

CPC**COOPERATIVE PATENT CLASSIFICATION****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 specific 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** (inhibiting corrosion or incrustation in general [C23F](#))

NOTE

1. In this subclass,
 - groups [C10G 9/00](#) to [C10G 49/00](#) are limited to one-step processes;
 - combined or multi-step processes are covered by groups [C10G 51/00](#) to [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.

WARNING

1. The following IPC groups are not used in the CPC system. Subject matter covered by these groups is classified in the following CPC groups:
[C10G 73/23](#) covered by [C10G 73/06](#)
2. Groups [C10G 2/30](#) to [C10G 2/50](#) do not correspond to former or current IPC groups. The concordance CPC : IPC is as follows: - [C10G 2/30](#)
 - [C10G 2/50](#) : [C10G 2/00](#)

C10G 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](#))

C10G 1/002

- . {in combination with oil conversion- or refining processes}

C10G 1/004

- . {Inhibiting of corrosion}

- C10G 1/006 . {Combinations of processes provided in groups [C10G 1/02](#) to [C10G 1/08](#)}
- C10G 1/008 . {Controlling or regulating of liquefaction processes (controlling or regulation in general [G05](#))}
- C10G 1/02 . by distillation (destructive distillation of oil-shale [C10B 53/06](#))
- C10G 1/04 . by extraction
 - .. {by the use of hydrogen-donor solvents}
 - .. {Separation of insoluble materials}
 - .. {Hot water or cold water extraction processes}
- C10G 1/042 .. {by the use of hydrogen-donor solvents}
- C10G 1/045 .. {Separation of insoluble materials}
- C10G 1/047 .. {Hot water or cold water extraction processes}
- C10G 1/06 . by destructive hydrogenation
 - .. {in the presence of a solvent}
- C10G 1/065 .. {in the presence of a solvent}
- C10G 1/08 . with moving catalysts
 - .. {in the presence of a solvent}
 - .. {Characterised by the catalyst used}
- C10G 1/083 .. {in the presence of a solvent}
- C10G 1/086 .. {Characterised by the catalyst used}
- C10G 1/10 . from rubber or rubber waste

C10G 2/00**Production of liquid hydrocarbon mixtures of undefined composition from oxides of carbon**

- C10G 2/30 . {from carbon monoxide with hydrogen}
- C10G 2/31 .. {thermal, non catalytic conversion}
- C10G 2/32 .. {with the use of catalysts}
- C10G 2/33 ... {characterised by the catalyst used}
- C10G 2/331 {containing group VIII-metals}
- C10G 2/332 {of the iron-group}
- C10G 2/333 {of the platinum-group}
- C10G 2/334 {containing molecular sieve catalysts}
- C10G 2/34 ... {Apparatus, reactors}
- C10G 2/341 {with stationary catalyst bed}
- C10G 2/342 {with moving solid catalysts}
- C10G 2/343 {according to the "moving-bed" method}
- C10G 2/344 {according to the "fluidised-bed" technique}
- C10G 2/35 .. {with the use of another activation, e.g. radiation, vibration, electrical or electromagnetic means}
- C10G 2/40 . {from carbon monoxide with water vapor}
- C10G 2/50 . {from carbon dioxide with hydrogen}

C10G 3/00**Production of liquid hydrocarbon mixtures from oxygen-containing or organic materials, e.g. fatty oils, fatty acids (production from non-melting solid oxygen-containing carbonaceous materials [C10G 1/00](#) ; preparation of individual hydrocarbons or mixtures thereof of definite or specified contribution [C07C](#))****WARNING**

1. Groups [C10G 3/40](#) to [C10G 3/62](#) are not complete pending a reorganization. See also [C10G 3/00](#)

C10G 3/00
(continued)

2. Groups [C10G 3/40](#) to [C10G 3/62](#) do not correspond to former or current IPC groups.

Concordance CPC : IPC for these groups is as follows: -

[C10G 3/40](#) - [C10G 3/62](#) : [C10G 3/00](#)

- [C10G 3/40](#) . {Thermal non-catalytic treatment}
- [C10G 3/42](#) . {Catalytic treatment}
- [C10G 3/44](#) . . {characterised by the catalyst used}
- [C10G 3/45](#) . . . {containing iron group metals or compounds thereof}
- [C10G 3/46](#) {in combination with chromium, molybdenum, tungsten metals or compounds thereof}
- [C10G 3/47](#) . . . {containing platinum group metals or compounds thereof}
- [C10G 3/48](#) . . . {further characterised by the catalyst support}
- [C10G 3/49](#) {containing crystalline aluminosilicates, e.g. molecular sieves}
- [C10G 3/50](#) . {in the presence of hydrogen, hydrogen donors or hydrogen generating compounds}
- [C10G 3/52](#) . . {Hydrogen in a special composition or from a special source}
- [C10G 3/54](#) . {characterised by the catalytic bed}
- [C10G 3/55](#) . . {with moving solid particles, e.g. moving beds}
- [C10G 3/56](#) . . . {suspended in the oil, e.g. slurries, ebullated beds}
- [C10G 3/57](#) . . . {according to the fluidised bed technique}
- [C10G 3/60](#) . {Controlling or regulating the process (controlling or regulating in general [G05](#))}
- [C10G 3/62](#) . {Catalyst regeneration (regeneration or reactivation of catalysts in general [B01J 38/00](#))}

