

C 12 P FERMENTATION OR ENZYME-USING PROCESSES TO SYNTHESISE A DESIRED CHEMICAL COMPOUND OR COMPOSITION OR TO SEPARATE OPTICAL ISOMERS FROM A RACEMIC MIXTURE (fermentation processes to form a food composition [A 21](#), [A 23](#); compounds in general, [see](#) the relevant compound class, e.g. [C 01](#), [C 07](#); brewing of beer [C 12 C](#); producing vinegar [C 12 J](#); processes for producing enzymes [C 12 N 9/00](#); DNA or RNA concerning genetic engineering, vectors, e.g. plasmids, or their isolation, preparation or purification [C 12 N 15/00](#)) [**3**]

Notes

- (1) This subclass [covers](#) both major and minor chemical modifications. [**3**]
- (2) Group [1/00](#) [covers](#) processes for producing organic compounds not sufficiently identified to be classified in groups [3/00](#) to [37/00](#). Compounds identified only by their empirical formulae are not considered to be sufficiently identified. [**3**]
- (3) Attention is drawn to Notes (1) to (3) following the title of class [C 12](#). [**4**]
- (4) If a particular reaction is considered of interest, it is also classified in the relevant chemical compound class, e.g. [C 07](#), [C 08](#). [**3**]
- (5) In this subclass:
 - metal or ammonium salts of a compound are classified as that compound.
 - compositions are classified in the relevant compound groups. [**3**]
- (6) In this subclass, it is desirable to add the indexing codes of subclass [C 12 R](#). The indexing codes should be [linked](#). [**6**]

Subclass Index

BIOSYNTHESIS OF CHEMICAL SUBSTANCES

Inorganic compounds	3/00
Acyclic or carbocyclic organic compounds	5/00 to 15/00
peptides or proteins	21/00
Carotenes.....	23/00
Tetracyclines	29/00
Prostaglandins	31/00

Steroids	33/00
Heterocyclic organic compounds	17/00
containing saccharide radicals	19/00
Riboflavin	25/00
Giberellin	27/00
Cephalosporin; penicillin.....	35/00; 37/00
SEPARATION OF OPTICAL ISOMERS	41/00
OTHER PROCESSES FOR BIOSYNTHESIS PREPARATIONS	1/00, 39/00

1/00	Preparation of compounds or compositions, not provided for in groups 3/00 to 39/00, by using micro-organisms or enzymes; General processes for the preparation of compounds or compositions by using micro-organisms or enzymes [3]	7/24	. containing a carbonyl group [3]
1/02	. by using fungi [3]	7/26	. . Ketones [3]
1/04	. by using bacteria [3]	7/28	. . . Acetone-containing products [3]
1/06	. by using actinomycetales [3]	7/30	. . . . produced from substrate containing inorganic compounds other than water [3]
3/00	Preparation of elements or inorganic compounds except carbon dioxide [3]	7/32	. . . . produced from substrate containing inorganic nitrogen source [3]
5/00	Preparation of hydrocarbons [3]	7/34	. . . . produced from substrate containing protein as nitrogen source [3]
5/02	. acyclic (producing methane by anaerobic treatment of sludge C 02 F 11/04) [3]	7/36	. . . . produced from substrate containing grain or cereal material [3]
7/00	Preparation of oxygen-containing organic compounds [3]	7/38	. . . Cyclopentanone- or cyclopentadione-containing products [3]
7/02	. containing a hydroxy group [3]	7/40	. containing a carboxyl group [3]
7/04	. . acyclic [3]	7/42	. . Hydroxy carboxylic acids [3]
7/06	. . . Ethanol, i.e. non-beverage [3]	7/44	. . Polycarboxylic acids [3]
7/08	. . . . produced as by-product or from waste or cellulosic material substrate [3]	7/46	. . . Dicarboxylic acids having four or less carbon atoms, e.g. fumaric acid, maleic acid [3]
7/10	. . . . . substrate containing cellulosic material [3]	7/48	. . . Tricarboxylic acids, e.g. citric acid [3]
7/12	. . . . . substrate containing sulfite waste liquor or citrus waste [3]	7/50	. . . having keto groups, e.g. 2-ketoglutaric acid [3]
7/14	. . . . . Multiple stages of fermentation; Multiple types of micro-organisms or reuse for micro-organisms [3]	7/52	. . Propionic acid; Butyric acids [3]
7/16	. . . . Butanols [3]	7/54	. . Acetic acid (vinegar C 12 J) [3]
7/18	. . . . polyhydric [3]	7/56	. . Lactic acid [3]
7/20	. . . . Glycerol [3]	7/58	. . Aldonic, ketoaldonic or saccharic acids (uronic acids 19/00) [3]
7/22	. . . . aromatic [3]	7/60	. . . 2-Ketogulonic acid [3]
		7/62	. Carboxylic acid esters [3]
		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 [3]
		7/66	. containing the quinoid structure [3]

