si guard catalyst	"	45	"	NiMo
ISM	NiMo promoted	-	NiMo promoted support catalyst	Sph.	42-45	-	"
ISMC	CoMo promoted	-	CoMo promoted support catalyst	"	42-55	-	CoMo
MRCP	-	-	Inert Si trap particle	"	40-44	-	-
PDH-10	Hydrogenation	Ethylene	Acetylene Hydrogenation Catalyst	Ext., Sph.	42-48	Proprietary	Pd
PDH-20	-	-	Py-Gas/Alky C ₄ selective hydrogenation catalyst	"	42-45	Al ₂ O ₃	"

UOP LLC

AS-200, -250	Arom. sat.	Naphtha, kero., jet, diesel	Low arom. naphtha, high smoke pt., kero, jet, diesel	Ext.	P	P	P
H-8	"	Naphtha	Low arom. naphtha	Sph.	"	Al ₂ O ₃	"
H-15	Select. hydrogen. of butadiene	C ₃ , C ₄ , C ₅ olef.	C ₃ , C ₄ , C ₅	"	"	"	"
H-18	Benzene saturation	Naphtha with benzene	Low benzene naphtha	Ext.	49	"	Pt
HC-DM	HDM	VGO, DAO, CGO, LCO, Naphtha	-	"	P	"	P
HyLube-100	Lubes	Lube	Lube	Sph.	"	"	"
N-200	High HDS	SR dist. GO	-	Quadralobe	"	"	"
N-205	High HDS, silica trap	"	-	"	"	"	"
RF-200	HDM, HDS, HDN	Resid, HVGO	-	"	"	"	"
S-100	Select. saturation	Alky	Olef. saturation	Ext.	P	"	"

Hydrotreating/hydrogenation/saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
S-120	High HDS	SR dist. VGO	SR dist. VGO	"	45	"	Co, Mo
S-200	Select. HDS	FCC naphtha	Low S naphtha	"		P	Ni, Mo
UF-75	Arsenic removal	VGO, DAO, CGO, LCO, etc.	-	"		"	"
UF-110	High HDS, HDN	SR dist. HVGO	-	Quadralobe		"	P
UF-310	"	Dist. diesel	Dist. diesel	"		"	P

ZEOLYST INTERNATIONAL

Z-704A	S, Ni tol., arom. sat.	GO, LCO, HCO, CGO	Diesel, kero, jet, GO	Cyl.		Zeo.	Noble metal
Z-714A	S, Ni tol., arom. sat., max. liquid yield	"	"	Sh. ext.		"	"

Polymerization catalysts

AXENS

IP 501	Oligomerization	C ₃ /C ₄	Gasol.	Sph.		-	-
IP 811	"	Light olef.	Gasol. and middle dist.	Tri. ext.		-	-

SUD-CHEMIE INC.

C-84-3-01	Form, particle size	Propylene, benzene, butenes	Propylene tetramer, high oct. gas	Ext.	55	Diatomaceous earth	H ₃ PO ₄
C-84-3-02	"	"	"	"	"	"	"
C-84-5-01	-	"	Polygas, cumene, high olef.	"	"	SiO ₂	"
CA 131	Polymerization, alky	Propylene	Cumene	"	52	"	"
COD	Polymerization	"	Polygas	"		P	P

UOP LLC

HO-B1, -B2	Controlled act., high olef.	Propylene, butene, pentene, benzene, toluene	Petrochemicals, gasol.	Ext.		P	SiO ₂
SPA-1, -2	High act., select.	"	"	"	58	"	"
SPA-1C	"	"	"	"		P	"

S (elemental) recovery catalysts

ALCOA

S-100 1/4"	High act.	H ₂ S, SO ₂ , COS, CS ₂	All converters	Sph.	45	Act. Al ₂ O ₃	Act. Al ₂ O ₃
S-100 3/16	"	"	"	"		"	"
S-400 1/4"	Higher act., high macroporosity	H ₂ S	S	"	42	"	"
S-400 3/16"	"	"	"	"		"	"

AXENS

AM	Sulfation protection	H ₂ S	S	Sph.	48	Al ₂ O ₃	Fe
AMS	"	"	"	"		"	P
CR	S recovery	"	"	"		-	"
CR 3S	Optimal macroporosity for max. conv.	"	"	"	42	"	-
CRS 31	High COS and CS ₂ conv.	"	"	Cyl.	59	TiO ₂	TiO ₂
DR	First-Generation Claus	"	"	"	47	Al ₂ O ₃	-
CSM 31	-	-	-	Sph.		-	-

S (elemental) recovery catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
DR 5-10	-	-	-	"	-	-	-
BASF CATALYSTS LLC							
DD-431	High act, SA, macroporosity	H ₂ S, SO ₂	Claus converters	Sph.	40	Al ₂ O ₃	Act. Al ₂ O ₃
DD-831	Sulfation resistance, improved COS conversion	H ₂ S, SO ₂ , COS	"	"	48	"	P
DD-931	High COS and CS ₂ conversion	H ₂ S, SO ₂ , COS, CS ₂	"	"	49	"	TiO ₂ /Al ₂ O ₃
S-100	High act., robust	H ₂ S, SO ₂	"	"	45	"	Act. Al ₂ O ₃
S-400	High act, macroporosity	"	"	"	48	"	"
S-100SR	Sulfation protection when O ₂ present	"	"	"	49	"	Fe
Ti-1100e	High COS and CS ₂ conversion, sulfation resistant	H ₂ S, SO ₂ , COS, CS ₂	"	Ext.	50	TiO ₂	TiO ₂
SRC-99ti	"	"	"	"	"	"	"
SRU ABS	Active bed support	H ₂ S, SO ₂	Bed support	Sph.	45	Al ₂ O ₃	Act. Al ₂ O ₃
DEGUSSA AG							
H9050	High COS, CS ₂ conv.	H ₂ S, SO ₂ , COS, CS ₂	S	Ext.	0.90*	Titania	-
H90102	S absorp.	Olef.	Olef.	Tablet	1, 2*	ZnO	-
GAS TECHNOLOGY PRODUCTS LLC							
ARI-350	Active ingredient in liquid	Ref. gas, SWS gas, tail gas, nat. gas	Elemental S	Liquid	74.8	None	Fe
ARI-340	"	"	"	"	77.9	"	"
HALDOR TOPSOE AS							
CKA	COS hydrolysis	-	COS-cont. gas	Ext.	0.60*	Al ₂ O ₃	-
POROCEL CORP.							
Maxcel 727	High act. claus	H ₂ S, SO ₂ , COS, CS ₂	Claus sulfur unit	Sph.	40	Act. Al ₂ O ₃	Act. Al ₂ O ₃
Maxcel 747	Promoted claus	"	"	"	46	Prom. Al ₂ O ₃	Prom. Al ₂ O ₃
Maxcel SD-A	Sub-dewpoint SRU	H ₂ S, SO ₂	"	"	39	Act. Al ₂ O ₃	Act. Al ₂ O ₃
UOP LLC							
S-201	High H ₂ S, SO ₂ conv., durability	H ₂ S, SO ₂ , COS, CS ₂	All converters	Sph.	42	Act. Al ₂ O ₃	Act. Al ₂ O ₃
S-2001	High durability, macroporosity, subdewpoint	"	"	"	41	"	"
S-7001	High COS, CS ₂ conv., sulfation resistant	"	"	Tablet	44	TiO ₂	TiO ₂
Selectox-32	Solid for oxide. of H ₂ S to S	Ref. gas, nat. gas, waste gas	S, no SO ₃	Ext.	P	P	Non-noble metal
Selectox-33	"	"	"	"	"	"	"