C10G 5/00

Recovery of liquid hydrocarbon mixtures from gases, e.g. natural gas

- [C10G 5/02](#) . with solid adsorbents
- [C10G 5/04](#) . with liquid absorbents
- [C10G 5/06](#) . by cooling or compressing

C10G 7/00

Distillation of hydrocarbon oils (distillation in general [B01D](#))

- [C10G 7/003](#) . {distillation of lubricating oils}
- [C10G 7/006](#) . {of waste oils other than lubricating oils, e.g. PCB's containing oils}
- [C10G 7/02](#) . Stabilising gasoline by removing gases by fractioning
- [C10G 7/04](#) . Dewatering
- [C10G 7/06](#) . Vacuum distillation
- [C10G 7/08](#) . Azeotropic or extractive distillation (refining of hydrocarbon oils, in the absence of hydrogen, by extraction with selective solvents [C10G 21/00](#))
- [C10G 7/10](#) . Inhibiting corrosion during distillation
- [C10G 7/12](#) . Controlling or regulating (controlling or regulating in general [G05](#))

Cracking in the absence of hydrogen

| | |
|-------------------|---|
| C10G 9/00 | Thermal non-catalytic cracking, in the absence of hydrogen, of hydrocarbon oils |
| C10G 9/002 | . {Cooling of cracked gases} |
| C10G 9/005 | . {Coking (in order to produce liquid products mainly)} |
| C10G 9/007 | . {Visbreaking} |
| C10G 9/02 | . in retorts |
| C10G 9/04 | .. Retorts |
| C10G 9/06 | . by pressure distillation |
| C10G 9/08 | .. Apparatus therefor |
| C10G 9/12 | ... Removing incrustation |
| C10G 9/14 | . in pipes or coils with or without auxiliary means, e.g. digesters, soaking drums, expansion means |
| C10G 9/16 | .. Preventing or removing incrustation |
| C10G 9/18 | .. Apparatus |
| C10G 9/20 | ... Tube furnaces |
| C10G 9/203 | {chemical composition of the tubes} |
| C10G 9/206 | {controlling or regulating the tube furnaces} |
| C10G 9/24 | . by heating with electrical means |
| C10G 9/26 | . with discontinuously preheated non-moving solid material, e.g. blast and run |
| C10G 9/28 | . with preheated moving solid material |
| C10G 9/30 | .. according to the "moving bed" method |
| C10G 9/32 | .. according to the "fluidised-bed" technique |
| C10G 9/34 | . by direct contact with inert preheated fluids, e.g. with molten metals or salts |
| C10G 9/36 | .. with heated gases or vapours |
| C10G 9/38 | ... produced by partial combustion of the material to be cracked or by combustion of another hydrocarbon |
| C10G 9/40 | . by indirect contact with preheated fluid other than hot combustion gases |
| C10G 9/42 | . by passing the material to be cracked in thin streams or as spray on or near continuously heated surfaces |
| C10G 11/00 | Catalytic cracking, in the absence of hydrogen, of hydrocarbon oils (cracking in direct contact with molten metals or salts C10G 9/34) |
| C10G 11/02 | . characterised by the catalyst used |
| C10G 11/04 | .. Oxides |
| C10G 11/05 | ... Crystalline aluminosilicates, e.g. molecular sieves |
| C10G 11/06 | .. Sulfides |
| C10G 11/08 | .. Halides |
| C10G 11/10 | . with stationary catalyst bed |
| C10G 11/12 | . with discontinuously preheated non-moving solid catalysts, e.g. blast and run |