- 9/00 Preparation of organic compounds containing a metal or atom other than H, N, C, O, S, or halogen [3]**
- 11/00 Preparation of sulfur-containing organic compounds [3]**
- 13/00 Preparation of nitrogen-containing organic compounds [3]**
- 13/02 . Amides, e.g. chloramphenicol [3]
- 13/04 . Alpha- or beta-amino acids [3]
- 13/06 . . Alanine; Leucine; Isoleucine; Serine; Homoserine [3]
- 13/08 . . Lysine; Diaminopimelic acid; Threonine; Valine [3]
- 13/10 . . Citrulline; Arginine; Ornithine [3]
- 13/12 . . Methionine; Cysteine; Cystine [3]
- 13/14 . . Glutamic acid; Glutamine [3]
- 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 [3]
- 13/18 . . . using biotin or its derivatives [3]
- 13/20 . . Aspartic acid; Asparagine [3]
- 13/22 . . Tryptophan; Tyrosine; Phenylalanine; 3,4-Dihydroxyphenylalanine [3]
- 13/24 . . Proline; Hydroxyproline; Histidine [3]
- 15/00 Preparation of compounds containing at least three condensed carbocyclic rings [3]**
- 17/00 Preparation of heterocyclic carbon compounds with only O, N, S, Se, or Te as ring hetero atoms (13/04 to 13/24 take precedence) [3]**
- 17/02 . Oxygen as only ring hetero atoms [3]
- 17/04 . . containing a five-membered hetero ring, e.g. griseofulvin [3]
- 17/06 . . containing a six-membered hetero ring, e.g. fluorescein [3]
- 17/08 . . containing a hetero ring of at least seven ring members, e.g. zearalenone, macrolide aglycons [3]
- 17/10 . Nitrogen as only ring hetero atom [3]
- 17/12 . . containing a six-membered hetero ring [3]
- 17/14 . Nitrogen or oxygen as hetero atom and at least one other diverse hetero ring atom in the same ring [3]
- 17/16 . containing two or more hetero rings [3]
- 17/18 . containing at least two hetero rings condensed among themselves or condensed with a common carbocyclic ring system, e.g. rifamycin [3]
- 19/00 Preparation of compounds containing saccharide radicals (ketoaldonic acids 7/58) [3]**
- Note**
- Attention is drawn to Note (3) following the title of subclass C 07 H, which defines the expression "saccharide radical". [3]
- 19/02 . Monosaccharides (2-ketogulonic acid 7/60) [3]
- 19/04 . Polysaccharides, i.e. compounds containing more than five saccharide radicals attached to each other by glycosidic bonds [3]
- 19/06 . . Xanthan, i.e. Xanthomonas-type heteropolysaccharides [3]
- 19/08 . . Dextran [3]
- 19/10 . . Pullulan [3]
- 19/12 . Disaccharides [3]
- 19/14 . produced by the action of a carbohydrase, e.g. by alpha-amylase [3]
- 19/16 . produced by the action of an alpha-1, 6-glucosidase, e.g. amylose, debranched amylopectin (non-biological hydrolysis of starch C 08 B 30/00) [3]
- 19/18 . produced by the action of a glycosyl transferase, e.g. alpha-, beta- or gamma-cyclodextrins [3]
- 19/20 . produced by the action of an exo-1, 4 alpha-glucosidase, e.g. dextrose [3]
- 19/22 . produced by the action of a beta-amylase, e.g. maltose [3]
- 19/24 . produced by the action of an isomerase, e.g. fructose [3]
- 19/26 . Preparation of nitrogen-containing carbohydrates [3]
- 19/28 . . N-glycosides [3]
- 19/30 . . . Nucleotides [3]
- 19/32 having a condensed ring system containing a six-membered ring having two nitrogen atoms in the same-ring, e.g. purine nucleotides, nicotineamide-adenine dinucleotide [3]
- 19/34 Polynucleotides, e.g. nucleic acids, oligoribonucleotides [3]
- 19/36 Dinucleotides, e.g. nicotineamide-adenine dinucleotide phosphate [3]
- 19/38 . . . Nucleosides [3]
- 19/40 having a condensed ring system containing a six-membered ring having two nitrogen atoms in the same ring, e.g. purine nucleosides [3]
- 19/42 . . . Cobalamins, i.e. vitamin B₁₂, LLD factor [3]
- 19/44 . Preparation of O-glycosides, e.g. glucosides [3]
- 19/46 . . having an oxygen atom of the saccharide radical bound to a cyclohexyl radical, e.g. kasugamycin [3]
- 19/48 . . . the cyclohexyl radical being substituted by two or more nitrogen atoms, e.g. destomycin, neamin [3]
- 19/50 having two saccharide radicals bound through only oxygen to adjacent ring carbon atoms of the cyclohexyl radical, e.g. ambutyrosin, ribostamycin [3]
- 19/52 containing three or more saccharide radicals, e.g. neomycin, lividomycin [3]
- 19/54 . . . the cyclohexyl radical being bound directly to a nitrogen atom of two or more $\begin{array}{c} >N-C-N< \\ || \\ N \end{array}$ radicals, e.g. streptomycin [3]
- 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 [3]
- 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 [3]
- 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 [3]
- 19/62 . . . the hetero ring having eight or more ring members and only oxygen as ring hetero atoms, e.g. erythromycin, spiramycin, nystatin [3]
- 19/64 . Preparation of S-glycosides, e.g. lincomycin [3]

