CPC  COOPERATIVE PATENT CLASSIFICATION

C  CHEMISTRY; METALLURGY

(NOTES omitted)

CHEMISTRY

C10  PETROLEUM, GAS OR COKE INDUSTRIES; TECHNICAL GASES CONTAINING CARBON MONOXIDE; FUELS; LUBRICANTS; PEAT

C10G  CRACKING HYDROCARBON OILS; PRODUCTION OF LIQUID HYDROCARBON MIXTURES, e.g. BY DESTRUCTIVE HYDROGENATION, Oligomerisation, Polymerisation (cracking to hydrogen or synthesis gas C01B; cracking or pyrolysis of hydrocarbon gases to individual hydrocarbons or mixtures thereof of definite or specified constitution C07C; cracking to cokes C10B); RECOVERY OF HYDROCARBON OILS FROM OIL-SHALE, OIL-SAND, OR GASES; REFINING MIXTURES MAINLY CONSISTING OF HYDROCARBONS; REFORMING OF NAPHTHA; MINERAL WAXES

NOTES

1. In this subclass,
   • groups C10G 9/00 - C10G 49/00 are limited to one-step processes;
   • combined or multi-step processes are covered by groups C10G 51/00 - C10G 69/00;
   • refining or recovery of mineral waxes is covered by group C10G 73/00

2. In this subclass, the following terms or expressions are used with the meanings indicated:
   • “in the presence of hydrogen” or “in the absence of hydrogen” mean treatments in which hydrogen, in free form or as hydrogen generating compounds, is added, or not added, respectively;
   • “hydrotreatment” is used for conversion processes as defined in group C10G 45/00 or group C10G 47/00;
   • “hydrocarbon oils” covers mixtures of hydrocarbons such as tar oils or mineral oils.

3. In this subclass, in the absence of an indication to the contrary, classification is made in the last appropriate place.

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
   C10G 73/23 covered by C10G 73/06

2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00  Production of liquid hydrocarbon mixtures from oil-shale, oil-sand, or non-melting solid carbonaceous or similar materials, e.g. wood, coal (mechanical winning of oil from oil-shales, oil-sand, or the like B03B)

1/002  . [in combination with oil conversion- or refining processes]
1/004  . [Inhibiting of corrosion]
1/006  . [Combinations of processes provided in groups C10G 1/02 - C10G 1/08]
1/008  . [Controlling or regulating of liquefaction processes]
1/02  . by distillation
1/04  . by extraction
1/042  . . [by the use of hydrogen-donor solvents]
1/045  . . [Separation of insoluble materials]
1/047  . . [Hot water or cold water extraction processes]
1/06  . by destructive hydrogenation
1/065  . . [in the presence of a solvent]
1/08  . with moving catalysts

1/083  . . [in the presence of a solvent]
1/086  . . [Characterised by the catalyst used]
1/10  . from rubber or rubber waste

2/00  Production of liquid hydrocarbon mixtures of undefined composition from oxides of carbon

2/30  . [from carbon monoxide with hydrogen]
2/31  . . [thermal, non catalytic conversion]
2/32  . . [with the use of catalysts]
2/33  . . . [characterised by the catalyst used]
2/331  . . . . [containing group VIII-metals]
2/332  . . . . . . [of the iron-group]
2/333  . . . . . . [of the platinum-group]
2/334  . . . . . . [containing molecular sieve catalysts]
2/34  . . . . [Apparatus, reactors]
2/341  . . . . . . [with stationary catalyst bed]
2/342  . . . . . . [with moving solid catalysts]
2/343  . . . . . . [according to the “moving-bed” method]
2/344  . . . . . . [according to the “fluidised-bed” technique]
Cracking in the absence of hydrogen

9/00 Thermal non-catalytic cracking, in the absence of hydrogen, of hydrocarbon oils

9/002 . . . [Cooling of cracked gases]
9/005 . . . [Coking (in order to produce liquid products mainly)]
9/007 . . . [Visbreaking]
9/02 . . . in retorts
9/04 . . . Retorts

9/06 . . . by pressure distillation
9/08 . . . Apparatus therefor
9/12 . . . Removing incrustation
9/14 . . . in pipes or coils with or without auxiliary means, e.g. digesters, soaking drums, expansion means
9/16 . . . Preventing or removing incrustation
9/18 . . . Apparatus
9/20 . . . Tube furnaces
9/203 . . . . . . . . . . [chemical composition of the tubes]
9/206 . . . . . . . . . . [controlling or regulating the tube furnaces]
9/24 . . . by heating with electrical means
9/26 . . . with discontinuously preheated non-moving solid material, e.g. blast and run
9/28 . . . with preheated moving solid material
9/30 . . . according to the "moving bed" method
9/32 . . . according to the "fluidised-bed" technique
9/34 . . . by direct contact with inert preheated fluids, e.g. with molten metals or salts
9/36 . . . with heated gases or vapours
9/38 . . . . . . . . . . produced by partial combustion of the material to be cracked or by combustion of another hydrocarbon
9/40 . . . by indirect contact with preheated fluid other than hot combustion gases
9/42 . . . by passing the material to be cracked in thin streams or as spray on or near continuously heated surfaces

