

277	..Group VIII metal with additional nonhydrocarbon agent or complexed with hydrocarbon	352	.Adamantane or derivative
		353	.By shift, opening, or removal of shared-carbon ring
300	PLURAL PARALLEL SYNTHESSES	354	..Cyclopentadiene from its polymer
301	.Using same catalyst, solvent, inert heat carrier, or component thereof	355	..Camphene or ten-C monocyclic from polycyclic, e.g., terpene isomerization, etc.
302	.With blending of products from two parallel reactions	356	...Camphene from pinene or derivative
303	..And passage to further reaction	357	.From nonhydrocarbon
304	.Diverse parallel syntheses	358	..Nonring moiety becomes ring
310	PLURAL SERIAL DIVERSE SYNTHESSES	359	..Halogen containing
311	.One synthesis rehabilitates catalyst for other, e.g., by alkylation with ester, etc.	360	.Polycyclic product
		361	..By condensation, e.g., Diels-Alder reaction, etc.
312	.Same catalyst, solvent, or component thereof used in both syntheses	362	...Dimerizing a cycloolefin
		363	..By double-bond shift in side-chain
313	..Entire catalyst composition	364	.By condensive ring expansion, e.g., "olefin dismutation", etc.
314	.With hydrocarbon effluent stream splitting for recycle to different syntheses	365	.From nonring hydrocarbon
315	.With hydrocarbon recycle from later to earlier synthesis	366	..Alkadiene
316	..Earlier synthesis is condensation or alkyl transfer	367	...Using refractory-group metal-containing catalyst
		368	...With nonmetal element or compound
317	.To produce alicyclic	369	...Using Co-, Fe-, or Ni-containing catalyst
318	..Having unsaturated ring		...With nonmetal organic compound
319	.To produce aromatic	371	.By ring expansion or contraction
320	..Polycyclic	372	..Using Al group metal halide catalyst
321	..Having plural side-chains	373	...With added hydrocarbon complex or nonhydrocarbon organic agent
322	..Including an aromatization step	374	..Using metal-containing catalyst
323	..Including an alkylation step	375	.By alkylation or alkyl transfer
324	.To produce unsaturate	376	..Feed has side-chain
325	..Having triple bond	377	.By double-bond shift
326	..Polyolefin	378	..Using organometallic compound, P- or S-containing catalyst
327	...From O compound feed or intermediate	379	.By dehydrogenation
328	..Including displacement from nonhydrocarbon by entire hydrocarbon molecule, e.g., growth reaction, etc.	380	..Using H acceptor
329	..Including polymerization of olefin	400	AROMATIC COMPOUND SYNTHESIS
330	...And a preliminary unsaturation step, e.g., cracking, dehydrogenation, etc.	401	.With measuring, sensing, testing, or synthesis operation control responsive to diverse condition
331	.Including alkylation to produce branched-chain paraffin	402	.Exploiting or conserving heat of quenching, reaction, or regeneration
332	..And preliminary isomerization or polymerization		
350	ALICYCLIC COMPOUND SYNTHESIS		
351	.Carotene or derivative		