21/00	Preparation of peptides or proteins (single-cell protein C 12 N 1/00) [3]	Notes	
21/02	. having a known sequence of two or more amino acids, e.g. glutathione [3]	(1)	In groups 33/02 to 33/20, the following terms are used with the meaning indicated: – “acting”, “forming”, “hydroxylating”, “dehydroxylating” or “dehydrogenating” means the action of a micro-organism or enzyme rather than other chemical action. [3]
21/04	. . Cyclic or bridged peptides or polypeptides, e.g. bacitracin (cyclised by –S–S– bonds only 21/02) [3]	(2)	Attention is drawn to the Note following the title of subclass C 07 J, which explains what is covered by the term “steroids”. [3]
21/06	. produced by the hydrolysis of a peptide bond, e.g. hydrolysate products (preparing foodstuffs by protein hydrolysis A 23 J 3/00) [3]		
21/08	. Monoclonal antibodies [5]		
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 hetero-rings 17/00) [3]	33/02	. Dehydrogenating; Dehydroxylating [3]
		33/04	. . Forming an aryl ring from A ring [3]
		33/06	. Hydroxylating [3]
		33/08	. . at 11 position [3]
		33/10	. . . at 11 alpha-position [3]
		33/12	. Acting on D ring [3]
		33/14	. . Hydroxylating at 16 position [3]
		33/16	. . Acting at 17 position [3]
		33/18	. . . Hydroxylating at 17 position [3]
		33/20	. containing heterocyclic rings [3]
		35/00	Preparation of compounds having a 5-thia-1-azabicyclo [4.2.0] octane ring system, e.g. cephalosporin [3]
		35/02	. by desacylation of the substituent in the 7 position [3]
		35/04	. by acylation of the substituent in the 7 position [3]
		35/06	. Cephalosporin C; Derivatives thereof [3]
		35/08	. disubstituted in the 7 position [3]
		37/00	Preparation of compounds having a 4-thia-1-azabicyclo [3.2.0] heptane ring system, e.g. penicillin [3]
		37/02	. in presence of phenylacetic acid or phenylacetamide or their derivatives [3]
		37/04	. by acylation of the substituent in the 6 position [3]
		37/06	. by desacylation of the substituent in the 6 position [3]
		39/00	Processes involving micro-organisms of different genera in the same process, simultaneously [3]
		41/00	Processes using enzymes or micro-organisms to separate optical isomers from a racemic mixture [4]
25/00	Preparation of compounds containing alloxazine or isoalloxazine nucleus, e.g. riboflavin [3]		
27/00	Preparation of compounds containing a gibbane ring system, e.g. gibberellin [3]		
29/00	Preparation of compounds containing a naphthacene ring system, e.g. tetracycline (19/00 takes precedence) [3]		
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 [3]		
33/00	Preparation of steroids [3]		