Steam hydrocarbon reforming catalysts

BASF CATALYSTS LLC							
G 1-80	Pre-reforming	Nat. gas/naphtha	H ₂ , Syngas	Tablet	-	Complex oxide	Ni
HALDOR TOPSOE AS							
AR-301	Pre-reforming	Nat. gas, offgas	H ₂ , CO, CO ₂	Cyl., 7-hole	1.25, 1.05*	MgAl ₂ O ₃	Ni
LK-811	Medium temp. shift	Shift effluent	CO gas	Cyl.	1.0*	Cu, Zn, Al	Cu, Zn, Al
LK-821-2	Low temp. CO conv.	High-temp. shift effluent	0.1-0.3% CO gas	"	1.0*	"	"

Steam hydrocarbon reforming catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
LK-823	Low temp. CO conv., low methanol formation	"	"	"	"	"	"
LSK	Low temp. shift chlorine guard	"	"	"	"	"	"
PK-5	Methanation	"	"	Ring	0.6*	Al ₂ O ₃	Ni
PK-7R	Methanation, low-temp.	"	"	"	"	"	"
R-67-7H	High act. steam reforming	Nat. gas	H ₂ , CO, CO ₂	7-hole	1.0*	MgAl ₂ O ₃	"
RK-201	High act. steam reforming, low alkaly promoted	C ₁ - C ₄ , offgas	"	"	"	MgAl ₂ O ₃ , CaAl ₂ O ₃	"
RK-202	High act. steam reforming, alkaly promoted	Naphtha, LPG, nat. gas	"	"	"	"	"
RKNGR	Pre-reforming	"	"	Cyl., 7-hole	1.05, 0.90*	MgO	"
RKNR	High-act. steam ref.	Naphtha, LPG, CH ₄	"	Ring	1.0*	"	"
SK-201-2	High temp. CO conv., act., no by-product at low S/C ratio	Steam ref. effluent	2-3% CO gas	Cyl.	"	Fe, Cr	Fe, Cr, Cu
JOHNSON MATTHEY CATALYST							
11 series	Methanation	Lt. shift effluent	CO, CO ₂	Pellet	75	MgO, Al ₂ O ₃	Ni
23 series	Steam reforming	Nat. gas, offgas	Syngas	Ring or 4 hole cyl.	70, 75	Al ₂ O ₃	"
25 series	"	Hydrocarbons to C ₅	"	"	56, 62	Calcium Al ₂ O ₃ te	"
46 series	"	LPG, naphtha	"	"	"	Prom. refractory	Ni, prom.
57 series	"	Nat. gas, offgas	"	"	"	Calcium Al ₂ O ₃ te	Ni
71-5	High temp. CO shift conv.	Steam ref. effluent	2 - 3% CO gas	Pellet	78	Complex refractory	Fe, Cr oxide, Cu prom.
83-3	Low temp CO shift conv.	High temp. shift effluent	0.1 to 0.3% CO gas	"	86	-	Cu, Zn, Al ₂ O ₃
83-3 K/X	"	"	"	"	"	"	Cu, Zn, Al ₂ O ₃ , prom.
83-5/6	Interm. temp. CO shift	"	<1% CO gas	"	81	"	"
CRG series	Prereforming, prerduced avail.	Nat. gas to naphtha	Methane, H ₂	Tablet	85	"	Ni, prom.
Dycat 800 series	High act. steam reforming	Nat. gas, LPG	Syngas	Ring, fluted	64	Al ₂ O ₃	Ni, La ₂ O ₃
Dycat 930 series	Heavy hydrocarbon steam reforming	LPG	"	"	64	Mod. Al ₂ O ₃	Ni, Al ₂ O ₃
K8-11	Sour shift conv.	-	2-3% CO gas	Pellet	44	MgO, Al ₂ O ₃	Co, Mo
KATALEUNA GMBH							
6524 T	Methanation	-	-	Tablet	35, 45	Al ₂ O ₃	Ni
6542 T	"	-	-	"	65, 80	CrO ₂ , Al ₂ O ₃	"
SUD-CHEMIE INC.							
C11-9-01-04/06	Different composition	Nat. gas, C ₃ H ₃ feed	H ₂	Ring	70, 95	Refractory	Ni
C11-9 HGS	"	"	"	Wheel	70	Al ₂ O ₃	"
C11-9 LDP	High act. non-prom.	Nat. gas	"	Cyl.	"	"	"
C11-PR3	Prereforming	LPG, heavy offgas	-	Tablet	60	"	"
C11-9-061	High act. K prom.	C ₄ H ₁₀ , naphtha	"	Ring, wheel	80-85	"	"
C11-9-062	"	"	"	"	70	"	"
C11-N/C-11-NK	High act. K promoted, split loaded	"	"	Raschig ring	67	"	"
C12-3-05	High-temp. shift conv.	Process gas ex. ref.	CO-free gas	Tablet	65	-	Fe, Cr

Steam hydrocarbon reforming catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
C12-4-01	Promoted HTS	High temp.	"	"	"	"	"
C13-3	Methanation	Process gas	H ₂	"	"	Refractory	Ni
C13-4	"	"	"	Sph.	55	"	"
C13-5	"	"	"	"	60	"	"
C18-7	High act., stab. low temp shift	"	CO ₂ -free gas	Tablet	80	Al ₂ O ₃	"
C18-HA	Mod. act., low temp. shift	"	"	"	"	"	"
C18-HALM	Low methanol, high act., LTS	"	"	"	80, 85	-	Cu
C18 HC	Low temp. shift conv.	"	"	"	"	-	"
C18 HCS	"	"	"	"	70, 80	-	"
C25-2-02	CO, H ₂ S shift	Process gas, partial ox.	H ₂	"	-	"	Co, Mo
C150-6-01	Prereforming	LPG, heavy offgas	-	"	60	"	Ni
G-3	High-temp. shift conv.	Process gas ex. ref.	CO-free gas	"	70	-	Fe, Cr
G-65	CO, H ₂ S shift	Process gas, partial ox.	H ₂	"	-	"	Co, Mo
G-65RS	Elevated temp. tol.	"	"	Ext., tablet	58, 60	"	"
G-66B	Low temp. shift conv.	Process gas	"	Tablet	85, 90	-	Cu
G-87	Methanation	Process gas, partial ox.	"	Ext.	60	"	"
G-87RS	"	"	"	Sph.	55	"	"
G-90	Different composition	C ₃ H ₈ feed	"	Raschig ring	50, 60	"	Ni
G-91 LDP	High act., alkaly promoted	Nat. gas, C ₄	"	Cyl.	60	Refractory	"

UNICAT CATALYST TECHNOLOGIES INC.