11/00 Catalytic cracking, in the absence of hydrogen, of hydrocarbon oils (cracking in direct contact with molten metals or salts C10G 9/34)

11/02 . . . characterised by the catalyst used
11/04 . . . Oxides
11/05 . . . Crystalline alumino-silicates, e.g. molecular sieves
11/06 . . . Sulfides
11/08 . . . Halides
11/10 . . . with stationary catalyst bed
11/12 . . . with discontinuously preheated non-moving solid catalysts, e.g. blast and run
11/14 . . . with preheated moving solid catalysts
11/16 . . . according to the "moving bed" method
11/18 . . . according to the "fluidised-bed" technique
11/182 . . . . . . . . . . [Regeneration]
11/185 . . . . . . . . . . [Energy recovery from regenerator effluent gases]
11/187 . . . . . . . . . . [Controlling or regulating]
11/20 . . . by direct contact with inert heated gases or vapours
11/22 . . . . . . produced by partial combustion of the material to be cracked

15/00 Cracking of hydrocarbon oils by electric means, electromagnetic or mechanical vibrations, by particle radiation or with gases superheated in electric arc

15/08 . . . by electric means or by electromagnetic or mechanical vibrations
15/10 . . . by particle radiation
15/12 . . . with gases superheated in an electric arc, e.g. plasma

Refining in the absence of hydrogen

17/00 Refining of hydrocarbon oils in the absence of hydrogen, with acids, acid-forming compounds or acid-containing liquids, e.g. acid sludge
Refining in the absence of hydrogen

Refining hydrocarbon oils in the absence of hydrogen, by alkaline treatment

Refining of hydrocarbon oils, in the absence of hydrogen, by extraction with selective solvents

Refining of hydrocarbon oils, in the absence of hydrogen, with solid sorbents

NOTE

When classifying in this group, classification is also made in group B01D 15/08 insofar as subject matter of general interest relating to chromatography is concerned.
Refining in the absence of hydrogen

Hydrotreatment processes

45/00 Refining of hydrocarbon oils using hydrogen or hydrogen-generating compounds

NOTE

Treatment of hydrocarbon oils in the presence of hydrogen-generating compounds not provided for in a single one of groups C10G 45/02, C10G 45/32, C10G 45/44 or C10G 45/58 is provided for in group C10G 49/00.

45/02 . to eliminate hetero atoms without changing the skeleton of the hydrocarbon involved and without cracking into lower boiling hydrocarbons; Hydrofinishing
45/04 . characterised by the catalyst used
45/06 . containing nickel or cobalt metal, or compounds thereof
45/08 . in combination with chromium, molybdenum, or tungsten metals, or compounds thereof
45/10 . containing platinum group metals or compounds thereof
45/12 . containing crystalline alumino-silicates, e.g. molecular sieves
45/14 . with moving solid particles
45/16 . suspended in the oil, e.g. slurries
45/18 . according to the "moving-bed" technique
45/20 . according to the "fluidised-bed" technique
45/22 . with hydrogen dissolved or suspended in the oil
45/24 . with hydrogen-generating compounds
45/26 . Steam or water
45/28 . Organic compounds; Autofining
45/30 . characterised by the catalyst used
45/32 . Selective hydrogenation of the diolefin or acetylene compounds

45/34 . characterised by the catalyst used
45/36 . containing nickel or cobalt metal, or compounds thereof
45/38 . in combination with chromium, molybdenum or tungsten metals, or compounds thereof
45/40 . containing platinum group metals or compounds thereof
45/42 . with moving solid particles
45/44 . Hydrogenation of the aromatic hydrocarbons
45/46 . characterised by the catalyst used
45/48 . containing nickel or cobalt metal, or compounds thereof
45/50 . in combination with chromium, molybdenum or tungsten metal, or compounds thereof
45/52 . containing platinum group metals or compounds thereof
45/54 . containing crystalline alumino-silicates, e.g. molecular sieves
45/56 . with moving solid particles
45/58 . to change the structural skeleton of some of the hydrocarbon content without cracking the other hydrocarbons present, e.g. lowering pour point; Selective hydrocracking of normal paraffins (C10G 32/00 takes precedence; improving or increasing the octane number or aromatic content of naphtha C10G 35/00)