- C10G 11/14 . with preheated moving solid catalysts
- C10G 11/16 . . according to the "moving bed" method
- C10G 11/18 . . according to the "fluidised-bed" technique
- C10G 11/182 . . . {Regeneration}
- C10G 11/185 . . . {Energy recovery from regenerator effluent gases (using steam turbines, see [F01K 23/064](#) ; using gas turbines, see [F01K 25/14](#) ; the combined use of gas and steam turbines, see [F01K 3/185](#))}
- C10G 11/187 . . . {Controlling or regulating (controlling or regulating in general [G05](#))}
- C10G 11/20 . by direct contact with inert heated gases or vapours
- C10G 11/22 . . produced by partial combustion of the material to be cracked
- C10G 15/00** **Cracking of hydrocarbon oils by electric means, electromagnetic or mechanical vibrations, by particle radiation or with gases superheated in electric arcs**
- C10G 15/08 . by electric means or by electromagnetic or mechanical vibrations
- C10G 15/10 . by particle radiation
- C10G 15/12 . with gases superheated in an electric arc, e.g. plasma

Refining in the absence of hydrogen

- C10G 17/00** **Refining of hydrocarbon oils in the absence of hydrogen, with acids, acid-forming compounds or acid-containing liquids, e.g. acid sludge**
- C10G 17/02 . with acids or acid-containing liquids, e.g. acid sludge
- C10G 17/04 . . Liquid-liquid treatment forming two immiscible phases
- C10G 17/06 . . . using acids derived from sulfur or acid sludge thereof
- C10G 17/07 . . . using halogen acids or oxyacids of halogen ([acids generating halogen C10G 27/02](#))
- C10G 17/08 . with acid-forming oxides ([refining with CO₂ or SO₂ as a selective solvent C10G 21/06](#))
- C10G 17/085 . . with oleum
- C10G 17/09 . with acid salts
- C10G 17/095 . with "solid acids" e.g. phosphoric acid deposited on a carrier
- C10G 17/10 . recovery of used refining agents
- C10G 19/00** **Refining hydrocarbon oils in the absence of hydrogen, by alkaline treatment**
- C10G 19/02 . with aqueous alkaline solutions
- C10G 19/04 . . containing solubilisers, e.g. solutisers
- C10G 19/06 . . with plumbites or plumbates
- C10G 19/067 . with molten alkaline material
- C10G 19/073 . with solid alkaline material
- C10G 19/08 . Recovery of used refining agents
- C10G 21/00** **Refining of hydrocarbon oils in the absence of hydrogen, by extraction with selective solvents ([C10G 17/00](#) , [C10G 19/00](#) take precedence; dewaxing oils [C10G 73/02](#))**

- C10G 21/003 . {Solvent de-asphalting}
- C10G 21/006 . {of waste oils, e.g.PCB's containing oils}
- C10G 21/02 . with two or more solvents, which are introduced or withdrawn separately
- C10G 21/04 . . by introducing simultaneously at least two immiscible solvents counter-current to each other
- C10G 21/06 . characterised by the solvent used
- C10G 21/08 . . Inorganic compounds only
- C10G 21/10 . . . Sulfur dioxide
- C10G 21/12 . . Organic compounds only
- C10G 21/14 . . . Hydrocarbons
- C10G 21/16 . . . Oxygen-containing compounds
- C10G 21/18 . . . Halogen-containing compounds
- C10G 21/20 . . . Nitrogen-containing compounds
- C10G 21/22 . . . Compounds containing sulfur, selenium, or tellurium
- C10G 21/24 . . . Phosphorus-containing compounds
- C10G 21/26 . . . Silicon-containing compounds
- C10G 21/27 . . . Organic compounds not provided for in a single one of groups [C10G 21/14](#) to [C10G 21/26](#)
- C10G 21/28 . Recovery of used solvent
- C10G 21/30 . Controlling or regulating ([controlling or regulating in general G05](#))

C10G 25/00 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.

- C10G 25/003 . {Specific sorbent material, not covered by [C10G 25/02](#) or [C10G 25/03](#)}
- C10G 25/006 . {of waste oils, e.g.PCB's containing oils}
- C10G 25/02 . with ion-exchange material
- C10G 25/03 . . with crystalline alumino-silicates, e.g. molecular sieves
- C10G 25/05 . . . Removal of non-hydrocarbon compounds, e.g sulfur compounds
- C10G 25/06 . with moving sorbents or sorbents dispersed in the oil
- C10G 25/08 . . according to the "moving bed" method
- C10G 25/09 . . according to the "fluidised bed" technique
- C10G 25/11 . . Distillation in the presence of moving sorbents
- C10G 25/12 . Recovery of used adsorbent

C10G 27/00 Refining of hydrocarbon oils in the absence of hydrogen, by oxidation

- C10G 27/02 . with halogen or compounds generating halogen; hypochlorous acid or salts thereof
- C10G 27/04 . with oxygen or compounds generating oxygen

- C10G 27/06 . . in the presence of alkaline solutions
- C10G 27/08 . . in the presence of copper chloride
- C10G 27/10 . . in the presence of metal-containing organic complexes, e.g. chelates, or cationic ion-exchange resins
- C10G 27/12 . . with oxygen-generating compounds, e.g. per-compounds, chromic acid, chromates ([plumbites or plumbates C10G 19/06](#))
- C10G 27/14 . . with ozone-containing gases

