

CPC COOPERATIVE PATENT CLASSIFICATION

C CHEMISTRY; METALLURGY

(NOTES omitted)

CHEMISTRY

C12 BIOCHEMISTRY; BEER; SPIRITS; WINE; VINEGAR; MICROBIOLOGY; ENZYMOLOGY; MUTATION OR GENETIC ENGINEERING

(NOTES omitted)

C12P FERMENTATION OR ENZYME-USING PROCESSES TO SYNTHESISE A DESIRED CHEMICAL COMPOUND OR COMPOSITION OR TO SEPARATE OPTICAL ISOMERS FROM A RACEMIC MIXTURE {(brewing of beer [C12C](#); producing vinegar [C12J](#); producing specific peptides or proteins [C07K](#); producing enzymes [C12N 9/00](#); DNA or RNA concerning genetic engineering, vectors, e.g. plasmids, or their isolation, preparation or purification [C12N 15/00](#); measuring or testing processes involving enzymes or microorganisms [C12Q](#); measuring or testing processes involving nucleic acid amplification reactions [C12Q 1/6844](#); fermentation processes to form a food composition, [A21](#) or [A23](#); compounds in general, see the relevant compound class, e.g. [C01](#), [C07](#))}

NOTES

1. This subclass covers the production of compounds or compositions by biochemical transformation of matter performed by using enzymes or microorganisms, wherein microorganisms are defined as any single-celled organisms, including bacteria, fungi, yeast or microalgae, or plant or mammalian cells in the form of cell cultures.
2. In this subclass, documents are primarily classified according to the compounds produced. In addition, if appropriate, classification according to the method or biocatalyst used to produce the compound is made.
3. Classification in groups [C12P 19/14](#) - [C12P 19/24](#), [C12P 39/00](#), [C12P 41/00](#) - [C12P 41/009](#) should only be made together with the corresponding product groups

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:
 - [C12P 21/04](#) covered by [C07K 7/50](#)
 - [C12P 21/08](#) covered by [C07K 16/00](#)
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 Preparation of compounds or compositions, not provided for in groups [C12P 3/00](#) - [C12P 39/00](#), by using microorganisms or enzymes

NOTES

1. This group is used for the classification of documents relating to the production of compounds of unknown structure
2. When classifying in this group, classification should be made also in [C12R](#)

- 1/02 . by using fungi
- 1/04 . by using bacteria
- 1/06 . by using actinomycetales

3/00 Preparation of elements or inorganic compounds except carbon dioxide {(recovery of carbon dioxides as by-products [C12F 3/02](#))}

5/00 Preparation of hydrocarbons {or halogenated hydrocarbons}

- 5/002 . {cyclic (compounds containing at least three condensed carbocyclic rings [C12P 15/00](#))}
- 5/005 . . {aromatic (naphthalene [C12P 29/00](#))}
- 5/007 . {containing one or more isoprene units, i.e. terpenes (carotenes [C12P 23/00](#))}
- 5/02 . acyclic {([C12P 5/007](#) takes precedence)}
- 5/023 . . {Methane}
- 5/026 . . {Unsaturated compounds, i.e. alkenes, alkynes or allenes}

7/00 Preparation of oxygen-containing organic compounds

- 7/02 . containing a hydroxy group
- 7/04 . . acyclic
- 7/06 . . . Ethanol, i.e. non-beverage
- 7/065 {with microorganisms other than yeasts}
- 7/08 produced as by-product or from waste or cellulosic material substrate
- 7/10 substrate containing cellulosic material