45/60 . characterised by the catalyst used
45/62 . containing platinum group metals or compounds thereof
45/64 . containing crystalline alumino-silicates, e.g. molecular sieves
45/66 . with moving solid particles
45/68 . Aromatisation of hydrocarbon oil fractions
45/70 . with catalysts containing platinum group metals or compounds thereof
45/72 . Controlling or regulating

47/00 Cracking of hydrocarbon oils, in the presence of hydrogen or hydrogen-generating compounds, to obtain lower boiling fractions (C10G 15/00 takes precedence; destructive hydrogenation of non-melting solid carbaceous or similar materials C10G 1/06)

47/02 . characterised by the catalyst used
47/04 . Oxides
47/06 . Sulfides
47/08 . Halides
47/10 . with catalysts deposited on a carrier
47/12 . Inorganic carriers
47/14 . the catalyst containing platinum group metals or compounds thereof
47/16 . Crystalline alumino-silicate carriers
47/18 . the catalyst containing platinum group metals or compounds thereof
47/20 . the catalyst containing other metals or compounds thereof
47/22 . Non-catalytic cracking in the presence of hydrogen
47/24 . with moving solid particles
47/26 . suspended in the oil, e.g. slurries
47/28 . according to the "moving-bed" technique
47/30 . according to the "fluidised-bed" technique
47/32 . in the presence of hydrogen-generating compounds
47/34 . Organic compounds, e.g. hydrogenated hydrocarbons
Hydrotreatment processes

47/36  Controlling or regulating

49/00  Treatment of hydrocarbon oils, in the presence of hydrogen or hydrogen-generating compounds, not provided for in a single one of groups C10G 45/02, C10G 45/32, C10G 45/44, C10G 45/58 or C10G 47/00

49/002  (Apparatus for fixed bed hydrotreatment processes)
49/005  (Inhibiting corrosion in hydrotreatment processes)
49/007  [in the presence of hydrogen from a special source or of a special composition or having been purified by a special treatment]
49/02  characterised by the catalyst used
49/04  containing nickel, cobalt, chromium, molybdenum, or tungsten metals, or compounds thereof
49/06  containing platinum group metals or compounds thereof
49/08  containing crystalline alumino-silicates, e.g. molecular sieves
49/10  with moving solid particles
49/12  suspended in the oil, e.g. slurries
49/14  according to the "moving-bed" technique
49/16  according to the "fluidised-bed" technique
49/18  in the presence of hydrogen-generating compounds, e.g. ammonia, water, hydrogen sulfide
49/20  Organic compounds
49/22  Separation of effluents
49/24  Starting-up hydrotreatment operations
49/26  Controlling or regulating

50/00  Production of liquid hydrocarbon mixtures from lower carbon number hydrocarbons, e.g. by oligomerisation
50/02  of hydrocarbon oils for lubricating purposes

Multi-step processes

NOTE
Groups C10G 51/00 - C10G 69/00 cover only those combined treating operations where the interest is directed to the relationship between the steps.

51/00  Treatment of hydrocarbon oils, in the absence of hydrogen, by two or more cracking processes only
51/02  plural serial stages only
51/023  [only thermal cracking steps]
51/026  [only catalytic cracking steps]
51/04  including only thermal and catalytic cracking steps
51/06  plural parallel stages only

53/00  Treatment of hydrocarbon oils, in the absence of hydrogen, by two or more refining processes
53/02  plural serial stages only
53/04  including at least one extraction step
53/06  including only extraction steps, e.g. deasphalting by solvent treatment followed by extraction of aromatics
53/08  including at least one sorption step
53/10  including at least one acid-treatment step
53/12  including at least one alkaline treatment step
53/14  including at least one oxidation step
53/16  plural parallel stages only

55/00  Treatment of hydrocarbon oils, in the absence of hydrogen, by at least one refining process and at least one cracking process
55/02  plural serial stages only
55/04  including at least one thermal cracking step
55/06  including at least one catalytic cracking step
55/08  plural parallel stages only

57/00  Treatment of hydrocarbon oils, in the absence of hydrogen, by at least one cracking process or refining process and at least one other conversion process
57/005  [with alkylation]
57/02  with polymerisation

59/00  Treatment of naphtha by two or more reforming processes only or by at least one reforming process and at least one process which does not substantially change the boiling range of the naphtha
59/02  plural serial stages only
59/04  including at least one catalytic and at least one non-catalytic reforming step
59/06  plural parallel stages only