C10G 29/00 Refining of hydrocarbon oils in the absence of hydrogen, with other chemicals

- C10G 29/02 . Non-metals
- C10G 29/04 . Metals, or metals deposited on a carrier
- C10G 29/06 . Metal salts, or metal salts deposited on a carrier
- C10G 29/08 . . containing the metal in the lower valency
- C10G 29/10 . . Sulfides
- C10G 29/12 . . Halides
- C10G 29/16 . Metal oxides
- C10G 29/20 . Organic compounds not containing metal atoms
- C10G 29/205 . . {by reaction with hydrocarbons added to the hydrocarbon oil}
- C10G 29/22 . . containing oxygen as the only hetero atom
- C10G 29/24 . . . aldehydes or ketones
- C10G 29/26 . . halogenated hydrocarbons
- C10G 29/28 . . containing sulfur as the only hetero atom, e.g. mercaptans, or sulfur and oxygen as the only hetero atoms

C10G 31/00 Refining of hydrocarbon oils in the absence of hydrogen, by methods not otherwise provided for ([by distillation C10G 7/00](#))

- C10G 31/06 . by heating, cooling, or pressure treatment
- C10G 31/08 . by treating with water
- C10G 31/09 . by filtration
- C10G 31/10 . with the aid of centrifugal force
- C10G 31/11 . by dialysis

C10G 32/00 Refining of hydrocarbons oils by electric or magnetic means, by irradiation or by using microorganisms

- C10G 32/02 . by electric or magnetic means
- C10G 32/04 . by particle radiation

C10G 33/00 Dewatering or demulsification of hydrocarbon oils ([by distillation C10G 7/04](#))

- C10G 33/02 . with electrical or magnetic means
- C10G 33/04 . with chemical means
- C10G 33/06 . with mechanical means, e.g. by filtration
- C10G 33/08 . Controlling or regulating ([controlling or regulating in general G05](#))

C10G 35/00 Reforming naphtha**NOTE**

By reforming is meant the treatment of naphtha, in order to improve the octane number or its aromatic content.

- C10G 35/02 . Thermal reforming
- C10G 35/04 . Catalytic reforming
- C10G 35/06 . . characterised by the catalyst used
- C10G 35/065 . . . {containing crystalline zeolitic molecular sieves, other than aluminosilicates}
- C10G 35/085 . . . containing platinum group metals or compounds thereof
- C10G 35/09 bimetallic catalysts in which at least one of the metals is a platinum group metal
- C10G 35/095 . . . containing crystalline aluminosilicates, e.g. molecular sieves {(C10G 35/065 takes precedence)}
- C10G 35/10 . . with moving catalysts
- C10G 35/12 . . . according to the "moving-bed" method
- C10G 35/14 . . . according to the "fluidised-bed" technique
- C10G 35/16 . with electric, electromagnetic, or mechanical vibrations; by particle radiation
- C10G 35/22 . Starting-up reforming operations
- C10G 35/24 . Controlling or regulating of reforming operations (controlling or regulating in general G05)

Hydrotreatment processes (reforming of naphtha C10G 35/00)**C10G 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 .

- C10G 45/02 . to eliminate hetero atoms without changing the skeleton of the hydrocarbon involved and without cracking into lower boiling hydrocarbons; Hydrofinishing
- C10G 45/04 . . characterised by the catalyst used
- C10G 45/06 . . . containing nickel or cobalt metal, or compounds thereof
- C10G 45/08 in combination with chromium, molybdenum, or tungsten metals, or compounds thereof
- C10G 45/10 . . . containing platinum group metals or compounds thereof
- C10G 45/12 . . . containing crystalline aluminosilicates, e.g. molecular sieves
- C10G 45/14 . . with moving solid particles