MC-710	-	Methanators	Methanation catalyst	Ext., sphere	55-68	Al ₂ O ₃	NiO
MC-710R	Pre-reduced	"	"	"	52-55	"	Ni+NiO
MC-720R	"	Ethylene operations	"	"	52-54	"	"
MC-750ER	-	SNG plant	Deep methanation Catalyst	Ext.	62-75	"	"
MS-900	-	Methanol synthesis	Low shift active Methanol Synthesis Catalyst	Pellets	74-89	"	CuO & ZnO
MYD-600	-	MYDREX reformers	Bottom support catalyst	6 hole cylinders or 5 hole spheres	"	"	Inert
MYD-604	-	"	Medium activity catalyst	"	"	"	NiO
MYD-604L	Quad metal type carrier	"	"	"	55-59	"	"
MYD-608	High activity	"	High activity reforming catalyst- MYDREX	"	60-68	"	"
MYD-610	Very high activity	"	Very high activity reforming catalyst- MYDREX	"	"	"	"
NG-600-6H	Cemented carrier and shape optimized	Secondary reformers	Secondary reforming catalyst	6 hole cylinder with convex ends	65 or 61	Cemented w/ SiO ₂	"
NG-600X	High thermal resistance	"	"	6 hole and ring shaped	62-68	Sintered alumina	NiO+Cr ₂ O ₃
NG-605-6H	Lower sections	"	"	6 hole shape optimized	68 or 62	Al ₂ O ₃	NiO

Steam hydrocarbon reforming catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
NG-610-5HQL	Lower DP	Steam reformers	Low DP steam reforming catalyst	5 hole cylinder with convex ends and 4 side-wall channels	58-59 or 60-61	"	"
NG-610-6H	Lower DP; higher activity	Hydrogen, ammonia, syngas, methanol plants	Primary steam reforming catalyst	6 hole cylinder with convex ends	60-65	"	"
NG-611-6H	Heavy gas	Propane, butane, and naphtha	Heavy gas/low S/DG steam reforming catalyst	"	55	"	"
NG-612-6H	-	Heavy gas	-	-	-	-	-
NG-615-4K	Heavy gas	Naphtha	Heavy gas/steam reforming catalyst	6 hole cylinder with convex ends	58-62	Ca+Al	NiO+K ₂ O
NG-615-6H	-	LPG, C ₄ , C ₃	Naphtha steam reforming catalyst	4 hole shape optimized with convex ends	55	MgAl ₂ O ₄	"
NGPR-1	Heavy NG	Natural gas	NG pretreater	Cylindrical pellets	62-68	Al ₂ O ₃	Ni+NiO
NGPR-2	-	Hydrocarbon streams	Heavy hydrocarbon pre-reforming catalyst	"	68	"	Ni, NiO
SR-101C	Very high surface area and pore volume	-	H ₂ S removal	3mm or 4mm ext.	48-52	-	Fe
SR-109	-	Natural gas, light naphtha, off-gas, and light hydrocarbons	"	-	68-75	-	ZnO
SR-110	High GSV	"	H ₂ S/light mercaptans Removal	3mm sph.	>71	-	"
SR-110C	Low temperature	Natural gas, syngas, CO ₂ , LPG, gasoline, propane, butane, and other HC streams	COS removal	4mm/2.5mm/1.6mm ext.	>53	-	"
SR-111	High temperature	Natural gas, light naphtha, off-gas, and light hydrocarbons	Maximum H ₂ S removal	4mm ext.	75-84	-	"
SS-445	-	Gasification	Sour shift catalyst-CO-CO ₂	4mm	46-48	Al ₂ O ₃	CoO+MoO ₃ +MgAl ₂ O ₃
SS-445G	-	"	"	6mm ext.	"	"	"
SS-450	2nd/3rd stage sour shift catalyst	"	-	-	55 particle	TiO ₂ + gAl ₂ O ₄ +Al ₂ O ₃	MoO ₃ +CoO
TSR-117G	High temperature	LNG, CO ₂ natural gas, and light HC streams	Sulfur removal	5*5mm or 5*2.5mm tablet or 4mm ext.	80	-	CuO+ZnO
Unimol 3A	-	Gas, ethylene, propylene, ethanol, methanol, etc.	General purpose drying agent	4*8 or 8-12 mesh/ 3-5mm or 1.5-2 mesh	45-46	-	Zeo.
Unimol 5A	-	HC streams	-	1/8" or 1/16"	42-45	-	"
Unimol PSA-5	-	-	PSA	1.2-2.5mm	42-48	-	-
Unicarbon HRU-PSA	-	-	"	6X10 mesh	36	Carbon	-
WR-11	-	Gas streams	"	2.5-3mm and 3-5mm sph.	45-48	Al ₂ O ₃	-
HS-500	-	-	High temperature shift catalyst	Cylindrical pellets	88	"	-
LS-402	-	Ammonia and hydrogen plants	Low temperature shift catalyst	6*4mm or 5*2.5-3mm	75-80	-	ZnO+CuO
LS-402LM	-	-	Low methanol	6*4mm or 5*2.5-3mm Mini: or 4*2.5-3mm	78	-	"
LS-401CG	-	-	LTS chloride guard	6*4mm tablet	74	-	"

Sweetening catalysts

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
Sweetening catalysts							
AXENS							
LCPS 30	LPG, gaso., kero.	FCC gaso. kero.	-	Liquid	72	-	P
GAS TECHNOLOGY PRODUCTS LLC							
ARI-100L	Solution of active metal	LPG, gaso.	Merox, Mericat	Liquid	-	None	P
ARI-100EXL	"	"	"	"	-	"	"
ARI-120L	Active metal	LPG, gaso., kero, jet	Mericat II, fixed bed	Powder, slurry prep. required	-	"	"
UOP LLC							
Merox CF	Promoter for caustic free	Gas., kero., jet	Caustic feed sweetening	Liquid	-	-	P
Merox FB	Catalyst for mercaptan conv.	Gas., kero., jet, lt. diesel	Fixed bed	"	-	-	"
Merox No. 8	Mercaptan conv.	"	"	Granular	30	Activated C	"
Merox No. 10	High act., heavy feed	Kero., jet	"	"	"	"	"
Merox No. 21	Caustic free mercaptan conv.	Gas, LPG, LSR	Caustic feed sweetening	"	"	"	"
Merox No. 31	"	Kero., jet	-	"	"	"	"
Merox Plus	Prom. for fixed bed	Gas., kero., jet	Fixed bed	-	-	-	"
Merox WS	Catalyst for mercaptan conv.	Gas, LPG, LSR	Liquid	Liquid	-	-	"
Claus unit tail gas treatment catalysts							
ALBEMARLE CATALYSTS & NIPPON KETJEN CO., LTD							
KF-124 HD-3E	Rugged	Claus tail gas	-	Cyl.	48	Al ₂ O ₃	Co, Mo
KF-124 LD-1/8"	Low density, rugged	"	-	"	38	"	"
KF-165-3E	Rugged	-	-	"	-	-	-
ALCOA							
S-100 1/8"	Higher SA	Claus tail gas	Sub dew pt. reactor	Sph.	45	Activated Al ₂ O ₃	Activated Al ₂ O ₃
S-400 3/16"	Higher act., high macroporosity	"	"	"	42	"	"
TG-431-3/16"	Ultrahigh macroporosity	"	"	"	41	"	"
AXENS							
TG 103	Total reduc. of tail gas S	Claus tail gas	-	Sph.	47	Al ₂ O ₃	Co, Mo
TG 107	"	Low temp. TGT	-	"	-	"	"
TG 136	"	"	-	Cyl. ext.	-	"	"
TG 123	TGT	-	-	Sph.	-	-	"
BASF CATALYSTS LLC							
DD-431	High act., SA, macroporosity	Claus Sub dewpt tail gas	Sub-Dewpoint RXR	Sph.	40	Al ₂ O ₃	Act. Al ₂ O ₃
S-100SR	Sulfation protection when O ₂ present	"	"	"	49	"	Fe
SRU ABS	Active bed support	H ₂ S, SO ₂	Bed support	"	45	"	Act. Al ₂ O ₃
CRITERION CATALYSTS & TECHNOLOGIES							
099	Incin. of Claus, SCOT tail gas	Claus, SCOT tail gas	-	Sph.	P	Al ₂ O ₃	P