7/12	. . . . substrate containing sulfite waste liquor or citrus waste	9/00	Preparation of organic compounds containing a metal or atom other than H, N, C, O, S or halogen {(phosphoglycerides, C12P 7/6481)}
7/14	. . . . Multiple stages of fermentation; Multiple types of microorganisms or re-use of microorganisms	11/00	Preparation of sulfur-containing organic compounds
7/16	. . . Butanols	13/00	Preparation of nitrogen-containing organic compounds
7/18	. . . polyhydric	13/001	. {Amines; Imines}
7/20	. . . . Glycerol	13/002	. {Nitriles (-CN)}
7/22	. . aromatic	13/004	. . {Cyanohydrins}
7/24	. containing a carbonyl group	13/005	. {Amino acids other than alpha- or beta amino acids, e.g. gamma amino acids}
7/26	. . Ketones	13/007	. {Carnitine; Butyrobetaine; Crotonobetaine}
7/28	. . . Acetone-containing products	13/008	. {containing a N-O bond, e.g. nitro (-NO ₂), nitroso (-NO)}
7/30	. . . . produced from substrate containing inorganic compounds other than water	13/02	. Amides, e.g. chloramphenicol {or polyamides; Imides or polyimides; Urethanes, i.e. compounds comprising N-C=O structural element or polyurethanes (peptides C12P 21/00 or C07K)}
7/32	. . . . produced from substrate containing inorganic nitrogen source	13/04	. Alpha- or beta- amino acids {(other amino acids C12P 13/005)}
7/34	. . . . produced from substrate containing protein as nitrogen source	13/06	. . Alanine; Leucine; Isoleucine; Serine; Homoserine
7/36	. . . . produced from substrate containing grain or cereal material	13/08	. . Lysine; Diaminopimelic acid; Threonine; Valine
7/38	. . . Cyclopentanone- or cyclopentadione-containing products	13/10	. . Citrulline; Arginine; Ornithine
7/40	. containing a carboxyl group {including Peroxycarboxylic acids (fatty acids C12P 7/6409)}	13/12	. . Methionine; Cysteine; Cystine
7/42	. . Hydroxy-carboxylic acids	13/14	. . Glutamic acid; Glutamine
7/44	. . Polycarboxylic acids	13/16	. . . using surfactants, fatty acids or fatty acid esters, i.e. having at least seven carbon atoms in an unbroken chain bound to a carboxyl group or a carboxyl ester group
7/46	. . . Dicarboxylic acids having four or less carbon atoms, e.g. fumaric acid, maleic acid	13/18	. . . using biotin or its derivatives
7/48	. . . Tricarboxylic acids, e.g. citric acid	13/20	. . Aspartic acid; Asparagine
7/50	. . . having keto groups, e.g. 2-ketoglutaric acid	13/22	. . Tryptophan; Tyrosine; Phenylalanine; 3,4-Dihydroxyphenylalanine
7/52	. . Propionic acid; Butyric acids		NOTE
7/54	. . Acetic acid (vinegar C12J)		Processes for the preparation of different amino acids covered by more than one of the groups C12P 13/222 - C12P 13/227 are classified in group C12P 13/22
7/56	. . Lactic acid		
7/58	. . Aldonic, ketoaldonic or saccharic acids (uronic acids C12P 19/00)	13/222	. . . {Phenylalanine}
7/60	. . . 2-Ketogulonic acid	13/225	. . . {Tyrosine; 3,4-Dihydroxyphenylalanine}
7/62	. Carboxylic acid esters {(fatty acid esters C12P 7/6436)}	13/227	. . . {Tryptophan}
7/625	. . {Polyesters of hydroxy-carboxylic acids}	13/24	. . Proline; Hydroxyproline; Histidine
7/64	. Fats; Fatty oils; Ester-type waxes; Higher fatty acids, i.e. having at least seven carbon atoms in an unbroken chain bound to a carboxyl group; Oxidised oils or fats	15/00	Preparation of compounds containing at least three condensed carbocyclic rings {(gibbanes C12P 27/00; naphthacenes C12P 29/00)}
7/6409	. . {Fatty acids}	17/00	Preparation of heterocyclic carbon compounds with only O, N, S, Se or Te as ring hetero atoms (C12P 13/04 - C12P 13/24 take precedence)
7/6418	. . . {by hydrolysis of Fatty acid esters}	17/02	. Oxygen as only ring hetero atoms
7/6427	. . . {Polyunsaturated fatty acids [PUFA], i.e. having 2 or more double bonds in their backbone}	17/04	. . containing a five-membered hetero ring, e.g. griseofulvin {, vitamin C}
7/6436	. . {Fatty acid esters}	17/06	. . containing a six-membered hetero ring, e.g. fluorescein
7/6445	. . . {Glycerides}	17/08	. . containing a hetero ring of at least seven ring members, e.g. zearalenone, macrolide aglycons
7/6454	. . . . {by esterification}	17/10	. Nitrogen as only ring hetero atom
7/6463	. . . . {obtained from glyceride producing microorganisms, e.g. single cell oil}	17/12	. . containing a six-membered hetero ring
7/6472	. . . . {containing polyunsaturated fatty acid [PUFA] residues, i.e. having 2 or more double bonds in their backbone}	17/14	. Nitrogen or oxygen as hetero atom and at least one other diverse hetero ring atom in the same ring
7/6481	. . . . {Phosphoglycerides (phosphoglycerides having carboxylic acids with less than 7 carbon atoms, C12P 7/62) }		
7/649	. . . {Biodiesel, i.e. Fatty acid alkyl esters}		
7/66	. containing the quinoid structure		