- 403 .Using apparatus of recited composition
- 404 .By ring expansion or contraction
- 405 ..Using transition metal-containing catalyst
- 406 .By dimerization of vinyl aromatic
- 407 .By ring formation from nonring moiety, e.g., aromatization, etc.
- 408 ..Nonhydrocarbon feed
- 409 ...Aromatic or carbonyl-containing reactant
- 410 ..Aromatic feed
- 411 ...Using metal-containing catalyst
- 412 ..Plural stage, with moving catalyst or with specified flow rate or procedure
- 413 ..With preliminary treatment of feed or plural separation procedures
- 414 ..Using metal-free H acceptor
- 415 ..Product compound has more C atoms than feed compound, e.g., cyclic polymerization, etc.
- 416 ...Triple bond-containing feed
- 417 ...Using transition metal-containing catalyst
- 418 ..Using transition metal-containing catalyst
- 419 ...Group VIII noble metal
- 420 ...Group VI metal
- 421 ...With alkaline metal compound
- 422 .By condensation of entire cyclic molecules or entire hydrocarbyl moieties thereof, e.g., polymerization, etc.
- 423 ..With plural separation procedures
- 424 ..Plural stage or with preliminary treatment of feed
- 425 ..Ring carbon of one molecule joined to ring carbon of other
- 426 ...Through residue of nonring molecule, e.g., acetylene, etc.
- 427 ...Arylene bond formed using metal-containing agent
- 428 ..Nonring moiety of one molecule bonded to nonring moiety of other, e.g., polystyrene, etc.
- 429 ...Through residue of nonring molecule, e.g., butadiene, etc.
- 430 .From alicyclic
- 431 ..Polycyclic product or with olefinic unsaturation in feed
- 432 ...Cymene product
- 433 ..Using H acceptor or Cr-, Mo-, or W-containing catalyst
- 434 ..Using noble metal catalyst
- 435 .Having alkenyl moiety, e.g., styrene, etc.
- 436 ..Polycyclic product or from nonhydrocarbon feed
- 437 ...O-containing feed
- 438 ..By condensation using metal-containing catalyst
- 439 ..By C removal, e.g., cracking, etc.
- 440 ..By dehydrogenation
- 441 ...Plural stage or with plural separation procedures
- 442 ...Using halogen or S
- 443 ...Using elemental O
- 444 ...Using metal oxide, sulfide, or salt
- 445Cr-, Mo-, or W-containing
- 446 .By condensation of entire molecules or entire hydrocarbyl moieties thereof, e.g., alkylation, etc.
- 447 ..With specified flow rate through reactor or flow procedure within or at entrance to reactor
- 448 ..With preliminary treatment of feed
- 449 ..Plural alkylation stages
- 450 ..With plural separation procedures
- 451 ...Including dissolving or solids formation or separation
- 452 ..Attachment to side-chain, e.g., telomerization, etc.
- 453 ...Resulting side-chain has less than four C atoms
- 454 ..Feed other than hydrocarbon, hydroxy, monohalide, or ether
- 455 ..Resulting side-chain restricted to more than five C atoms, e.g., "detergent alkylate", etc.
- 456 ...Using halogen-containing catalyst

457	..Using organometallic compound catalyst	488	...And H
458	..Using S-containing catalyst	489	....Transition metal-containing catalyst
459	..Using Al halide catalyst	500	UNSATURATED COMPOUND SYNTHESIS
460	...And additional metal-containing or nonhalide inorganic agent	501	.With measuring, sensing, testing, or synthesis operation control responsive to diverse condition
461	...Complexed, e.g., sludge, etc., or with additional extraneous organic agent	502	.By addition of entire unsaturated molecules, e.g., polymerization, etc.
462	..Using halogen-containing catalyst	503	..With heat conservation or using apparatus of recited composition
463	..Alumina containing	504	..With specified procedure for recycle of nonhydrocarbon
464	...HF	505	..Triple-bond product
465	...B trifluoride in a complex or with additional nonhydrocarbon agent	506	..Poly-double-bond product
466	..Using P-containing catalyst	507	...More than two double bonds, e.g., diene polymerization, etc.
467	..Using metal, metal oxide, or hydroxide catalyst	508	....Of definite molecular weight, e.g., dimer, etc.
468	...Noncrystalline, and containing Al and Si	509	...Using P-containing catalyst
469	.From nonhydrocarbon feed	510	..Definite molecular weight product, e.g., dimer, etc.
470	.By alkyl or aryl transfer between molecules, e.g., disproportionation, etc.	511	...Using catalyst containing metal bonded to or complexed with C, C-containing compound, or H
471	..Product is polycyclic, of increased side-chain length, or a specific position polyalkyl benzene isomer	512	....Al-and transition metal-containing
472	...Using Al or B halide catalyst	513	.....And N-, P-, or S-containing
473	....Meta- or 1,3,5-alkyl benzene	514	...Using P-containing catalyst
474	..Plural compounds of different weight become midweight compound, i.e., averaging	515	...Using S-containing catalyst
475	..Using crystalline aluminosilicate catalyst	516	..Using alkali metal-containing catalyst
476	.By ring opening, removal, degradation, or shift on chain or other ring	517	..Plural serial polymerization stages
477	.By isomerization	518	..With preliminary treatment of feed
478	..With plural separation steps	519	...Removal of hydrocarbon fraction
479	...Including a crystallization step	520	..Using extraneous nonhydrocarbon agent, e.g., catalyst, etc.
480	..Using metal oxide- or sulfide-containing catalyst	521	...Hydride or organic compound or complex containing alkaline-, B-, or Zn group material
481	...Crystalline aluminosilicate	522	....Al trialkyl
482	...Pt-group metal containing	523	....Transition metal-containing
483	.By dealkylation	524	.....Ti
484	..Polycyclic	525	...B-containing catalyst
485	...Using catalyst and H	526	...S-containing catalyst
486	..Using extraneous agent in reaction zone, e.g., catalyst, etc.	527	...N- or P-containing catalyst
487	...And steam	528	....Metal phosphate