- C10G 45/16 . . . suspended in the oil, e.g. slurries
- C10G 45/18 . . . according to the "moving-bed" technique
- C10G 45/20 . . . according to the "fluidised-bed" technique
- C10G 45/22 . . with hydrogen dissolved or suspended in the oil
- C10G 45/24 . . with hydrogen-generating compounds
- C10G 45/26 . . . Steam or water
- C10G 45/28 . . . Organic compounds; Autofining
- C10G 45/30 characterised by the catalyst used
- C10G 45/32 . Selective hydrogenation of the diolefin or acetylene compounds
- C10G 45/34 . . characterised by the catalyst used
- C10G 45/36 . . . containing nickel or cobalt metal, or compounds thereof
- C10G 45/38 in combination with chromium, molybdenum or tungsten metals, or compounds thereof
- C10G 45/40 . . . containing platinum group metals or compounds thereof
- C10G 45/42 . . with moving solid particles
- C10G 45/44 . Hydrogenation of the aromatic hydrocarbons
- C10G 45/46 . . characterised by the catalyst used
- C10G 45/48 . . . containing nickel or cobalt metal, or compounds thereof
- C10G 45/50 in combination with chromium, molybdenum or tungsten metal, or compounds thereof
- C10G 45/52 . . . containing platinum group metals or compounds thereof
- C10G 45/54 . . . containing crystalline alumino-silicates, e.g. molecular sieves
- C10G 45/56 . . with moving solid particles
- C10G 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](#))
- C10G 45/60 . . characterised by the catalyst used
- C10G 45/62 . . . containing platinum group metals or compounds thereof
- C10G 45/64 . . . containing crystalline alumino-silicates, e.g. molecular sieves
- C10G 45/66 . . with moving solid particles
- C10G 45/68 . . Aromatisation of hydrocarbon oil fractions ([of naphtha C10G 35/00](#))
- C10G 45/70 . . . with catalysts containing platinum group metals or compounds thereof
- C10G 45/72 . Controlling or regulating ([controlling or regulating in general G05](#))
- C10G 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 carbonaceous or similar materials C10G 1/06](#))**
- C10G 47/02 . characterised by the catalyst used
- C10G 47/04 . . Oxides
- C10G 47/06 . . Sulfides
- C10G 47/08 . . Halides

- C10G 47/10 . . with catalysts deposited on a carrier
- C10G 47/12 . . . Inorganic carriers
- C10G 47/14 the catalyst containing platinum group metals or compounds thereof
- C10G 47/16 Crystalline alumino-silicate carriers
- C10G 47/18 the catalyst containing platinum group metals or compounds thereof
- C10G 47/20 the catalyst containing other metals or compounds thereof
- C10G 47/22 . Non-catalytic cracking in the presence of hydrogen
- C10G 47/24 . with moving solid particles
- C10G 47/26 . . suspended in the oil, e.g. slurries
- C10G 47/28 . . according to the "moving-bed" technique
- C10G 47/30 . . according to the "fluidised-bed" technique
- C10G 47/32 . in the presence of hydrogen-generating compounds
- C10G 47/34 . . Organic compounds, e.g. hydrogenated hydrocarbons
- C10G 47/36 . Controlling or regulating ([controlling or regulating in general G05](#))

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

- C10G 49/002 . {Apparatus for fixed bed hydrotreatment processes}
- C10G 49/005 . {Inhibiting corrosion in hydrotreatment processes}
- C10G 49/007 . {in the presence of hydrogen from a special source or of a special composition or having been purified by a special treatment}
- C10G 49/02 . characterised by the catalyst used
- C10G 49/04 . . containing nickel, cobalt, chromium, molybdenum, or tungsten metals, or compounds thereof
- C10G 49/06 . . containing platinum group metals or compounds thereof
- C10G 49/08 . . containing crystalline alumino-silicates, e.g. molecular sieves
- C10G 49/10 . with moving solid particles
- C10G 49/12 . . suspended in the oil, e.g. slurries
- C10G 49/14 . . according to the "moving-bed" technique
- C10G 49/16 . . according to the "fluidised-bed" technique
- C10G 49/18 . in the presence of hydrogen-generating compounds, e.g. ammonia, water, hydrogen sulfide
- C10G 49/20 . . Organic compounds
- C10G 49/22 . Separation of effluents
- C10G 49/24 . Starting-up hydrotreatment operations
- C10G 49/26 . Controlling or regulating ([controlling or regulating in general G05](#))

C10G 50/00 Production of liquid hydrocarbon mixtures from lower carbon number hydrocarbons, e.g. by oligomerisation ([preparation of individual hydrocarbons or mixtures thereof of definite or specified constitution C07C](#))

- C10G 50/02 . of hydrocarbon oils for lubricating purposes

Multi-step processes**NOTE**

Groups [C10G 51/00](#) to [C10G 69/00](#) cover only those combined treating operations where the interest is directed to the relationship between the steps.

