

# 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 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](#))

##### NOTES

- 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](#)
- 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.
- In this subclass, in the absence of an indication to the contrary, classification is made in the last appropriate place.

##### WARNINGS

- 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](#)
- 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.

<b>1/00</b>	<b>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 <a href="#">B03B</a>)</b>	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
1/002	. {in combination with oil conversion- or refining processes}	<b>2/00</b>	<b>Production of liquid hydrocarbon mixtures of undefined composition from oxides of carbon</b>
1/004	. {Inhibiting of corrosion}	2/30	. {from carbon monoxide with hydrogen}
1/006	. {Combinations of processes provided in groups <a href="#">C10G 1/02</a> - <a href="#">C10G 1/08</a> }	2/31	. . {thermal, non catalytic conversion}
		2/32	. . {with the use of catalysts}
1/008	. {Controlling or regulating of liquefaction processes (controlling or regulation in general <a href="#">G05</a> )}	2/33	. . . {characterised by the catalyst used}
		2/331	. . . . {containing group VIII-metals}
1/02	. by distillation (destructive distillation of oil-shale <a href="#">C10B 53/06</a> )	2/332	. . . . . {of the iron-group}
		2/333	. . . . . {of the platinum-group}
1/04	. by extraction	2/334	. . . . . {containing molecular sieve catalysts}
1/042	. . {by the use of hydrogen-donor solvents}	2/34	. . . {Apparatus, reactors}
1/045	. . {Separation of insoluble materials}	2/341	. . . . {with stationary catalyst bed}
1/047	. . {Hot water or cold water extraction processes}	2/342	. . . . {with moving solid catalysts}
1/06	. by destructive hydrogenation	2/343	. . . . . {according to the "moving-bed" method}
1/065	. . {in the presence of a solvent}		

- 2/344 . . . . . {according to the "fluidised-bed" technique}
- 2/35 . . {with the use of another activation, e.g. radiation, vibration, electrical or electromagnetic means}
- 2/40 . {from carbon monoxide with water vapor}
- 2/50 . {from carbon dioxide with hydrogen}
- 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)**
- 3/40 . {Thermal non-catalytic treatment}
- 3/42 . {Catalytic treatment}
- 3/44 . . {characterised by the catalyst used}
- 3/45 . . . {containing iron group metals or compounds thereof}
- 3/46 . . . . {in combination with chromium, molybdenum, tungsten metals or compounds thereof}
- 3/47 . . . {containing platinum group metals or compounds thereof}
- 3/48 . . . {further characterised by the catalyst support}
- 3/49 . . . . {containing crystalline aluminosilicates, e.g. molecular sieves}
- 3/50 . {in the presence of hydrogen, hydrogen donors or hydrogen generating compounds}
- 3/52 . . {Hydrogen in a special composition or from a special source}
- 3/54 . {characterised by the catalytic bed}
- 3/55 . . {with moving solid particles, e.g. moving beds}
- 3/56 . . . {suspended in the oil, e.g. slurries, ebullated beds}
- 3/57 . . . {according to the fluidised bed technique}
- 3/60 . {Controlling or regulating the process (controlling or regulating in general G05)}
- 3/62 . {Catalyst regeneration (regeneration or reactivation of catalysts in general B01J 38/00)}
- 5/00 Recovery of liquid hydrocarbon mixtures from gases, e.g. natural gas**
- 5/02 . with solid adsorbents
- 5/04 . with liquid adsorbents
- 5/06 . by cooling or compressing
- 7/00 Distillation of hydrocarbon oils (distillation in general B01D)**
- 7/003 . {distillation of lubricating oils}
- 7/006 . {of waste oils other than lubricating oils, e.g. PCB's containing oils}
- 7/02 . Stabilising gasoline by removing gases by fractioning
- 7/04 . Dewatering
- 7/06 . Vacuum distillation
- 7/08 . Azeotropic or extractive distillation (refining of hydrocarbon oils, in the absence of hydrogen, by extraction with selective solvents C10G 21/00)
- 7/10 . Inhibiting corrosion during distillation
- 7/12 . Controlling or regulating (controlling or regulating in general G05)