Claus unit tail gas treatment catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
234	Conv. of S compounds. to H ₂ S	Claus tail gas	-	Sph. ext.	" "	" "	Co, Mo
534	"	"	-	"	" "	" "	"
734	Low temp. conv. of S compounds to H ₂ S	"	-	"	" "	" "	"
GAS TECHNOLOGY PRODUCTS LLC							
ARI-350	Active ingred. in chelated aqueous solution	Claus tail gas, amine acid gas	Elemental S	Liquid	74.8	-	Fe
ARI-340	"	Ref. gas, SWS gas, amine tail gas, nat. gas	"	"	77.9	-	"
HALDORTOPSOE AS							
TK-220	HDS	Claus tail gas	-	Ext.		P Al ₂ O ₃	Co, Mo
TK-222	"	Claus tail gas	-	Ring		" "	"
TK-224	"	Claus tail gas	-	Sph.		" "	"
POROCEL CORP.							
Maxcel 727	High act. Claus	H ₂ S, SO ₂ , COS, CS ₂	Claus sulfur unit	Sphere	40	Act. Al ₂ O ₃	Act. Al ₂ O ₃
Maxcel 747	Promoted Claus	"	"	"	46	Prom. Al ₂ O ₃	Prom. Al ₂ O ₃
Maxcel SD-A	Sub-dewpoint SRU	H ₂ S, SO ₂	"	"	39	Act. Al ₂ O ₃	Act. Al ₂ O ₃
SUD-CHEMIE INC.							
C29-2-02	-	Claus tail gas	-	Ext.	37	Al ₂ O ₃	Co, Mo
C29-2-03	Stab. carrier	"	-	"	"	"	"
C29-2-04	Stab. carrier, lower metals	"	-	"	"	"	"
G-4IP	COS hydrolysis	High CS ₂ /COS conv.	-	"	34, 38	"	P
UOP LLC							
S-201	High H ₂ S, SO ₂ conv., durability	H ₂ S, SO ₂ , COS, CS ₂	All converters	Sph.	42	Act. Al ₂ O ₃	Act. Al ₂ O ₃
S-2001	High durability, macroporosity, subdewpoint	"	"	"	41	"	"
S-7001	High COS, CS ₂ conv., sulfation resistant	"	"	Tablet	44	TiO ₂	TiO ₂
Selectox-32	COS, arsine removal	"	-	"	"	"	Non-noble metal
Selectox-33	CO ₂ and S removal	"	-	"	"	"	"

Other refining catalysts

AXENS							
ACG 369	S sorbing (vapor phase)	Ref. feed	S free ref. feed	Pellet	60	Al ₂ O ₃	P
CMG 273	Mercury removal	Various	Liquid, gas	Sph.	41	"	"
CMG 841	Arsenic removal, ethylene feed	"	-	"	37	"	Ni
D 1275	S sorbing (liquid phase)	"	-	Clover	47	"	"
MEP 171,- 191	Arsenic removal	C ₃	C ₃	Sph.	37	"	PbO
MEP 841	"	Naphtha	Naphtha to select. hydrog.	"	"	"	NiO
ACT 979	Guard bed	Arsenic, silicon	-	"	-	-	-
CMG 171	Mercury removal	Hydrocarbon liquids	-	"	-	-	-
CMG 271	"	Gases	-	"	-	-	-

Other refining catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
CMG 406	Mercury, arsenic removal	Liquid hydrocarbon	-	Trilobal ext.	-	-	-
PHI 402	Transformation	FT paraffins	-	Cyl. ext.	-	-	Pt
BASF CATALYSTS LLC							
EMCAT series	Moving bed catalytic cracking	Heavy gas oil	LPG, gasoline, LCO	Ext.	0.95*	In situ zeo.	Y zeo./matrix
HZ Plus series	"	"	"	"	"	"	"
Selexcat	High activity, SA, macroporosity	HC gases, liquids	COS hydrolysis	Sph.	47	Al ₂ O ₃	Act. Al ₂ O ₃
Selexsorb AS	Arsine, H ₂ S, COS, removal	HC streams, esp. olefins	Various	"	50	"	CuO
Selexsorb CD	Mercaptans, sulfides, nitriles and oxygenates removal	"	"	"	43	"	P
Selexsorb COS	COS, CO ₂ , H ₂ S, CS ₂ removal	"	"	"	49	"	"
Selexsorb HG	Mercury removal	Various	"	Pellet	34	Carbon	"
Selexsorb SG	Sulfur removal	HC gases, liquids	"	Sph.	52	Al ₂ O ₃	"
Sorbead R	Dehydration	HC gases	"	"	44	SiO ₂	SiO ₂
Sorbead H	Hydrocarbon recovery, NG dew-pointing	"	"	"	"	"	"
Sorbead WS	Water stable, protection layer for dehydration units	"	"	"	"	"	"
CL-750	HCl	HC gases, liquids	"	"	48	Al ₂ O ₃	P
CL-760	"	"	"	"	52	"	"
HF-200	HF and organic fluoride removal	"	"	"	48	"	Act. Al ₂ O ₃
HF-200XP	"	"	"	"	"	"	P
Xylapure	Olefin alkylation, decolorization, max selectivity	Aromatics	Xylenes	"	41	Montmorillonite	H ₂ SO ₄
HPNIVB	Alky feed pretreatment	C ₃ 's, C ₄ 's	Alky feed	"	50	Al ₂ O ₃	Pd
HPNV	Alky or TAME feed pretreatment	C ₅ 's	"	"	"	"	"
E-143	Alky feed pretreatment	C ₃ 's, C ₄ 's, C ₅ 's	"	"	55	"	"
E-144	"	"	"	"	"	"	"
E-315	High capacity Arsine, H ₂ S, COS removal, H ₂ continuous streams	Olefin from FCC, coker	De-S Olef	"	60	"	"
E-443	Alky feed pretreatment	C ₃ 's, C ₄ 's, C ₅ 's	Alky feed	"	55	"	"
E-445	"	C ₃ 's, C ₄ 's, C ₅ 's	"	"	"	"	"
EMCAT series	Moving bed catalytic cracking	Heavy gas oil	LPG, gasoline, LCO	Ext.	0.95*	In situ zeo.	Y zeo./matrix
HZ Plus series	"	"	"	"	"	"	"
F-24	Olefin alkylation, decolorization, high activity	Aromatics	BTX, xylenes, cumene	Granular	45	Montmorillonite	H ₂ SO ₄
F-54	Olefin alkylation, decolorization, high selectivity	"	"	Sph.	40	"	"
D-1275	High capacity, liquid phase S removal	Hydrotreated naphtha, gasoline	Feed for ref and isomerization	Sh. ext.	47	Al ₂ O ₃	Ni
Puristar R3-12	High capacity Arsine, H ₂ S, COS removal	Olefin from FCC, coker	De-S Olef	Tablet	72	"	Cu, Zn
Puristar R3-81	High activity and selectivity, removal of NOx and O ₂	"	Ethylene, propylene for recovery	"	52	P	Cu, L
CHEVRON LUMMUS GLOBAL LLC							
ICR 404	First generation dewaxing catalyst	Hydrocrackate, raffinate, hydrotreated feedstock	Lube base oils, white oils	-	-	-	-