529	....P compound on solid carrier, e.g., "solid phosphoric acid", etc.	619	.....Halogen is I only
530	...Catalyst containing inorganic metal	620	.....Halogen is Cl only
531	....Group VIII metal	621	....Elemental O acceptor
532	....Al	622	.....With P containing extraneous agent
533	.....Al oxide, e.g., aluminosilicate, etc.	623	.....Sn-containing
534	.Triple-bond product	624	.....With metal oxide or hydroxide extraneous agent
535	..With heat conservation or using solid inert heat carrier, e.g., regenerative furnace, etc.	625	.....Ferrite
536	...With carrier movement through reaction zone	626	.....Oxide of As, Bi, or Sb
537	..Using apparatus of recited composition	627	..Using extraneous nonhydrocarbon agent, e.g., catalyst, etc.
538	..From organic nontriple-bond feed	628	...Moving catalyst or plural stage
539	...By thermal conversion of hydrocarbon, i.e., thermolysis	629	...Transition metal oxide or sulfide agent
540	...By partial combustion of hydrocarbon	630	.....Cr, Mo, or W
541	....Using extraneous nonreactant, e.g., diluent, catalyst, etc.	631	.....With other transition metal
600	.Product having more than two double bonds	632	...Metal salt agent
601	.Diolefin product	633	...Plural stage or with specified quench or separation procedure
602	..With heat conservation or using solid inert heat carrier, e.g., regenerative furnace, etc.	634	.With heat conservation or using solid or molten inert heat carrier, e.g., regenerative furnace, etc.
603	..From nonhydrocarbon feed	635	..With carrier movement through reaction zone or use in quenching
604	..Heterocyclic	636	.Using apparatus of recited composition
605	....Using P-containing catalyst	637	.By displacement of hydrocarbon radical by hydrocarbon molecule
606	...O-containing	638	.From nonhydrocarbon feed
607	....Plural O-containing organic compounds	639	..Alcohol, ester, or ether
608	....With unsaturated hydrocarbon in feed	640	...Using metal oxide catalyst
609	....Alcohol	641	..Halogen-containing
610	.....Diol	642	...Using acid, metal oxide, or salt catalyst
611	.....Using P-containing catalyst	643	.By alkyl transfer, e.g., disproportionation, etc.
612	..Halogen-containing feed using extraneous nonhydrocarbon agent	644	..Plural stage or averaging
613	..By C content reduction, e.g., cracking, etc.	645	..Using organic extraneous agent
614	...Isoprene product per se	646	..Using catalyst containing Mo, Re, or W and another transition metal
615	...Butadiene product per se	647	..Using Re-containing catalyst
616	..By dehydrogenation	648	.By C content reduction, e.g., cracking, etc.
617	...Using nonhydrocarbon acceptor	649	..Isobutylene product per se
618	....Halogen-containing acceptor with elemental O	650	..Ethylene product per se
		651	...Using catalyst
		652	...Using O (partial combustion) or steam