**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 (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)}
- 11/187 . . . {Controlling or regulating (controlling or regulating in general G05)}
- 11/20 . by direct contact with inert heated gases or vapours
- 11/22 . . produced by partial combustion of the material to be cracked

<b>15/00</b>	<b>Cracking of hydrocarbon oils by electric means, electromagnetic or mechanical vibrations, by particle radiation or with gases superheated in electric arcs</b>	21/30	<ul style="list-style-type: none"> <li>Controlling or regulating (<a href="#">controlling or regulating in general G05</a>)</li> </ul>
15/08	<ul style="list-style-type: none"> <li>by electric means or by electromagnetic or mechanical vibrations</li> </ul>	<b>25/00</b>	<b>Refining of hydrocarbon oils in the absence of hydrogen, with solid sorbents</b>
15/10	<ul style="list-style-type: none"> <li>by particle radiation</li> </ul>	<b>NOTE</b>	When classifying in this group, classification is also made in group <a href="#">B01D 15/08</a> insofar as subject matter of general interest relating to chromatography is concerned.
15/12	<ul style="list-style-type: none"> <li>with gases superheated in an electric arc, e.g. plasma</li> </ul>		
<b>Refining in the absence of hydrogen</b>			
<b>17/00</b>	<b>Refining of hydrocarbon oils in the absence of hydrogen, with acids, acid-forming compounds or acid-containing liquids, e.g. acid sludge</b>	25/003	<ul style="list-style-type: none"> <li>{<a href="#">Specific sorbent material, not covered by C10G 25/02 or C10G 25/03</a>}</li> </ul>
17/02	<ul style="list-style-type: none"> <li>with acids or acid-containing liquids, e.g. acid sludge</li> </ul>	25/006	<ul style="list-style-type: none"> <li>{<a href="#">of waste oils, e.g. PCB's containing oils</a>}</li> </ul>
17/04	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Liquid-liquid treatment forming two immiscible phases</li> </ul> </li> </ul>	25/02	<ul style="list-style-type: none"> <li>with ion-exchange material</li> </ul>
17/06	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>using acids derived from sulfur or acid sludge thereof</li> </ul> </li> </ul> </li> </ul>	25/03	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with crystalline aluminosilicates, e.g. molecular sieves</li> </ul> </li> </ul>
17/07	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>using halogen acids or oxyacids of halogen (<a href="#">acids generating halogen C10G 27/02</a>)</li> </ul> </li> </ul> </li> </ul>	25/05	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Removal of non-hydrocarbon compounds, e.g. sulfur compounds</li> </ul> </li> </ul>
17/08	<ul style="list-style-type: none"> <li>with acid-forming oxides (<a href="#">refining with CO<sub>2</sub> or SO<sub>2</sub> as a selective solvent C10G 21/06</a>)</li> </ul>	25/06	<ul style="list-style-type: none"> <li>with moving sorbents or sorbents dispersed in the oil</li> </ul>
17/085	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with oleum</li> </ul> </li> </ul>	25/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>according to the "moving bed" method</li> </ul> </li> </ul>
17/09	<ul style="list-style-type: none"> <li>with acid salts</li> </ul>	25/09	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>according to the "fluidised bed" technique</li> </ul> </li> </ul>
17/095	<ul style="list-style-type: none"> <li>with "solid acids", e.g. phosphoric acid deposited on a carrier</li> </ul>	25/11	<ul style="list-style-type: none"> <li>Distillation in the presence of moving sorbents</li> </ul>
17/10	<ul style="list-style-type: none"> <li>Recovery of used refining agents</li> </ul>	25/12	<ul style="list-style-type: none"> <li>Recovery of used adsorbent</li> </ul>
<b>19/00</b>	<b>Refining hydrocarbon oils in the absence of hydrogen, by alkaline treatment</b>	<b>27/00</b>	<b>Refining of hydrocarbon oils in the absence of hydrogen, by oxidation</b>
19/02	<ul style="list-style-type: none"> <li>with aqueous alkaline solutions</li> </ul>	27/02	<ul style="list-style-type: none"> <li>with halogen or compounds generating halogen; Hypochlorous acid or salts thereof</li> </ul>
19/04	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>containing solubilisers, e.g. solutisers</li> </ul> </li> </ul>	27/04	<ul style="list-style-type: none"> <li>with oxygen or compounds generating oxygen</li> </ul>
19/06	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with plumbites or plumbates</li> </ul> </li> </ul>	27/06	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>in the presence of alkaline solutions</li> </ul> </li> </ul>
19/067	<ul style="list-style-type: none"> <li>with molten alkaline material</li> </ul>	27/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>in the presence of copper chloride</li> </ul> </li> </ul>