- 17/16 . containing two or more hetero rings {(thiamine open chain analogs [C12P 17/167](#), i.e. not condensed among themselves or through a common carbocyclic ring system)}
- 17/162 . . {Heterorings having oxygen atoms as the only ring heteroatoms, e.g. Lasalocid}
- 17/165 . . {Heterorings having nitrogen atoms as the only ring heteroatoms}
- 17/167 . . {Heterorings having sulfur atoms as ring heteroatoms, e.g. vitamin B1, thiamine nucleus and open chain analogs}
- 17/18 . containing at least two hetero rings condensed among themselves or condensed with a common carbocyclic ring system, e.g. rifamycin {(e.g. [Rifamycin C12P 17/189](#))}
- 17/181 . . {Heterocyclic compounds containing oxygen atoms as the only ring heteroatoms in the condensed system, e.g. Salinomycin, Septamycin}
- 17/182 . . {Heterocyclic compounds containing nitrogen atoms as the only ring heteroatoms in the condensed system (alloxazine or isoalloxazine, e.g. riboflavine [C12P 25/00](#))}
- 17/183 . . . {containing an indolo[4,3-F,G]quinoline nucleus, e.g. compound containing the lysergic acid nucleus as well as the dimeric ergot nucleus}
- 17/184 . . . {containing a beta-lactam ring, e.g. thienamycin}
- 17/185 . . {Heterocyclic compounds containing sulfur atoms as ring hetero atoms in the condensed system (cepm nucleus [C12P 35/00](#); penam nucleus [C12P 37/00](#))}
- 17/186 . . . {containing a 2-oxo-thieno[3,4-d]imidazol nucleus, e.g. Biotin}
- 17/187 . . . {containing two or more directly linked sulfur atoms, e.g. epithiopiperazines}
- 17/188 . . {Heterocyclic compound containing in the condensed system at least one hetero ring having nitrogen atoms and oxygen atoms as the only ring heteroatoms (ergot-alkaloids [C12P 17/183](#))}
- 17/189 . . . {containing the rifamycin nucleus}
- 19/00 Preparation of compounds containing saccharide radicals (ketoaldonic acids [C12P 7/58](#))**
- NOTE**
- Attention is drawn to the term "saccharide radical" in the first Note following the title of subclass [C07H](#).
- 19/02 . Monosaccharides (2-ketogulonic acid [C12P 7/60](#))
- 19/04 . Polysaccharides, i.e. compounds containing more than five saccharide radicals attached to each other by glycosidic bonds
- 19/06 . . Xanthan, i.e. Xanthomonas-type heteropolysaccharides
- 19/08 . . Dextran
- 19/10 . . Pullulan
- 19/12 . Disaccharides
- 19/14 . produced by the action of a carbohydrase {(EC 3.2.x)}, e.g. by alpha-amylase {, e.g. by cellulase, hemicellulase}
- 19/16 . produced by the action of an alpha-1, 6-glucosidase, e.g. amylose, debranched amylopectin (non-biological hydrolysis of starch [C08B 30/00](#))