Other refining catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
ICR 408	Second generation dewaxing catalyst	"	"	-	-	-	-
ICR 410	Improved first generation dewaxing catalyst	"	"	-	-	-	-
ICR 418	Third generation dewaxing catalyst	"	"	-	-	-	-
ICR 422	"	"	"	-	-	-	-
ICR 424	"	"	"	-	-	-	-
ICR 426	"	"	"	-	-	-	-
ICR 432	Fourth generation dewaxing catalyst	"	"	-	-	-	-
ICR 403	Second generation finishing catalyst	Hydroprocessed feedstocks	"	-	-	-	-
ICR 407	Third generation finishing catalyst	"	"	-	-	-	-
ICR 419	Fourth generation finishing catalyst	"	"	-	-	-	-
HALDORTOPSOE AS							
HTG-1	Halide removal	Light hydrocarbons	Halide free hydrocarbons	Ext.	0.68*	Al ₂ O ₃	K carbonate
HTZ-3	Fine De-S of steam reform. feed	CH ₄ , LPG, naphtha	S free hydrocarbons	"	1.3*	-	ZnO
HTZ-4	Fine De-S of steam reform. feed, low temp. COS removal	Nat. gas	"	"	1.2*	ZnO, Al ₂ O ₃	ZnO, Al ₂ O ₃
HTZ-5	Fine De-S of steam reform. feed, low temp., low S	CH ₄ , LPG, naphtha	"	"	1*	-	ZnO
ST-101	"	"	"	Cyl.	"	Cu, Zn, Al	Cu, Zn
TK-250	HDS	Light hydrocarbons	"	Ext.	0.5*	Al ₂ O ₃	Co, Mo
TK-251	"	"	"	"	"	"	"
INTERCAT INC.							
V-TRAP*	Vanadium demobilization	FCC feeds	Select. demobilizes V	MS	-	P	P
JOHNSON MATTHEY CATALYST							
32 series	S removal	Hydrocarbons to naphtha	S free feed	Sph.	74, 85	Al ₂ O ₃	ZnO
41-6	HDS	"	De-S feed	Ext.	40	"	Co, Mo
61-1	"	"	"	"	"	"	Ni, Mo
59-3	Halide removal	"	Halide free feed	Sph.	53	"	Na aluminate
Dycat 140	S removal	"	S free feed	"	74, 90	"	ZnO
Dycat 160	Bulk deS	Lt. hydrocarbons	Low S gas	Various	50	"	P
Dycat 162	Arsine removal	Ethylene, propylene	-	Sph., ext.	62	"	Cu
PURASPEC Cl-guard	Trace Cl removal	Hydrocarbons to naphtha	Cl free	Sph.	53	"	Al ₂ O ₃ , prom.
PURASPEC Hg	Trace Hg removal	"	Mercury free	"	Various	-	ZnO prom.
PURASPEC S-guard	Trace S removal	-	S free	"	74, 85	"	"
PURASPEC	Trace impurities removal	-	-	Various	Various	"	P
KATALEUNA GMBH							
4011	High capacity H ₂ S removal	-	-	Tablet	1.4*	-	ZnO
4017	"	-	-	Cyl.	1.0*	Al ₂ O ₃	"
4202	High capacity Hg removal	-	-	Sph.	0.7*	"	Ag

Other refining catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
4210	CO removal	-	-	Tablet	1.4*	-	Cu, ZnO
4211	O ₂ removal	-	-	"	0.95*	"	Cu, CuO, ZnO
4212	"	-	-	"	1.1*	"	Ni
4213	Arsenic and S removal	Naphtha	Sweet naphtha	Tablet, ext.	1.0*	-	Cu
4495	CO removal	Compressed air	-	Cyl.	0.80*	-	CuO, MnO
5707	Chlorine removal	-	-	Ext.	0.85*	-	ZnO
5712	"	-	-	-	0.75*	"	-
5713	CO ₂ , COS, H ₂ S removal	-	-	-	0.80*	"	-
5715	P, As removal	-	-	-	0.70*	"	Cu
5717	Chlorine removal	-	-	Tablet	0.75*	"	CuO, ZnO
5718	CO ₂ , H ₂ O, C ₂ H ₂ removal	Air separation	-	Sph.	0.70*	-	Zeo.
5719	Elimination of organic compounds from gas	Off gas	Off gas	"	"	-	"
6512B	High capacity S removal	Ref. feed	-	Cyl.	0.80*	"	Ni
7230	Sorbent	-	-	Sh. ext.	1.0*	TiO ₂	-
8213	As trap, H ₂ S service	-	-	"	0.6*	Al ₂ O ₃	P
8230	Removal of S, N, O	Polishing	-	"	1.1*	SiO ₂ Al ₂ O ₃	Ni, Mo
8403	Gas De-S	Hydrogen plant	-	Ext.	0.55*	Al ₂ O ₃	Co, Mo
Lime	Removal of CO ₂ , H ₂ S, COS, C ₂ H ₅ SH, SO ₂ , HCl, CH ₃ SH, AsH ₃	Ethylene and propylene	Sweet C ₂ =, C ₃ =	"	0.70*	-	-

POROCEL CORP.