19/073	<ul style="list-style-type: none"> <li>with solid alkaline material</li> </ul>	27/10	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>in the presence of metal-containing organic complexes, e.g. chelates, or cationic ion-exchange resins</li> </ul> </li> </ul>
19/08	<ul style="list-style-type: none"> <li>Recovery of used refining agents</li> </ul>	27/12	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with oxygen-generating compounds, e.g. per-compounds, chromic acid, chromates (<a href="#">plumbites or plumbates C10G 19/06</a>)</li> </ul> </li> </ul>
<b>21/00</b>	<b>Refining of hydrocarbon oils in the absence of hydrogen, by extraction with selective solvents (<a href="#">C10G 17/00</a>, <a href="#">C10G 19/00</a> take precedence; <a href="#">dewaxing oils C10G 73/02</a>)</b>	27/14	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with ozone-containing gases</li> </ul> </li> </ul>
21/003	<ul style="list-style-type: none"> <li>{<a href="#">Solvent de-asphalting</a>}</li> </ul>	<b>29/00</b>	<b>Refining of hydrocarbon oils in the absence of hydrogen, with other chemicals</b>
21/006	<ul style="list-style-type: none"> <li>{<a href="#">of waste oils, e.g. PCB's containing oils</a>}</li> </ul>	29/02	<ul style="list-style-type: none"> <li>Non-metals</li> </ul>
21/02	<ul style="list-style-type: none"> <li>with two or more solvents, which are introduced or withdrawn separately</li> </ul>	29/04	<ul style="list-style-type: none"> <li>Metals, or metals deposited on a carrier</li> </ul>
21/04	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>by introducing simultaneously at least two immiscible solvents counter-current to each other</li> </ul> </li> </ul>	29/06	<ul style="list-style-type: none"> <li>Metal salts, or metal salts deposited on a carrier</li> </ul>
21/06	<ul style="list-style-type: none"> <li>characterised by the solvent used</li> </ul>	29/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>containing the metal in the lower valency</li> </ul> </li> </ul>
21/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Inorganic compounds only</li> </ul> </li> </ul>	29/10	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Sulfides</li> </ul> </li> </ul>
21/10	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Sulfur dioxide</li> </ul> </li> </ul> </li> </ul>	29/12	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Halides</li> </ul> </li> </ul>
21/12	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Organic compounds only</li> </ul> </li> </ul>	29/16	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Metal oxides</li> </ul> </li> </ul>
21/14	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Hydrocarbons</li> </ul> </li> </ul> </li> </ul>	29/20	<ul style="list-style-type: none"> <li>Organic compounds not containing metal atoms</li> </ul>
21/16	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Oxygen-containing compounds</li> </ul> </li> </ul> </li> </ul>	29/205	<ul style="list-style-type: none"> <li>{<a href="#">by reaction with hydrocarbons added to the hydrocarbon oil</a>}</li> </ul>
21/18	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Halogen-containing compounds</li> </ul> </li> </ul> </li> </ul>	29/22	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>containing oxygen as the only hetero atom</li> </ul> </li> </ul>
21/20	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Nitrogen-containing compounds</li> </ul> </li> </ul> </li> </ul>	29/24	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Aldehydes or ketones</li> </ul> </li> </ul>
21/22	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Compounds containing sulfur, selenium, or tellurium</li> </ul> </li> </ul> </li> </ul>	29/26	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Halogenated hydrocarbons</li> </ul> </li> </ul>
21/24	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Phosphorus-containing compounds</li> </ul> </li> </ul> </li> </ul>	29/28	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>containing sulfur as the only hetero atom, e.g. mercaptans, or sulfur and oxygen as the only hetero atoms</li> </ul> </li> </ul>
21/26	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Silicon-containing compounds</li> </ul> </li> </ul> </li> </ul>	<b>31/00</b>	<b>Refining of hydrocarbon oils in the absence of hydrogen, by methods not otherwise provided for (<a href="#">by distillation C10G 7/00</a>)</b>
21/27	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Organic compounds not provided for in a single one of groups <a href="#">C10G 21/14</a> - <a href="#">C10G 21/26</a></li> </ul> </li> </ul>	31/06	<ul style="list-style-type: none"> <li>by heating, cooling, or pressure treatment</li> </ul>
21/28	<ul style="list-style-type: none"> <li>Recovery of used solvent</li> </ul>	31/08	<ul style="list-style-type: none"> <li>by treating with water</li> </ul>