| | |
|-------------------|---|
| C10G 51/00 | Treatment of hydrocarbon oils in the absence of hydrogen, by two or more cracking processes only |
| C10G 51/02 | . plural serial stages only |
| C10G 51/023 | . . {only thermal cracking steps} |
| C10G 51/026 | . . {only catalytic cracking steps} |
| C10G 51/04 | . . including only thermal and catalytic cracking steps |
| C10G 51/06 | . plural parallel stages only |
| C10G 53/00 | Treatment of hydrocarbon oils in the absence of hydrogen, by two or more refining processes |
| C10G 53/02 | . plural serial stages only |
| C10G 53/04 | . . including at least one extraction step |
| C10G 53/06 | . . . including only extraction steps, e.g. deasphalting by solvent treatment followed by extraction of aromatics (refining in one step with two or more solvents which are introduced or withdrawn separately C10G 21/02) |
| C10G 53/08 | . . including at least one sorption step |
| C10G 53/10 | . . including at least one acid-treatment step |
| C10G 53/12 | . . including at least one alkaline treatment step |
| C10G 53/14 | . . including at least one oxidation step |
| C10G 53/16 | . plural parallel stages only |
| C10G 55/00 | Treatment of hydrocarbon oils in the absence of hydrogen, by at least one refining process and at least one cracking process |
| C10G 55/02 | . plural serial stages only |
| C10G 55/04 | . . including at least one thermal cracking step |
| C10G 55/06 | . . including at least one catalytic cracking step |
| C10G 55/08 | . plural parallel stages only |
| C10G 57/00 | Treatment of hydrocarbon oils in the absence of the hydrogen, by at least one cracking process or refining process and at least one other conversion process |
| C10G 57/005 | . {with alkylation} |
| C10G 57/02 | . with polymerisation |
| C10G 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 |

| | |
|-------------------|---|
| C10G 59/02 | . plural serial stages only |
| C10G 59/04 | .. including at least one catalytic and at least one non-catalytic reforming step |
| C10G 59/06 | . plural parallel stages only |
| C10G 61/00 | Treatment of naphtha by at least one reforming process and at least one process of refining in the absence of hydrogen |
| C10G 61/02 | . plural serial stages only |
| C10G 61/04 | .. the refining step being an extraction |
| C10G 61/06 | .. the refining step being a sorption process |
| C10G 61/08 | . plural parallel stages only |
| C10G 61/10 | . processes also including other conversion steps |
| C10G 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) |
| C10G 63/02 | . plural serial stages only |
| C10G 63/04 | .. including at least one cracking step |
| C10G 63/06 | . plural parallel stages only |
| C10G 63/08 | .. including at least one cracking step |
| C10G 65/00 | Treatment of hydrocarbon oils by two or more hydrotreatment processes only |
| C10G 65/02 | . plural serial stages only |
| C10G 65/04 | .. including only refining steps |
| C10G 65/043 | ... {at least one step being a change in the structural skeleton} |
| C10G 65/046 | ... {at least one step being an aromatisation step} |
| C10G 65/06 | ... at least one step being a selective hydrogenation of the diolefins |
| C10G 65/08 | ... at least one step being a hydrogenation of the aromatic hydrocarbons |
| C10G 65/10 | .. including only cracking steps |
| C10G 65/12 | .. including cracking steps and other hydrotreatment steps |
| C10G 65/14 | . plural parallel stages only |
| C10G 65/16 | .. including only refining steps |
| C10G 65/18 | .. including only cracking steps |
| C10G 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 |
| C10G 67/02 | . plural serial stages only |
| C10G 67/04 | .. including solvent extraction as the refining step in the absence of hydrogen |
| C10G 67/0409 | ... {Extraction of unsaturated hydrocarbons} |
| C10G 67/0418 | {The hydrotreatment being a hydrotreating} |
| C10G 67/0427 | {The hydrotreatment being a selective hydrogenation of diolefins or acetylenes} |
| C10G 67/0436 | {The hydrotreatment being an aromatic saturation} |
| C10G 67/0445 | {The hydrotreatment being a hydrocracking} |

- C10G 67/0454 . . . {Solvent desasphalting}
- C10G 67/0463 {The hydrotreatment being a hydrorefining}
- C10G 67/0472 {The hydrotreatment being a selective hydrogenation of diolefines or acetylenes}
- C10G 67/0481 {The hydrotreatment being an aromatics saturation}
- C10G 67/049 {The hydrotreatment being a hydrocracking}
- C10G 67/06 . . including a sorption process as the refining step in the absence of hydrogen
- C10G 67/08 . . including acid treatment as the refining step in the absence of hydrogen
- C10G 67/10 . . including alkaline treatment as the refining step in the absence of hydrogen
- C10G 67/12 . . including oxidation as the refining step in the absence of hydrogen
- C10G 67/14 . . including at least two different refining steps in the absence of hydrogen
- C10G 67/16 . plural parallel stages only

C10G 69/00 **Treatment of hydrocarbon oils by at least one hydrotreatment process and at least one other conversion process ([C10G 67/00](#) takes precedence)**