- 19/18 . produced by the action of a glycosyl transferase, e.g. alpha-, beta- or gamma-cyclodextrins
- 19/20 . produced by the action of an exo-1,4 alpha-glucosidase, e.g. dextrose
- 19/22 . produced by the action of a beta-amylase, e.g. maltose
- 19/24 . produced by the action of an isomerase, e.g. fructose
- 19/26 . Preparation of nitrogen-containing carbohydrates
- 19/28 . . N-glycosides
- 19/30 . . . Nucleotides
- 19/305 {Pyrimidine nucleotides}
- 19/32 having a condensed ring system containing a six-membered ring having two N-atoms in the same ring, e.g. purine nucleotides, nicotinate-adenine dinucleotide
- 19/34 Polynucleotides, e.g. nucleic acids, oligoribonucleotides
- 19/36 Dinucleotides, e.g. nicotinate-adenine dinucleotide phosphate
- 19/38 . . . Nucleosides
- 19/385 {Pyrimidine nucleosides}
- 19/40 having a condensed ring system containing a six-membered ring having two nitrogen atoms in the same ring, e.g. purine nucleosides
- 19/42 . . . Cobalamins, i.e. vitamin B₁₂, LLD factor
- 19/44 . Preparation of O-glycosides, e.g. glucosides {(polysaccharides and not substituted disaccharides [C12P 19/04](#), [C12P 19/12](#))}
- 19/445 . . {The saccharide radical is condensed with a heterocyclic radical, e.g. everminomycin, papulacandin}
- 19/46 . . having an oxygen atom of the saccharide radical bound to a cyclohexyl radical, e.g. kasugamycin
- 19/48 . . . the cyclohexyl radical being substituted by two or more nitrogen atoms, e.g. destomycin, neamin
- 19/485 {Having two saccharide radicals bound through only oxygen to non-adjacent ring carbons of the cyclohexyl radical, e.g. gentamycin, kanamycin, sisomycin, verdamycin, mutamycin, tobramycin, nebramycin, antibiotics 66-40B, 66-40D, XK-62-2, 66-40, G-418, G-52 (see also [C12P 19/54](#))}
- 19/50 having two saccharide radicals bound through only oxygen to adjacent ring carbon atoms of the cyclohexyl radical, e.g.ambutyrosin, ribostamycin
- 19/52 containing three or more saccharide radicals, e.g. neomycin, lividomycin
- 19/54 . . . the cyclohexyl radical being bound directly to a nitrogen atom of two or more
- $$\begin{array}{c} \text{N}-\text{C}-\text{N} \\ || \\ \text{N} \end{array}$$
- radicals, e.g. streptomycin
- 19/56 . . having an oxygen atom of the saccharide radical directly bound to a condensed ring system having three or more carbocyclic rings, e.g. daunomycin, adriamycin
- 19/58 . . having an oxygen atom of the saccharide radical directly bound through only acyclic carbon atoms to a non-saccharide heterocyclic ring, e.g. bleomycin, phleomycin