31/09	• by filtration	45/08	• . . . . in combination with chromium, molybdenum, or tungsten metals, or compounds thereof
31/10	• with the aid of centrifugal force	45/10	• . . . containing platinum group metals or compounds thereof
31/11	• by dialysis	45/12	• . . . containing crystalline alumino-silicates, e.g. molecular sieves
<b>32/00</b>	<b>Refining of hydrocarbon oils by electric or magnetic means, by irradiation or by using microorganisms</b>	45/14	• . . with moving solid particles
32/02	• by electric or magnetic means	45/16	• . . . suspended in the oil, e.g. slurries
32/04	• by particle radiation	45/18	• . . . according to the "moving-bed" technique
<b>33/00</b>	<b>Dewatering or demulsification of hydrocarbon oils (by distillation C10G 7/04)</b>	45/20	• . . . according to the "fluidised-bed" technique
33/02	• with electrical or magnetic means	45/22	• . . with hydrogen dissolved or suspended in the oil
33/04	• with chemical means	45/24	• . . with hydrogen-generating compounds
33/06	• with mechanical means, e.g. by filtration	45/26	• . . . Steam or water
33/08	• Controlling or regulating (controlling or regulating in general G05)	45/28	• . . . Organic compounds; Autofining
<b>35/00</b>	<b>Reforming naphtha</b>	45/30	• . . . . characterised by the catalyst used
	<b>NOTE</b>	45/32	• Selective hydrogenation of the diolefin or acetylene compounds
	By reforming is meant the treatment of naphtha, in order to improve the octane number or its aromatic content.	45/34	• . . characterised by the catalyst used
35/02	• Thermal reforming	45/36	• . . . containing nickel or cobalt metal, or compounds thereof
35/04	• Catalytic reforming	45/38	• . . . . in combination with chromium, molybdenum or tungsten metals, or compounds thereof
35/06	• . . characterised by the catalyst used	45/40	• . . . containing platinum group metals or compounds thereof
35/065	• . . . {containing crystalline zeolitic molecular sieves, other than aluminosilicates}	45/42	• . . with moving solid particles
35/085	• . . . containing platinum group metals or compounds thereof	45/44	• Hydrogenation of the aromatic hydrocarbons
35/09	• . . . . Bimetallic catalysts in which at least one of the metals is a platinum group metal	45/46	• . . characterised by the catalyst used
35/095	• . . . containing crystalline alumino-silicates, e.g. molecular sieves {(C10G 35/065 takes precedence)}	45/48	• . . . containing nickel or cobalt metal, or compounds thereof
35/10	• . . with moving catalysts	45/50	• . . . . in combination with chromium, molybdenum or tungsten metal, or compounds thereof
35/12	• . . . according to the "moving-bed" method	45/52	• . . . containing platinum group metals or compounds thereof
35/14	• . . . according to the "fluidised-bed" technique	45/54	• . . . containing crystalline alumino-silicates, e.g. molecular sieves
35/16	• with electric, electromagnetic, or mechanical vibrations; by particle radiation	45/56	• . . with moving solid particles
35/22	• Starting-up reforming operations	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)
35/24	• Controlling or regulating of reforming operations (controlling or regulating in general G05)	45/60	• . . characterised by the catalyst used
<b>Hydrotreatment processes (reforming of naphtha C10G 35/00)</b>		45/62	• . . . containing platinum group metals or compounds thereof
<b>45/00</b>	<b>Refining of hydrocarbon oils using hydrogen or hydrogen-generating compounds</b>	45/64	• . . . containing crystalline alumino-silicates, e.g. molecular sieves
	<b>NOTE</b>	45/66	• . . with moving solid particles
	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.	45/68	• . . Aromatisation of hydrocarbon oil fractions (of naphtha C10G 35/00)
45/02	• to eliminate hetero atoms without changing the skeleton of the hydrocarbon involved and without cracking into lower boiling hydrocarbons; Hydrofinishing	45/70	• . . . with catalysts containing platinum group metals or compounds thereof
45/04	• . . characterised by the catalyst used	45/72	• Controlling or regulating (controlling or regulating in general G05)
45/06	• . . . containing nickel or cobalt metal, or compounds thereof	<b>47/00</b>	<b>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)</b>
		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
47/36	. Controlling or regulating (controlling or regulating in general G05)
<b>49/00</b>	<b>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</b>
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 (controlling or regulating in general G05)
<b>50/00</b>	<b>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)</b>
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.

