

CPC COOPERATIVE PATENT CLASSIFICATION

C12M APPARATUS FOR ENZYMOLOGY OR MICROBIOLOGY; {APPARATUS FOR CULTURING MICROORGANISMS FOR PRODUCING BIOMASS, FOR GROWING CELLS OR FOR OBTAINING FERMENTATION OR METABOLIC PRODUCTS, i.e. BIOREACTORS OR FERMENTERS}

NOTES

1. In this subclass the term microorganism includes prokaryotic and eukaryotic cells. Viruses, human, animal or plant cells, protozoa, tissues and unicellular algae are considered microorganisms.
2. When classifying an apparatus according to its use in group [C12M 21/00](#), classification should also be given in at least one of the groups [C12M 23/00-C12M 99/00](#).
3. This subclass covers apparatus or devices for the fermentation or for growing microorganisms or animal tissues of both laboratory and industrial scale, i.e. bioreactors.
4. This subclass covers also apparatus or devices for the pre-treatment or after-treatment of the biomass or microorganisms to be cultured or that have been cultured.
5. This subclass does not cover the methods or processes taking place in the bioreactors that are not based on the use of the parts of the apparatus.
6. This subclass does not cover:
 - apparatus for culturing plant tissue, which are covered by [A01H 4/001](#);
 - apparatus for preservation of living parts of bodies of humans or animals, which are covered by [A01N 1/0242](#);
 - apparatus or devices for testing sterility conditions not linked to a bioreactor or fermenter growing biomass, which are covered by [A61L 2/00](#), [G01N 31/226](#);
 - apparatus for biological treatment of water, waste water, sewage or sludge, which are covered by [C02F 3/00](#), [C02F 11/00](#);
 - apparatus for brewing of beer, which are covered by [C12C](#);
 - apparatus for production of wine or vinegar, which are covered by [C12G](#), [C12J 1/10](#);
 - apparatus or devices for DNA and RNA technology, which are covered by [B01L 7/52](#), [B01J 19/0046](#), [C12N 15/1003](#);
 - fermentation processes, which are covered by [C12P](#);
 - apparatus for bioleaching of ores, which are covered by [C22B 3/18](#);
 - removing cellulose from cellulosic substances, which is covered by [D21C](#);
 - apparatus or devices for sampling, detection, investigation or analysis of microorganisms or biosensors, which are covered by [G01N 33/48](#);
 - apparatus for automatic analysis not linked to a bioreactor or fermenter growing biomass, which are covered by [G01N 35/00](#);
 - testing or evaluating the effect of a chemical or biological compound involving human or animal cells, which are covered by [G01N 33/5005](#);
 - apparatus for immunological test processes, which are covered by [G01N 33/5302](#).

1/00 Apparatus for enzymology or microbiology

NOTE

This group covers:

- apparatus where micro-organisms or enzymes are produced or isolated;
- apparatus where the characteristics of micro-organisms or enzymes are investigated, e.g. which growth factors are necessary;
- apparatus specially adapted to employ micro-organisms or enzymes as "reactants" or biocatalysts;
- apparatus of both laboratory and industrial scale.

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|-------|--|-------|---|
| 1/002 | . {Photo bio reactors} | 1/065 | . . . {on a horizontal axis} |
| 1/005 | . {Incubators} | 1/08 | . . with draft tube |
| 1/007 | . {Flexible bags or containers} | 1/09 | . . Flotation apparatus |
| 1/02 | . with agitation means; with heat exchange means | 1/10 | . rotatably mounted |
| 1/04 | . with gas introduction means | 1/107 | . with means for collecting fermentation gases, e.g. methane (producing methane by anaerobic treatment of sludge C02F 11/04) |
| 1/045 | . . {providing an anaerobic atmosphere} | 1/113 | . . with transport of the substrate during the fermentation |
| 1/06 | . . with agitator, e.g. impeller | 1/12 | . with sterilisation, filtration or dialysis means |
| | | 1/121 | . . {with sterilisation means} |
| | | 1/123 | . . {with flat plate filter elements} |
| | | 1/125 | . . . {Culture inserts} |
| | | 1/126 | . . {with hollow fibres or tubular filter elements} |
| | | 1/128 | . . {with moving or mobile filter elements} |
| | | 1/14 | . with means providing thin layers or with multi-level trays |
| | | 1/16 | . containing, or adapted to contain, solid media |
| | | 1/165 | . . {treated with gel punching devices} |
| | | 1/18 | . . Multiple fields or compartments |
| | | 1/20 | . . . Horizontal planar fields |