Chlorocel 901	High capacity chloride adsorbent	Vapor or liquid	Catalytic reforming	Sph.	48	Prom. Al ₂ O ₃	Prom. Al ₂ O ₃
Chlorocel 903	Low reactivity chloride adsorbent	"	"	"	50	"	"
Chlorocel RCL	Organic chloride adsorbent	"	"	"	"	Act. Al ₂ O ₃	Metal oxide
Chlorocel 805	Zeolite chloride adsorbent	"	"	Sph. ext.	44	Zeo.	Zeo.
Fluorocel 828	High capacity fluoride adsorbent	"	HF alkylation	Sph.	45	Act. Al ₂ O ₃	Act. Al ₂ O ₃
Fluorocel 830	"	"	"	"	48	Prom. Al ₂ O ₃	Prom. Al ₂ O ₃
Hydrocel 630	COS hydrolysis	Vapor	C ₃ , light hydrocarbons	"	42	Act. Al ₂ O ₃	Act. Al ₂ O ₃
Hydrocel 640	Promoted COS hydrolysis	"	C ₃ , light hydrocarbons	"	44	Prom. Al ₂ O ₃	Prom. Al ₂ O ₃
Dynocel 628	H ₂ S, CO ₂ , COS adsorbent	Vapor or liquid	Light hydrocarbon purification	"	49	"	"
Dynocel 650	Acid gas/oxygenate adsorbent	"	"	"	44	"	P
Dynocel ASR	H ₂ S, mercaptan, Hg, As adsorbent	"	"	"	50	"	"
Dryocel 848	Dehydration	"	Dehydration	"	48	Act. Al ₂ O ₃	Act. Al ₂ O ₃
Dryocel 850	"	"	"	"	"	"	"

SINOPEC CATALYST COMPANY

Guard cat. FZC-100	Large pore volume, suitable activity, high space ration, strong impurities endurance	All	-	Sph.	.75-85*	Al ₂ O ₃	-
FZC-102	"	"	-	Rasc-hig ring	.44-50*	"	Ni

Other refining catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
FZC-102B	"	"	-	"	.44-.52*	"	Mo, Ni
FZC-103	"	"	-	"	.56-.62*	"	"
FZC-103A	"	"	-	"	.48-.58*	"	"
FHRS-1	High surface area, high si endurance	Coker naphtha	-	Tri.	.65-.75*	"	W, Mo, Ni
FDAS-1	High As endurance	Naphtha with As	Naphtha with low As	"	.70*	"	Ni
WT3-1	Low feed consumption, long life, good selection, high conversion, not easily coked	MTBE	High purity isobutylene	Sph.	.55*	"	Si, Al
SUD-CHEMIE INC.							
C125	Chloride removal, vapor/liquid phase	Ref. offgas	-	Ext.	50	ZnO	Ca
C28-1-01	S removal	Naphtha, ref. feed	-	"	45, 50	P	P
C53-2-01	COS hydrolysis	FCC gas	-	"	28, 32	Al ₂ O ₃	PTS
C7-2	De-S, metal content	-	S-free streams	"	70	Binder	ZnO
C7-4	"	"	"	"	80	"	"
Catofin	Lt. paraffin dehydrogen.	Isobutane, propane	Isobutylene, propylene	"	60	Al ₂ O ₃	Cr
G-1	Conv. of S compounds to H ₂ /H ₂ S	-	S free streams	Tablet	P	P	P
G-72E	De-S, metal content	-	"	Ext.	70	Binder	ZnO
G-132	As, S removal	Propylene, butylene	Propylene, butylene	"	65	ZnO	Cu
JCL/TCL	Chloride removal, vapor/liquid phase	Ref. offgas	-	"	50	"	Ca
TDP	Toluene disproportionation	Toluene	Benz., xylene	"	-	P	Ni
T-2250	As, S removal	Propylene, butylene	Propylene, butylene	"	40	Al ₂ O ₃	CuO
T-2552A	Hg, As, COS removal	"	"	Sph.	45	"	Ag
Hydex-G	Dewaxing	Dist.	Diesel	Ext.	40	Zeo.	P
UNICAT CATALYST TECHNOLOGIES INC.							
ADC-2	-	Coke oven gas	Ammonia dissociation catalyst	Ring shaped or solid cylinder	86-90	Al ₂ O ₃	Ni
APC-18	-	Air/HC	Air purification catalyst	3.2-5mm sphere	50	"	KMnO ₄
AS-110	-		Ammonia synthesis catalyst	Irregular black magnetic particles	124-140	-	Fe ₂ O ₃
SR-101C	Very high surface area and pore volume	HC, gas, air	H ₂ S removal	3mm or 4mm ext.	48-52	-	"
SR-105	Iron carrier	"	Sulfur removal catalyst	4mm ext.	"	Fe	-
SR-115CR	MnO high temperature	Hot gas	"	4mm ext. or mini at 2.5mm	48-55	-	MnO ₂
SR-116CR	High density/high MnO	"	"	"	60-65	-	-
TSR-118	Cold gas/liquid sulfur removal	"	Natural gas, light HC, sulfur removal	4mm ext.	62-68	P	CuO and ZnO
TSR-121	High sulfur capacity	"	Low temperature sulfur absorption catalyst	2.5 or 4mm lobe	55-62	"	P
TSR-122	"	"	"	"	65-72	"	"
TSR-122E	"	"	"	"	>68-75	"	"
TSR-123	-	HC, gas	Sulfur removal catalyst, mercapten	1.6-2.5mm lobe or 5mm tablet	55-78	Al ₂ O ₃	CuO, ZnO

Other refining catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
CLX-13	-	"	Zeolite based chloride guard catalyst	1/8" and 1/16" ext.	42-45	Zeo.	-
CLX-16	High capacity HCl RCl	Liquid, gas, HC	High capacity zeolite chloride guard	Spheres or 1/8"-1/16" ext.	45-48	"	-
CLX-19	Organic Cl removal	"	Organic chloride trap+HCL	"	47	-	Zeo., P
CR-10X	-	All	Chloride removal catalyst	2-4 or 3-5 mm spheres	45-50	Al ₂ O ₃	-
CR-20	-	Hot gas	"	-	45-52	"	-
CR-55	-	All	"	1.6mm, 2.5mm, 4mm ext.		"	ZnO, CaO
CTX-44	-	-	Combustion catalyst	5*5mm tablets	62	-	Pt
CTX-48	Removal of VOC	-	"	"	"	-	Pd/Pt
FR-15	-	-	HF removal catalyst	-	45-48	-	-
KSR-16	Bender	Jet fuel	Kero sweetening catalyst	Ext.	72-75	-	PbO
TCR12	RCl removal	All	Organic chloride removal	Ext. and spheres	44-48	-	CuO
TCR14	Heavy organic chloride	"	Heavy organic chloride	Ext., sph.	55	-	"
TCR16	"	"	"	"	"	-	P
UDC-1000	Flow distribution/DP		Ceramic support	6 hole ceramic		-	-
MR-13	-	Gas phase	Mercury removal catalyst	4x10 mesh or 4mm ext.	34	Carbon	Sulfur
MR-15	Liquid or vapor phase HC service	Gas, liquid, HC	Chloride removal catalyst	Spherical beads	48-50	Al ₂ O ₃	"
MR-17	-	Gas, liquid	Low temperature mercury & H ₂ S removal catalyst	4mm lobe	58-62	"	P
MR-19	-	Liquid	"	Lobe	62-70	"	"
MR-21	Naphtha or heavier service	Naphtha or heavier	Mercury removal catalyst	"	55-62	-	-
AR-201	-	Propylene, propane, ethane, and light HC streams	Arsine and sulfur absorption catalyst	Spheres	42-52	-	PbO
AR-202HC	-	LNG, CO ₂ , natural gas, ethylene, propylene, propane, ethane, and light HC streams	"	Lobe or tablet	52-78	Al ₂ O ₃	CuO, ZnO
AR-205E	-	Natural gas and light vapor phased HC streams	Gas service arsine & TMA removal catalyst	Lobe	44-48	-	CuO, MnO
Pollycat II	-	-	Polymerization catalyst	Cyl., ext.	60-63 or 57-59	-	Solid phosphoric acid
OR-400	-	-	Reducing gas removal catalyst	Tablet	80	-	CuO, ZnO
OR-35	-	-	De-oxidation catalyst industrial gas/HC service	Sphere or tablet	50-62	-	Pd
OR-50C	-	Process gas or olefinic streams	O ₂ removal catalyst	Tablet	80-90	SiO ₂	CuO
HR-47	-	-	Hydrogen removal catalyst	Tablet, sphere	43-45	Al ₂ O ₃	Pt, Pd
HR-49	-	CO ₂ gas streams	"	"	62	"	Pt
NSR-116R	Ni based	HC service	Sulfur removal catalyst	Lobe	55-62	-	NiO+Ni
NSR-116RX	Higher sulfur capacity than the NSR-116R	"	"	Ext.	49-50	-	Ni
UOP LLC							
ADS-11L	S adsorbent	Naphtha	-	Ext.	58	Al ₂ O ₃	Ni