- 653 ..Using catalyst
- 654 .By dehydrogenation
- 655 ..With plural separation
procedures applied to effluent
or effluent component
- 656 ..Using acceptor, e.g., hydrogen-
exchange disproportionation,
etc.
- 657 ...Halogen-containing acceptor
- 658 ...Elemental O or S acceptor with
extraneous nonhydrocarbon
agent, e.g., catalyst, etc.
- 659 ..Plural stages or with catalyst
movement
- 660 ..Using extraneous agent
containing Pt-group metal and
non-Pt-group metal
- 661 ..Using transition metal oxide,
sulfide, or salt
- 662 ...Cr, Mo, or W
- 663 ...With other transition metal
- 664 .By double-bond-shift
isomerization
- 665 ..Using organometallic catalyst
- 666 ..Using aluminosilicate catalyst
- 667 ..Using P-containing catalyst
- 668 ..Using S-containing catalyst
- 669 ..Using halogen-containing
catalyst
- 670 ..Using transition metal-
containing catalyst
- 671 .By skeletal isomerization
- 700 **SATURATED COMPOUND SYNTHESIS**
- 701 .With measuring, sensing,
testing, or synthesis
operation control responsive
to diverse condition
- 702 .Synthesis catalyst, solvent, or
component thereof used as
agent in hydrocarbon
purification or separation
- 703 ..By interaction with
nonhydrocarbon
- 704 .With control of water content of
recycled catalyst
- 705 .With removal of catalyst
component from metal-
hydrocarbon complex
- 706 .With addition of reactor
effluent component to catalyst
as agent for rehabilitation or
recycle
- 707 .With specified procedure for
adding fresh makeup catalyst
component to complex (sludge),
support, or inert contact
material
- 708 .By alkyl transfer, e.g.,
disproportionation, etc.
- 709 .By condensation of a paraffin
molecule with an olefin-acting
molecule, e.g., alkylation,
etc.
- 710 ..With catalyst rehabilitation by
reversion from different
compound or HF complex
- 711 ..Including nonhydrocarbon
reactant
- 712 ..With removal of organic halogen
contaminant
- 713 ...Using solid catalyst or
sorbent
- 714 ..With introduction of same
material at more than two
serially spaced points of
reaction zone system
- 715 ..With autorefrigeration
- 716 ..Plural alkylation stages
- 717 ..With preliminary treatment of
feed
- 718 ..With coalescing or sorption of,
or addition of specific agent
to, effluent or effluent
component
- 719 ..With plural separation
procedures applied to effluent
or effluent component
- 720 ..With specified flow procedure
within or at entrance to
reactor, e.g., by use of named
mixing device, etc.
- 721 ..Using extraneous nonhydrocarbon
agent
- 722 ...Aluminosilicate or
organometallic
- 723 ...HF
- 724 ...With additional
nonhydrocarbon agent
- 725B-, N-, or P-containing
- 726 ...B-containing
- 727 ...Al halide
- 728 ...With additional
nonhydrocarbon agent
- 729H halide
- 730 ...S-containing
- 731 ...Sulfuric acid with additional
nonhydrocarbon agent

732	...O-containing	808	...Agent contains N, carbonyl, or dihydroxy moiety
733	.From nonhydrocarbon feed		
734	.By isomerization	809	..To recover unsaturate
735	..Using temperature gradient or material concentration gradient or introduction of same material at more than two serially spaced points of reaction zone system	810	...Diolefin
		811	...Including treatment with S-containing agent
736	..Plural isomerization stages	812	.By cooling of liquid to obtain solid, e.g., crystallization, etc.
737	..With preliminary treatment of paraffin feed	813	..Using specified holding time or specified cooling rate
738	..With specified isomerizate purification or separation procedure	814	..With treatment of mother liquor after crystal separation
739	..Using aluminosilicate catalyst	815	..With dissolving or plural serial crystallizations
740	..Using B- or P-containing catalyst	816	..With addition of extraneous material
741	..Using Al halide catalyst	817	...Before crystal formation
742	..With additional metal halide	818	.By membrane, selective septum, or coalescer
743	..With S-containing or free or organic halogen agent	819	..Aromatic permeate
744	..With metal oxide or elemental carbon, e.g., supported, etc.	820	.By contact with solid sorbent
745	..With added organic agent or in complex with organic material	821	..With measuring, sensing, testing, or recycle of sorbate to same sorption zone
746	...With inorganic material other than halogen-containing	822	..Plural serial sorptions
747	..Using halogen-containing catalyst	823	..Sorbate is nonhydrocarbon or chemically undetermined component, e.g., "color-former", etc.
748	...With alumina	824	...O-containing sorbate
749	...F	825	..With fractional or linear desorption, e.g., chromatography, etc.
750	..Using metal oxide or hydroxide catalyst		
751	...Including free metal	826	..With specified sorbent rehabilitation procedure or agent, e.g., desorbent, etc.
752	.By C content reduction, e.g., hydrocracking, etc.		
800	PURIFICATION, SEPARATION, OR RECOVERY	827	...Cyclic sorbate
801	.By conversion of solid to gas, e.g., sublimation, etc., or by melting or squeezing out liquid from solid natural source	828	...Aromatic separated from other aromatic
802	.By plural serial diverse separations	829	...Unsaturated sorbate
803	..To recover alicyclic	830	..Sorbent is or contains organic
804	..To recover aromatic	831	..Cyclic sorbate
805	...Xylene or ethylbenzene	832	.Polymerization and depolymerization
806	...Having unsaturated or one-C side-chain	833	.By addition of extraneous agent, e.g., solvent, etc.
807	...Including steps of distillation and agent addition	834	..With contact procedure involving particular apparatus or more than two moving streams
		835	..With fractional disengagement from agent by use of other agent