<b>51/00</b>	<b>Treatment of hydrocarbon oils in the absence of hydrogen, by two or more cracking processes only</b>
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
<b>53/00</b>	<b>Treatment of hydrocarbon oils in the absence of hydrogen, by two or more refining processes</b>
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 (refining in one step with two or more solvents which are introduced or withdrawn separately C10G 21/02)
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
<b>55/00</b>	<b>Treatment of hydrocarbon oils in the absence of hydrogen, by at least one refining process and at least one cracking process</b>
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
<b>57/00</b>	<b>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</b>
57/005	. {with alkylation}
57/02	. with polymerisation
<b>59/00</b>	<b>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</b>
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
<b>61/00</b>	<b>Treatment of naphtha by at least one reforming process and at least one process of refining in the absence of hydrogen</b>
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
  - 67/0409 . . . {Extraction of unsaturated hydrocarbons}
  - 67/0418 . . . . {The hydrotreatment being a hydrotreating}
  - 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 hydrocracking}
  - 67/0454 . . . {Solvent desasphalting}
  - 67/0463 . . . . {The hydrotreatment being a hydrotreating}
  - 67/0472 . . . . {The hydrotreatment being a selective hydrogenation of diolefins or acetylenes}
  - 67/0481 . . . . {The hydrotreatment being an aromatics saturation}
  - 67/049 . . . . {The hydrotreatment being a hydrocracking}
  - 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 (by Fischer-Tropsch C07C 1/00; lubricating compositions C10M)**

- 71/02 . Thickening by voltolising (chemical modification of drying oils by voltolising 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 (controlling or regulating in general G05)