Other refining catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
ADS-12	"	"	Naphtha	Bead	50	"	Cu
AZ series	Trace contaminant from reactive streams	Olef., others	-	Sph.	42	"	P
CLR-204	Chloride removal	Various	Cl free feed	"	50	"	"
GB series	Impurities removed	Reactive	-	"	Various	"	CuO
HgSIV series	Regen. mercury removal	Various	-	Pellet, bead	"	Molecular sieve	Ag
9139A	Chloride removal	"	Cl free feed	Sph.	50	Al ₂ O ₃	P

Fluid catalytic cracking additives

ALBEMARLE CATALYSTS CO. BV

BCMT-100	Bott. upgrdg. and vanadium tol.	HGO, resid	Max. liquid yield, bott. upgrdg.	MS	-	-	-
BCMT-500	Max. bott. upgrdg. with Ni + V tol. and coke select.	All types, resid with high Fe and V	Max. bott. upgrdg, Fe and V tol., coke select.	"	-	-	-
B.O.O.S.T	Higher act. ZSM-5 to increase C ₃ /C ₄ olef. and oct.	All feeds	LPG olef., oct.	"	0.85*	SiO ₂ Al ₂ O ₃	ZSM-5
ELIMINOx	Bi-metallic non-platinum CO combustion promoter	"	CO promotion with less NOx	"	-	-	Pt
io-1010	Gas. S reduc.	"	Gas. S reduc.	"	-	P	P
IsoBOOST	Increase LPG olef. with higher C ₃ /C ₄ ratio	"	LPG olef., oct.	"	0.85*	SiO ₂ Al ₂ O ₃	"
K-2000	ZSM-5 to increase C ₃ /C ₄ olef. and oct.	"	Max. C ₃ =max. oct.	"	-	-	ZSM-5
KDNOx-2001	Copper-free NOx reduc.	"	NOx reduc.	"	"	"	P
KDSOx-2000	Basic SOx reduc.	"	SOx reduc.	"	"	P	"
KDSOx-2002	"	"	"	"	0.85*	Hydrotalcite	MgO, Ce, V
KOC-15	Platinum-based CO combustion promoter	"	All types	"	-	-	Pt
KOC-18	High act. platinum-based CO combustion promoter	"	"	"	-	-	"
OCTUP-11S	Oct. booster, increase propylene	"	LPG, olef., gaso. oct.	"	0.70-0.85	SiO ₂ Al ₂ O ₃	ZSM-5
Plus-1	SOx reduc.	"	All	"	0.80-0.90	Al ₂ O ₃	Metal
PROvantage	Highest propylene yield and minimal slurry	"	LPG olef., oct., bott. upgrdg.	"	-	SiO ₂ Al ₂ O ₃	Multiple zeo.s, acid strength
Resolve-700	Gas. S reduc.	"	All types	"	-	-	Pt
Resolve-750	Higher gaso. S reduc.	"	"	"	0.70-0.85*	-	P
Resolve-800	Gas. S, SOx reduc.	"	Reduce gaso. S, SOx	"	"	"	"
Resolve-850	Higher gaso./LCO S reduc., SOx reduc. without vanadium	"	Reduce gaso. S	"	"	"	"
Resolve-950	Highest gaso./LCO S reduc., SOx reduc. without vanadium	"	Gas. LCO S, SOx reduc.	"	0.85*	P	"
SOxDOWN	Best SOx reduc.	"	SOx reduc.	"	"	Hydrotalcite	MgO, Ce, V
SP-10S	CO combustion promoter	"	All	"	0.85-0.95	Al ₂ O ₃	Pt
ZOOM	Highest act. ZSM-5 to increase C ₃ /C ₄ olef. and oct.	"	LPG olef., oct.	"	0.80*	SiO ₂ Al ₂ O ₃	ZSM-5

AMBUR CHEMICAL CO. INC.

CCA-1	Highest act., bimetallic	CO combustion	All types	MS	-	Al ₂ O ₃	Pt, Pd
CCA-8	High act., bimetallic	"	"	"	-	"	"
CCA-350	Lower act., monometallic	"	"	"	-	"	Pt