- 19/60 . . having an oxygen of the saccharide radical directly bound to a non-saccharide heterocyclic ring or a condensed ring system containing a non-saccharide heterocyclic ring, e.g. coumermycin, novobiocin ([C12P 19/605](#))
- 19/605 . . . {to a 1-benzopyran-2-on (or the chalcones and hydrogenated chalcones thereof, e.g. coumermycin, novobiocin, novenamin)}
- 19/62 . . . the hetero ring having eight or more ring members and only oxygen as ring hetero atoms, e.g. erythromycin, spiramycin, nystatin
- 19/623 {Avermectin; Milbemycin; Ivermectin; C-076}
- 19/626 {Natamycin; Pimaricin; Tenneccetin}
- 19/64 . Preparation of S-glycosides, e.g. lincomycin
- 21/00 Preparation of peptides or proteins (single cell protein [C12N 1/00](#))**
- 21/005 . {Glycopeptides, glycoproteins}
- 21/02 . having a known sequence of two or more amino acids, e.g. glutathione
- 21/06 . produced by the hydrolysis of a peptide bond, e.g. hydrolysate products (preparing foodstuffs by protein hydrolysis [A23J 3/00](#))
- 23/00 Preparation of compounds containing a cyclohexene ring having an unsaturated side chain containing at least ten carbon atoms bound by conjugated double bonds, e.g. carotenes (containing heterorings [C12P 17/00](#))**
- 25/00 Preparation of compounds containing alloxazine or isoalloxazine nucleus, e.g. riboflavin**
- 27/00 Preparation of compounds containing a gibbane ring system, e.g. gibberellin**
- 29/00 Preparation of compounds containing a naphthacene ring system, e.g. tetracycline ([C12P 19/00](#) takes precedence)**
- 31/00 Preparation of compounds containing a five-membered ring having two side-chains in ortho position to each other, and having at least one oxygen atom directly bound to the ring in ortho position to one of the side-chains, one side-chain containing, not directly bound to the ring, a carbon atom having three bonds to hetero atoms with at the most one bond to halogen, and the other side-chain having at least one oxygen atom bound in gamma-position to the ring, e.g. prostaglandins**
- 31/005 . {by fermentation or enzyme-using processes from marine organisms, e.g. Plexaura Homomalla}
- 33/00 Preparation of steroids**
- NOTES**
1. Attention is drawn to the definition of steroids in the note following the title of subclass [C07J](#).
 2. In groups [C12P 33/02](#) - [C12P 33/20](#), the terms "acting", "forming", "hydroxylating", "dehydroxylating" and "dehydrogenating" refer to the action of a microorganism or enzyme rather than other chemical action.
- 33/005 . {Degradation of the lateral chains at position 17}
- 33/02 . Dehydrogenating; Dehydroxylating
- 33/04 . . Forming an aryl ring from A ring
- 33/06 . Hydroxylating
- 33/08 . . at 11 position
- 33/10 . . . at 11 alpha-position
- 33/12 . Acting on D ring {(carbons 13 and 14 belong to the C ring; degradation of lateral chains [C12P 33/005](#))}
- 33/14 . . Hydroxylating at 16 position
- 33/16 . . Acting at 17 position
- 33/18 . . . Hydroxylating at 17 position
- 33/20 . containing heterocyclic rings {(reactions are also classified in groups [C12P 33/00](#) - [C12P 33/18](#))}
- 35/00 Preparation of compounds having a 5-thia-1-azabicyclo [4.2.0] octane ring system, e.g. cephalosporin**
- 35/02 . by desacylation of the substituent in the 7 position
- 35/04 . by acylation of the substituent in the 7 position
- 35/06 . Cephalosporin C; Derivatives thereof
- 35/08 . disubstituted in the 7 position
- 37/00 Preparation of compounds having a 4-thia-1-azabicyclo [3.2.0] heptane ring system, e.g. penicillin**
- 37/02 . in presence of phenylacetic acid or phenylacetamide or their derivatives {not to be used}
- 37/04 . by acylation of the substituent in the 6 position
- 37/06 . by desacylation of the substituent in the 6 position
- 39/00 Processes involving microorganisms of different genera in the same process, simultaneously**
- 41/00 Processes using enzymes or microorganisms to separate optical isomers from a racemic mixture**
- 41/001 . {by metabolizing one of the enantiomers}
- 41/002 . {by oxidation/reduction reactions}
- 41/003 . {by ester formation, lactone formation or the inverse reactions}
- 41/004 . . {by esterification of alcohol- or thiol groups in the enantiomers or the inverse reaction}
- 41/005 . . {by esterification of carboxylic acid groups in the enantiomers or the inverse reaction}
- 41/006 . {by reactions involving C-N bonds, e.g. nitriles, amides, hydantoins, carbamates, lactames, transamination reactions, or keto group formation from racemic mixtures}
- 41/007 . . {by reactions involving acyl derivatives of racemic amines}
- 41/008 . . {by reactions involving carbamates}
- 41/009 . . {by reactions involving hydantoins or carbamoylamino compounds}
- 2201/00 Pretreatment of cellulosic or lignocellulosic material for subsequent enzymatic treatment or hydrolysis**
- 2203/00 Fermentation products obtained from optionally pretreated or hydrolyzed cellulosic or lignocellulosic material as the carbon source (ethanol [C12P 7/10](#))**