73/36	. Recovery of petroleum waxes from other compositions containing oil in minor proportions, from concentrates or from residues; De-oiling, sweating	2300/206	. . . . Asphaltenes
73/38	. Chemical modification of petroleum	2300/207	. . . Acid gases, e.g. H <sub>2</sub> S, COS, SO <sub>2</sub> , HCN
73/40	. Physical treatment of waxes or modified waxes, e.g. granulation, dispersion, emulsion, irradiation	2300/208	. . . Sediments, e.g. bottom sediment and water or BSW
73/42	. Refining of petroleum waxes	2300/30	. . Physical properties of feedstocks or products
73/44	. . in the presence of hydrogen or hydrogen-generating compounds	2300/301	. . . Boiling range
		2300/302	. . . Viscosity
		2300/304	. . . Pour point, cloud point, cold flow properties
		2300/305	. . . Octane number, e.g. motor octane number [MON], research octane number [RON]
			. . . Cetane number, cetane index
		2300/308	. . . Gravity, density, e.g. API
		2300/40	. Characteristics of the process deviating from typical ways of processing
		2300/4006	. . Temperature
		2300/4012	. . Pressure
		2300/4018	. . Spatial velocity, e.g. LHSV, WHSV
		2300/4025	. . Yield
		2300/4031	. . Start up or shut down operations
		2300/4037	. . In-situ processes
		2300/4043	. . Limiting CO <sub>2</sub> emissions
		2300/405	. . Limiting CO, NO <sub>x</sub> or SO <sub>x</sub> emissions
		2300/4056	. . Retrofitting operations
		2300/4062	. . Geographical aspects, e.g. different process units form a combination process at different geographical locations
		2300/4068	. . Moveable devices or units, e.g. on trucks, barges
		2300/4075	. . Limiting deterioration of equipment
		2300/4081	. . Recycling aspects
		2300/4087	. . Catalytic distillation
		2300/4093	. . Catalyst stripping
		2300/42	. . Hydrogen of special source or of special composition
		2300/44	. . Solvents
		2300/70	. Catalyst aspects
		2300/701	. . Use of spent catalysts
		2300/703	. . Activation
		2300/705	. . Passivation
		2300/706	. . Catalytic metal recovery
		2300/708	. . Coking aspect, coke content and composition of deposits
		2300/80	. Additives
		2300/802	. . Diluents
		2300/805	. . Water
		2300/807	. . . Steam
<b>2300/00</b>	<b>Aspects relating to hydrocarbon processing covered by groups <a href="#">C10G 1/00</a> - <a href="#">C10G 99/00</a></b>	<b>2400/00</b>	<b>Products obtained by processes covered by groups <a href="#">C10G 9/00</a> - <a href="#">C10G 69/14</a></b>
2300/10	. Feedstock materials	2400/02	. Gasoline
2300/1003	. . Waste materials	2400/04	. Diesel oil
2300/1007	. . . Used oils	2400/06	. Gasoil
2300/1011	. . Biomass	2400/08	. Jet fuel
2300/1014	. . . of vegetal origin	2400/10	. Lubricating oil
2300/1018	. . . of animal origin	2400/12	. Electrical isolation oil
2300/1022	. . Fischer-Tropsch products	2400/14	. White oil, eating oil
2300/1025	. . Natural gas	2400/16	. Residues
2300/1029	. . Gas hydrates	2400/18	. Solvents
2300/1033	. . Oil well production fluids	2400/20	. C <sub>2</sub> -C <sub>4</sub> olefins
2300/1037	. . Hydrocarbon fractions	2400/22	. Higher olefins
2300/104	. . . Light gasoline having a boiling range of about 20 - 100 °C	2400/24	. Acetylene and homologues
2300/1044	. . . Heavy gasoline or naphtha having a boiling range of about 100 - 180 °C	2400/26	. Fuel gas
2300/1048	. . . Middle distillates	2400/28	. Propane and butane
2300/1051	. . . . Kerosene having a boiling range of about 180 - 230 °C		
2300/1055	. . . . Diesel having a boiling range of about 230 - 330 °C		
2300/1059	. . . . Gasoil having a boiling range of about 330 - 427 °C		
2300/1062	. . . Lubricating oils		
2300/1066	. . . . Special oils		
2300/107	. . Atmospheric residues having a boiling point of at least about 538 °C		
2300/1074	. . Vacuum distillates		
2300/1077	. . Vacuum residues		
2300/1081	. . Alkanes		
2300/1085	. . . Solid paraffins		
2300/1088	. . Olefins		
2300/1092	. . . C <sub>2</sub> -C <sub>4</sub> olefins		
2300/1096	. . Aromatics or polyaromatics		
2300/20	. Characteristics of the feedstock or the products		
2300/201	. . Impurities		
2300/202	. . . Heteroatoms content, i.e. S, N, O, P		
2300/203	. . . . Naphthenic acids, TAN		
2300/205	. . . Metal content		