Fluid catalytic cracking additives—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
CCA-500	Medium act., monometallic	"	"	"	-	"	"
CCA-850	High act., monometallic	"	"	"	-	"	"
CCA-1000	Highest act., monometallic	"	"	"	-	"	"
BASF CATALYSTS LLC							
Converter	Activity enhancement, operating flexibility	VGO, resid	Conversion, low coke	MS	0.7-1.1*	P	Y zeo., DMS matrix
HDUltra	Max LCO, operating flexibility	"	Max LCO	"	"	"	Y zeo., Prox-SMZ matrix
CLEANOx	NOx reduction additive	"	NOx reduction	"	"	"	P
EZ Flow	Fluidization/circulation enhancement	"	All FCC	"	"	Kaolin	
EZ Flow Plus	Fluidization/circulation enhancement with activity	"	"	"	"	"	Y zeo., DMS matrix
BASF Maximum Olefins Additive (MOA)	ZSM-5	"	C ₃ /C ₄ olefins, octane	"	"	P	ZSM-5
BASF Octane Enhancement Additive (OEA)	Increased octane/C ₄ selectivity	"	Octane	"	"	"	P
BASF Maximum Propylene Additive (MPA)	ZSM-5, no activity dilution	"	Propylene	"	"	"	ZSM-5, Y zeo., DMS matrix
BASF Low Sulfur Additive (LSA)	Gasoline sulfur reduction	"	Low S gasoline	"	"	"	P
CATALYSTS & CHEMICALS INDUSTRIES CO. LTD.							
io	Gasol. S reduc.	All	Gasol. S reduc.	MS	-	P	P
OCTUP-7, -11	Oct. booster, increase propylene	"	LPG, olef., gasol. oct.	"	0.70-0.85	SiO ₂ Al ₂ O ₃	ZSM-5
Plus-1	Reduce SOx	"	All	"	0.80-0.90	Al ₂ O ₃	Metal
SP-10S, -60	CO combustion promoter	"	"	"	0.85-0.95	"	Pt
GRACE DAVISON							
Activa	High act. additive for max. conv.	VGO, resid	"	-	-	-	-
AP-PMC (APEX)	Max. propylene in high sev. operations	All	C ₃ /C ₄ olef., gasol. oct.	MS	0.70-0.80*	P	P
Butimax	Max. butylene selec.	"	LPG, olef., gasol.	"	-	-	ZSM-5
CP-3, CP-5, CP-A	CO combustion promoter	VGO, resid	All	"	0.70-0.80*	SiO ₂ Al ₂ O ₃	Pt
D-PriSM	Gasol. S reduc.	"	Gasol. S reduc.	"	0.85-0.95*	Al ₂ O ₃	P
Flowmotion	Fluidization and unit start up aid	"	-	-	-	-	-
GSR-5	Gasol. S reduc.	"	Gasol. S reduc.	MS	0.70-0.80*	SiO ₂ Al ₂ O ₃	P
XNOx	Low NOx combustion promoter	"	NOx reduc.	"	"	"	"
DENOX	NOx reduc. additive	"	"	"	"	"	"
Super DESOX	SOx reduc.	"	SOx reduc.	"	"	"	"
OlefinsExtra	Intermediate LPG, olef., oct.	"	"	"	-	P	ZSM-5
OlefinsMax	High act., LPG, olef., oct.	"	Light olef., LPG, oct.	"	"	"	"
OlefinsUltra	Ultrahigh act., LPG, olef. oct.	"	"	"	"	"	"
ProfiExtra	Increased LPG olefinicity, gasol. oct.	"	C ₃ /C ₄ olef., gasol. oct.	"	"	"	"

Fluid catalytic cracking additives—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
ProfiMax	High act., high LPG olefinicity, high gaso. oct.	"	"	"	"	"	"
RFG	Gaso. olef. reduc.	"	Gaso. olef. reduc.	"	0.70-0.85*	SiO ₂ Al ₂ O ₃	P
Saturn	S reduc.	"	Gaso. S reduc.	"	"	"	"
SuRCA	"	"	"	"	0.70-0.80*	"	"
INSTITUTO MEXICANO DEL PETROLEO							
IMP-IO-02	Shape select. oct.	GO	High oct. gaso., olef.	MS	0.91*	Kaolin	Shape select. zeo.
IMP-IO-03	"	"	"	"	0.82*	"	"
IMP-IO-04	Shape select. oct. with RE	"	"	"	0.80*	"	"
IMP-IO-04 (+)	"	"	"	"	"	"	"
IMP-ADF-01	High metal tol.	Resid	Increase gaso. yield	"	-	Al ₂ O ₃	-
IMP-PC-500	CO combustion	CO combustion	Additive	"	-	Theta Al ₂ O ₃	Pt.
IMP-RESOX-01	High SOx reduc.	Powder	SOx reduc.	Additive	-	-	-
INTERCAT INC.							
BCA-105	Select. cracks HCO to LCO, gaso.	HCO	LCO, gaso.	MS	-	MS	Blend in FCC cat.
COP-375	CO comb. promoter	FCC feed	-	"	-	Al ₂ O ₃	Pt
COP-550	"	"	"	"	-	"	"
COP-850	"	"	"	"	-	"	"
Isocat	Oct., mod. LPG yield	"	High oct. gaso., mod. LPG yield	P	50	P	ZSM-5
LGS-150	Reduce S in gaso.	"	High oct. gaso., improved LCN, MON, low LPG yield	MS	-	-	-
Octamax	Oct., low LPG yield	"	High oct., low LPG yield	P	50	P	Mod. ZSM-5
Pentacat	"	"	High oct., LPG yield	"	"	"	ZSM-5
Pentacat Plus	Oct., max. C ₃ = prod.	"	"	"	"	"	Pentasil
Pentacat-HP	Oct., max. propylene produc.	"	"	"	"	"	P
SoCat-HP	Oct., high LPG yield	"	High oct. gaso., high LPG yield	"	"	"	ZSM-5
Soxgetter	Hydrotalcite tech.	"	SOx removal	"	-	-	-
Z-CAT-HP	Oct., max. propylene	"	High oct. gaso., LPG yield	"	50	P	ZSM-5
ZMX-B-HP	Oct., mod. LPG yield	"	High oct. gaso., improved LCN, MON, mod. LPG yield	"	"	"	P
ZMX-C-HP	Oct., low LPG yield	"	High oct. gaso., improved LCN, MON, low LPG yield	"	"	"	"
ONDEO NALCO ENERGY SERVICES							
MVP	Vanadium passivator	FCC feed	Increased conv.	Liquid	-	Liquid	P
Nickel Passivation Plus	Nickel passivator	"	Reduce hydrogen	"	-	Water	Antimony
SINOPEC CATALYST COMPANY							
CA	Enhance LPG and gaso. oct.	All types	LPG, high oct.	MS	-	Clay, Al ₂ O ₃	P
GOR-A	Select. H transfer	"	Low olef. gaso.	"	0.74	"	"

Fluid catalytic cracking additives—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft, g/cc*	Carrier, support	Active agents
LDC-971	Bott. conv.	All types, especially resid	Max. LCO	"	0.85	P	"
LGSA	Reduce S in gaso.	All types, especially high S, high metal feeds	Low S gaso.	"	0.75	Clay, Al ₂ O ₃	"
MP-051	High C ₃ =ratio LPG	All types	Max. propylene	"	0.70-0.80	"	"
MS-011	Reduce S in gaso.	All types, especially high S	Low S gaso.	"	0.75	P	"
RFS-C	SO _x transfer	High S feeds	Low SO ₂ reg.	"	0.82	"	"
ZHP	High yield for propylene additive	Naphtha	Propylene	Powder	0.75	Clay, Al ₂ O ₃	Fe, P

UOP LLC

Unicat CI-3	CO comb. prom.	-	Active metal	Powder	-	SiO ₂ Al ₂ O ₃	Pt
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Combustion promoters

BASF CATALYSTS LLC

Procat	Pt CO combustion promoter	VGO, resid	CO combustion	MS	0.7-1.1*	P	Pt
USP	"	"	"	"	"	"	"
OxyClean	Low NO _x CO combustion promoter	"	"	"	"	"	"
BASF Low NO _x Promoter (LNP, LNP-100)	"	"	"	"	"	"	non-Pt

Sulfur oxides reduction

BASF CATALYSTS LLC

BASF SO _x Reduction Additive (SRA)	SO _x reduction	VGO, resid	SO _x reduction	MS	0.7-1.1*	P	Mg based
SOXCAT Extra	"	"	"	"	"	"	"