61/00  Treatment of naphtha by at least one reforming process and at least one process of refining in the absence of hydrogen
61/02  plural serial stages only
61/04  the refining step being an extraction
61/06  the refining step being a sorption process
61/08  plural parallel stages only
61/10  processes also including other conversion steps

63/00  Treatment of naphtha by at least one reforming process and at least one other conversion process (C10G 59/00, C10G 61/00 take precedence)
63/02  plural serial stages only
63/04  including at least one cracking step
63/06  plural parallel stages only
63/08  including at least one cracking step

65/00  Treatment of hydrocarbon oils by two or more hydrotreatment processes only
65/02  plural serial stages only
65/04  including only refining steps
65/043  [at least one step being a change in the structural skeleton]
65/046  [at least one step being an aromatisation step]
65/06  at least one step being a selective hydrogenation of the diolefins
65/08  at least one step being a hydrogenation of the aromatic hydrocarbons
65/10  including only cracking steps
65/12  including cracking steps and other hydrotreatment steps
65/14  plural parallel stages only
65/16  including only refining steps
65/18  including only cracking steps

67/00  Treatment of hydrocarbon oils by at least one hydrotreatment process and at least one process for refining in the absence of hydrogen only
67/02  plural serial stages only
67/04  including solvent extraction as the refining step in the absence of hydrogen
Multi-step processes

67/0409 . . . [Extraction of unsaturated hydrocarbons]
67/0418 . . . [The hydrotreatment being a hydrefining]
67/0427 . . . [The hydrotreatment being a selective
  hydrogenation of diolefins or acetylenes]
67/0436 . . . [The hydrotreatment being an aromatic
  saturation]
67/0445 . . . [The hydrotreatment being a hydrefining]
67/0454 . . . [Solvent desphalting]
67/0463 . . . [The hydrotreatment being a hydrefining]
67/0472 . . . [The hydrotreatment being a selective
  hydrogenation of diolefines or acetylcyenes]
67/0481 . . . [The hydrotreatment being an aromatics
  saturation]
67/049 . . . [The hydrotreatment being a hydrefining]
67/06 . . . including a sorption process as the refining step in
  the absence of hydrogen
67/08 . . . including acid treatment as the refining step in
  the absence of hydrogen
67/10 . . . including alkaline treatment as the refining step in
  the absence of hydrogen
67/12 . . . including oxidation as the refining step in
  the absence of hydrogen
67/14 . . . including at least two different refining steps in
  the absence of hydrogen
67/16 . plural parallel stages only
69/00 Treatment of hydrocarbon oils by at least one
  hydrotreatment process and at least one other
  conversion process (C10G 67/00 takes precedence)
  69/02 . plural serial stages only
  69/04 . including at least one step of catalytic cracking in
  the absence of hydrogen
  69/06 . including at least one step of thermal cracking in
  the absence of hydrogen
  69/08 . including at least one step of reforming naphtha
  69/10 . . . hydrocracking of higher boiling fractions into
  naphtha and reforming the naphtha obtained
  69/12 . . . including at least one polymerisation or alkylation
    step
  69/123 . . . [alkylation]
  69/126 . . . [polymerisation, e.g. oligomerisation]
  69/14 . plural parallel stages only
70/00 Working-up undefined normally gaseous
  mixtures obtained by processes covered by groups
  C10G 9/00, C10G 11/00, C10G 15/00, C10G 47/00,
  C10G 51/00
  70/002 . [by forming adducts or complexes]
  70/004 . [with solutions of copper salts]
  70/006 . [with the use of acids or sulfur oxides]
  70/008 . [with the use of organometallic compounds]
  70/02 . by hydrogenation
  70/04 . by physical processes
  70/041 . [by distillation]
  70/042 . . . [with the use of auxiliary compounds]
  70/043 . . . [by fractional condensation]
  70/044 . . . [by crystallisation]
  70/045 . . . [using membranes, e.g. selective permeation]
  70/046 . . . [by adsorption, i.e. with the use of solids]
  70/047 . . . [by molecular sieve technique]
  70/048 . . . [by liquid-liquid extraction]
  70/06 . by gas-liquid contact
71/00 Treatment by methods not otherwise provided for
  of hydrocarbon oils or fatty oils for lubricating
  purposes
  71/02 . Thickening by volatolising (chemical modification of
  drying oils by volatolising C09F 7/04)
73/00 Recovery or refining of mineral waxes, e.g. montan
  wax (compositions essentially based on waxes
  C08L 91/00)
  73/02 . Recovery of petroleum waxes from hydrocarbon
  oils; Dewaxing of hydrocarbon oils
  73/025 . [by filtration]
  73/04 . with the use of filter aids
  73/06 . with the use of solvents
  73/08 . . . Organic compounds
  73/10 . . . . . . . . . . . . . Hydrocarbons
  73/12 . . . . . . . . . . . . . Oxygen-containing compounds
  73/14 . . . . . . . . . . . . . Halogen-containing compounds
  73/16 . . . . . . . . . . . . . Nitrogen-containing compounds
  73/18 . . . . . . . . . . . . . containing sulfur, selenium or tellurium
  73/20 . . . . . . . . . . . . . containing phosphorus
  73/22 . . . . . . . . . . . . . Mixtures or organic compounds
  73/24 . . . by formation of adducts
  73/26 . . . by flotation
  73/28 . . . by centrifugal force
  73/30 . . . with electric means
  73/32 . . . Methods of cooling during dewaxing
  73/34 . . . Controlling or regulating
  73/36 . . . Recovery of petroleum waxes from other
  compositions containing oil in minor proportions,
  from concentrates or from residues; De-oiling,
  sweating
  73/38 . . . Chemical modification of petroleum
  73/40 . Physical treatment of waxes or modified waxes, e.g.
    granulation, dispersion, emulsion, irradiation
  73/42 . Refining of petroleum waxes
  73/44 . . . . . . . . . . . . . in the presence of hydrogen or hydrogen-
    generating compounds
75/00 Inhibiting corrosion or fouling in apparatus for
  treatment or conversion of hydrocarbon oils, in
  general (C10G 7/10, C10G 9/16 take precedence)
  75/02 . by addition of corrosion inhibitors
  75/04 . by addition of antifouling agents
99/00 Subject matter not provided for in other groups of
  this subclass