- 836 ..Different, sequentially used agents
- 837 ...One agent is a diluent, i.e., nonselective solvent or heat exchange material
- 838 ...Resolution of feed into more than two different components
- 839 ...Later agent disengages earlier, e.g., decomplexing agent, etc.
- 840 ...Later agent is hydrocarbon
- 841 ..H
- 842 ..HF and another fluoride
- 843 ..Ag
- 844 ..By interaction with monoolefin
- 845 ..Cu
- 846 ...Ammoniacal, e.g., Cu ammonium acetate (CAA), etc.
- 847 ...Triple-bond compound separated
- 848 ...Plural metal or nonhalide Cu compound-containing
- 849 ..Cu halide with added material other than water
- 850 ..Group VII or VIII transition metal-containing, e.g., Werner complex formation, etc.
- 851 ..Group III nontransition element-containing
- 852 ...Al
- 853 ..Alkaline metal-containing
- 854 ...Elemental metal, oxide, or hydroxide
- 855 ..Metal-containing
- 856 ..S containing
- 857 ...S dioxide, sulfolane, or sulfolene
- 858 ...Sulfuric acid
- 859 ...Interaction with tertiary olefin
- 860 ..N-containing
- 861 ..Ammonia
- 862 ...Carbonyl moiety-containing
- 863 ...Interaction with aromatic
- 864 ..Organic agent
- 865 ...Heterocyclic or polymeric
- 866 ...Acid, anhydride, ester or ether
- 867 ...Hydrocarbon
- 868 ..Inorganic O-containing agent
- 899 **MISCELLANEOUS PROCESS, E.G., INDETERMINATE MODIFICATION OF A PROPERTY, STORAGE, TRANSPORTATION, ETC.**

CROSS-REFERENCE ART COLLECTIONS**CATALYST AND RECYCLE CONSIDERATIONS**

- 900 .Rehabilitation of H acceptor
- 901 .With recycle, rehabilitation, or preservation of solvent, diluent, or mass action agent
- 902 ..Recycle of solvent and catalyst
- 903 .With hydrocarbon recycle to control synthesis reaction, e.g., by cooling, quenching, etc.
- 904 .Catalyst rehabilitation by reversion from different compound
- 905 .By-product conversion to feed
- 906 .Catalyst preservation or manufacture (e.g., activation, etc.) before use

HEAT CONSIDERATIONS

- 910 .Exploiting or conserving heat of quenching, reaction, or regeneration
- 911 .Introducing, maintaining, or removing heat by atypical procedure
- 912 ..Molten material
- 913 ..Electric
- 914 ..Phase change, e.g., evaporation, etc.

APPARATUS CONSIDERATIONS

- 920 .Using apparatus of recited composition
- 921 .Using recited apparatus structure
- 922 ..Reactor fluid manipulating device
- 923 ...At reactor inlet
- 924 ..Reactor shape or disposition
- 925 ...Dimension or proportion
- 926 ...Plurality or verticality

SPECIAL CHEMICAL CONSIDERATIONS

- 930 .Process including synthesis of nonhydrocarbon intermediate
- 931 ..Metal-, Si-, B-, or P-containing, e.g., Grignard, etc.
- 932 ..Carboxyl-containing, e.g., acid, etc.
- 933 ..N-containing
- 934 ..Chalcogen-containing

- 935 ..Halogen-containing
 - 940 .Opening of hydrocarbon ring
 - 941 .Isotope exchange process
 - 942 .Production of carbonium ion or hydrocarbon free-radical
 - 943 .Synthesis from methane or inorganic carbon source, e.g., coal, etc.
 - 944 .Radiation-resistant composition
 - 945 .Product is drying oil
 - 946 .Product is waxy polymer
 - 947 .Terpene manufacture or recovery
- MISCELLANEOUS CONSIDERATIONS**
- 950 .Prevention or removal of corrosion or solid deposits
 - 951 .Reaction start-up procedure
 - 952 .Reaction stopping or retarding
 - 953 .Pulsed, sonic, or plasma process
 - 954 .Exploiting mass-action phenomenon
 - 955 .Specified mixing procedure
 - 956 .Condition-responsive control and related procedures in alicyclic synthesis and purification

FOREIGN ART COLLECTIONS

FOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**