- C10G 69/02 . plural serial stages only
- C10G 69/04 . . including at least one step of catalytic cracking in the absence of hydrogen
- C10G 69/06 . . including at least one step of thermal cracking in the absence of hydrogen
- C10G 69/08 . . including at least one step of reforming naphtha
- C10G 69/10 . . . hydrocracking of higher boiling fractions into naphtha and reforming the naphtha obtained
- C10G 69/12 . . including at least one polymerisation or alkylation step
- C10G 69/123 . . . {alkylation}
- C10G 69/126 . . . {polymerisation, e.g. oligomerisation}
- C10G 69/14 . plural parallel stages only

C10G 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](#)**

- C10G 70/002 . {by forming adducts or complexes}
- C10G 70/004 . . {with solutions of copper salts}
- C10G 70/006 . {with the use of acids or sulfur oxides}
- C10G 70/008 . {with the use of organometallic compounds}
- C10G 70/02 . by hydrogenation
- C10G 70/04 . by physical processes
- C10G 70/041 . . {by distillation}
- C10G 70/042 . . . {with the use of auxiliary compounds}
- C10G 70/043 . . {by fractional condensation}
- C10G 70/044 . . {by crystallisation}
- C10G 70/045 . . {using membranes, e.g. selective permeation}
- C10G 70/046 . . {by adsorption, i.e. with the use of solids}
- C10G 70/047 . . . {by molecular sieve technique}

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| C10G 70/048 | .. {by liquid-liquid extraction} |
| C10G 70/06 | .. by gas-liquid contact |
| C10G 71/00 | Treatment by methods not otherwise provided for of hydrocarbon oils or fatty oils for lubricating purposes (by Fischer-Tropsch C07C 1/00 ; lubricating compositions C10M) |
| C10G 71/02 | . Thickening by voltolising (chemical modification of drying oils by voltolising C09F 7/04) |
| C10G 73/00 | Recovery or refining of mineral waxes, e.g. montan wax (compositions essentially based on waxes C08L 91/00) |
| C10G 73/02 | . Recovery of petroleum waxes from hydrocarbon oils; Dewaxing of hydrocarbon oils |
| C10G 73/025 | .. {by filtration} |
| C10G 73/04 | .. with the use of filter aids |
| C10G 73/06 | .. with the use of solvents |
| C10G 73/08 | ... Organic compounds |
| C10G 73/10 | Hydrocarbons |
| C10G 73/12 | Oxygen-containing compounds |
| C10G 73/14 | Halogen-containing compounds |
| C10G 73/16 | Nitrogen-containing compounds |
| C10G 73/18 | containing sulfur, selenium or tellurium |
| C10G 73/20 | containing phosphorus |
| C10G 73/22 | Mixtures or organic compounds |
| C10G 73/24 | .. by formation of adducts |
| C10G 73/26 | .. by flotation |
| C10G 73/28 | .. by centrifugal force |
| C10G 73/30 | .. with electric means |
| C10G 73/32 | .. Methods of cooling during dewaxing |
| C10G 73/34 | .. Controlling or regulating (controlling or regulating in general G05) |
| C10G 73/36 | . Recovery of petroleum waxes from other compositions containing oil in minor proportions, from concentrates or from residues; De-oiling, sweating |
| C10G 73/38 | . Chemical modification of petroleum |
| C10G 73/40 | . Physical treatment of waxes or modified waxes, e.g. granulation, dispersion, emulsion, irradiation |
| C10G 73/42 | . Refining of petroleum waxes |
| C10G 73/44 | .. in the presence of hydrogen or hydrogen-generating compounds |
| C10G 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; protection of pipes against corrosion or incrustation F16L 58/00) |
| C10G 75/02 | . by addition of corrosion inhibitors |
| C10G 75/04 | . by addition of antifouling agents |
| C10G 99/00 | Subject matter not provided for in other groups of this subclass |