2300/00 Aspects relating to hydrocarbon processing
  covered by groups C10G 1/00 - C10G 99/00
  2300/10 . Feedstock materials
  2300/1003 . . . Waste materials
  2300/1007 . . . Used oils
  2300/1011 . . . Biomass
  2300/1014 . . . of vegetal origin
  2300/1018 . . . of animal origin
  2300/1022 . . . Fischer-Tropsch products
  2300/1025 . . . Natural gas
  2300/1029 . . . Gas hydrates
  2300/1033 . . . Oil well production fluids
  2300/1037 . . . Hydrocarbon fractions
Light gasoline having a boiling range of about 20 - 100 °C
Heavy gasoline or naphtha having a boiling range of about 100 - 180 °C
Middle distillates
Kerosene having a boiling range of about 180 - 230 °C
Diesel having a boiling range of about 230 - 330 °C
Gasoil having a boiling range of about 330 - 427 °C

Lubricating oils
Special oils
Atmospheric residues having a boiling point of at least about 538 °C
Vacuum distillates
Vacuum residues
Alkanes
Solid paraffins
Olefins
C2-C4 olefins
Aromatics or polyaromatics

Characteristics of the feedstock or the products
Impurities
Heteroatoms content, i.e. S, N, O, P
Naphthenic acids, TAN
Metal content
Asphaltenes
Acid gases, e.g. H₂S, COS, SO₂, HCN
Sediments, e.g. bottom sediment and water or BSW

Physical properties of feedstocks or products
Boiling range
Viscosity
Pour point, cloud point, cold flow properties
Octane number, e.g. motor octane number (MON), research octane number (RON)
Cetane number, cetane index
Gravity, density, e.g. API

Characteristics of the process deviating from typical ways of processing
Temperature
Pressure
Spatial velocity, e.g. LHSV, WHSV
Yield
Start up or shut down operations
In-situ processes
Limiting CO₂ emissions
Limiting CO, NOx or SOx emissions
Retrofitting operations
Geographical aspects, e.g. different process units form a combination process at different geographical locations
Moveable devices or units, e.g. on trucks, barges
Limiting deterioration of equipment
Recycling aspects

Use of spent catalysts
Activation
Passivation
Catalytic metal recovery
Coking aspect, coke content and composition of deposits
Additives
Diluents
Water
Steam

Products obtained by processes covered by groups
Gasoline
Diesel oil
Gasoil
Jet fuel
Lubricating oil
Electrical isolation oil
White oil, eating oil
Residues
Solvents
C2-C4 olefins
Higher olefins
Acetylene and homologues
Fuel gas
Propane and butane
Aromatics

Catalyst aspects
Use of spent catalysts
Activation
Passivation
Catalytic metal recovery
Coking aspect, coke content and composition of deposits
Additives
Diluents
Water
Steam

Catalyst stripping
Hydrogen of special source or of special composition
Recycling aspects