| C10G 2300/00 | Aspects relating to hydrocarbon processing covered by groups <u>C10G 1/00</u> - <u>C10G 99/00</u> |
|---------------------|--|
| C10G 2300/10 | . Feedstock materials |
| C10G 2300/1003 | .. Waste materials |
| C10G 2300/1007 | ... Used oils |
| C10G 2300/1011 | .. Biomass |
| C10G 2300/1014 | ... of vegetal origin |
| C10G 2300/1018 | ... of animal origin |
| C10G 2300/1022 | .. Fischer-Tropsch products |
| C10G 2300/1025 | .. Natural gas |
| C10G 2300/1029 | .. Gas hydrates |
| C10G 2300/1033 | .. Oil well production fluids |
| C10G 2300/1037 | .. Hydrocarbon fractions |
| C10G 2300/104 | ... Light gasoline having a boiling range of about 20 - 100 °C |
| C10G 2300/1044 | ... Heavy gasoline or naphtha having a boiling range of about 100 - 180 °C |
| C10G 2300/1048 | ... Middle distillates |
| C10G 2300/1051 | Kerosene having a boiling range of about 180 - 230 °C |
| C10G 2300/1055 | Diesel having a boiling range of about 230 - 330 °C |
| C10G 2300/1059 | Gasoil having a boiling range of about 330 - 427 °C |
| C10G 2300/1062 | ... Lubricating oils |
| C10G 2300/1066 | Special oils |
| C10G 2300/107 | .. Atmospheric residues having a boiling point of at least about 538 °C |
| C10G 2300/1074 | .. Vacuum distillates |
| C10G 2300/1077 | .. Vacuum residues |
| C10G 2300/1081 | .. Alkanes |
| C10G 2300/1085 | ... Solid paraffins |
| C10G 2300/1088 | .. Olefins |
| C10G 2300/1092 | ... C2-C4 olefins |
| C10G 2300/1096 | .. Aromatics or polyaromatics |
| C10G 2300/20 | . Characteristics of the feedstock or the products |
| C10G 2300/201 | .. Impurities |
| C10G 2300/202 | ... Heteroatoms content, i.e. S,N,O,P |
| C10G 2300/203 | Naphthenic acids, TAN |
| C10G 2300/205 | ... Metal content |
| C10G 2300/206 | Asphaltenes |
| C10G 2300/207 | ... Acid gases, e.g. H ₂ S, COS, SO ₂ , HCN |
| C10G 2300/208 | ... Sediments, e.g. bottom sediment and water or BSW |
| C10G 2300/30 | .. Physical properties of feedstocks or products |
| C10G 2300/301 | ... Boiling range |

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| C10G 2300/302 | ... | Viscosity |
| C10G 2300/304 | ... | Pour point, cloud point, cold flow properties |
| C10G 2300/305 | ... | Octane number, e.g. motor octane number (MON), research octane number (RON) |
| C10G 2300/307 | ... | Cetane number, cetane index |
| C10G 2300/308 | ... | Gravity, density, e.g. API |
| C10G 2300/40 | . | Characteristics of the process deviating from typical ways of processing |
| C10G 2300/4006 | .. | Temperature |
| C10G 2300/4012 | .. | Pressure |
| C10G 2300/4018 | .. | Spatial velocity, e.g. LHSV, WHSV |
| C10G 2300/4025 | .. | Yield |
| C10G 2300/4031 | .. | Start up or shut down operations |
| C10G 2300/4037 | .. | In-situ processes |
| C10G 2300/4043 | .. | Limiting CO ₂ emissions |
| C10G 2300/405 | .. | Limiting CO, NO _x or SO _x emissions |
| C10G 2300/4056 | .. | Retrofitting operations |
| C10G 2300/4062 | .. | Geographical aspects e.g. different process units form a combination process at different geographical locations. |
| C10G 2300/4068 | .. | Moveable devices or units, e.g. on trucks, barges |
| C10G 2300/4075 | .. | Limiting deterioration of equipment |
| C10G 2300/4081 | .. | Recycling aspects |
| C10G 2300/4087 | .. | Catalytic distillation |
| C10G 2300/4093 | .. | Catalyst stripping |
| C10G 2300/42 | .. | Hydrogen of special source or of special composition |
| C10G 2300/44 | .. | Solvents |
| C10G 2300/70 | . | Catalyst aspects |
| C10G 2300/701 | .. | Use of spent catalysts |
| C10G 2300/703 | .. | Activation |
| C10G 2300/705 | .. | Passivation |
| C10G 2300/706 | .. | Catalytic metal recovery |
| C10G 2300/708 | .. | Coking aspect, coke content and composition of deposits |
| C10G 2300/80 | . | Additives |
| C10G 2300/802 | .. | Diluents |
| C10G 2300/805 | .. | Water |
| C10G 2300/807 | ... | Steam |
| C10G 2400/00 | Products obtained by processes covered by groups C10G 9/00 to C10G 69/14 | |
| C10G 2400/02 | . | Gasoline |
| C10G 2400/04 | . | Diesel oil |
| C10G 2400/06 | . | Gasoil |
| C10G 2400/08 | . | Jet fuel |

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| C10G 2400/10 | . Lubricating oil |
| C10G 2400/12 | . Electrical isolation oil |
| C10G 2400/14 | . White oil, eating oil |
| C10G 2400/16 | . Residues |
| C10G 2400/18 | . Solvents |
| C10G 2400/20 | . C2-C4 olefins |
| C10G 2400/22 | . Higher olefins |
| C10G 2400/24 | . Acetylene and homologues |
| C10G 2400/26 | . Fuel gas |
| C10G 2400/28 | . Propane and butane |
| C10G 2400/30 | . Aromatics |