1/203	. . . . {Disc dispensing devices therefor}	3/08	. Apparatus for tissue disaggregation
1/206	. . . . {Multiple discs supporting devices}	3/10	. for culture in eggs
1/21	. Froth suppressors	21/00	{Bioreactors or fermenters specially adapted for specific uses} (digesters for manure A01C 3/023 ; apparatus for PCR B01L 7/52 ; destroying or transforming solid waste B09B 3/00 ; methods for genetic engineering C12N 15/00 , C12Q 1/68 ; nucleic acid amplification reactions C12Q 1/6844)
1/22	. Petri type dish		
1/24	. Tube or bottle type (anaerobic jars C12M 1/045)	21/02	. {Photobioreactors (culturing algae A01G 33/00 , A01H 4/001 , C12N 1/12)}
1/26	. Inoculator or sampler	21/04	. {for producing gas, e.g. biogas (digesters for manure with production of biogas A01C 3/028 , biological treatment of water, waste water or sewage C02F 3/00 , C02F 11/02 , preparation of natural gas or syngas C10L 3/06 , C10L 3/10)}
1/261	. . {Airborne micro-organism samplers}	21/06	. {for <i>in vitro</i> fertilization}
1/262	. . {Handle streaking devices}	21/08	. {for producing artificial tissue or for ex-vivo cultivation of tissue (prostheses A61F 2/00 , grafts A61L 27/00)}
1/263	. . {Replica plating devices}	21/10	. {adapted for the cultivation of avian eggs or in avian eggs, e.g. for vaccine production}
1/264	. . {Devices involving centrifugal, centripetal or rotational forces}	21/12	. {for producing fuels or solvents (C12M 21/04 takes precedence; liquid carbonaceous fuels C10L 1/00 , solid fuels C10L 5/00)}
1/265	. . {Pipettes; Syringes; Suction devices}	21/14	. {for producing enzymes}
1/266	. . {Magnetic separators}	21/16	. {Solid state fermenters, e.g. for koji production}
1/267	. . {Biofilm separators}	21/18	. {Apparatus specially designed for the use of free, immobilized or carrier-bound enzymes}
1/268	. . {Positioning tools for sampling or inoculating devices}	23/00	{Constructional details, e.g. recesses, hinges} (flow directing inserts in C12M 27/18-C12M 27/24 ; apparatus for chemical or physical processes in general B01J , chemical or physical laboratory apparatus in general B01L)
1/28	. . being part of container	23/02	. {Form or structure of the vessel (large containers B65D 88/00)}
1/30	. . . Sampler being a swab	23/04	. . {Flat or tray type, drawers (C12M 23/10 , C12M 23/12 , C12M 23/16 take precedence)}
1/32	. . Multiple field or continuous type	23/06	. . {Tubular (C12M 23/08 , C12M 23/16 take precedence)}
1/33	. Disintegrators	23/08	. . {Flask, bottle or test tube}
1/34	. Measuring or testing with condition measuring or sensing means, e.g. colony counters	23/10	. . {Petri dish (crystallising dishes B01L 3/06)}
1/3407	. . {Measure of electrical or magnetical factor}	23/12	. . {Well or multiwell plates (C12M 25/04 takes precedence)}
1/3415	. . {Pressure measure, e.g. with manometers, respirometers}	23/14	. . {Bags}
1/3423	. . {Calorimetry}	23/16	. . {Microfluidic devices; Capillary tubes (integrated microfluidic structures B01L 3/5027 ; microreactors B01J 19/0093)}
1/343	. . {Mass spectrometry}	23/18	. . {Open ponds; Greenhouse type or underground installations}
1/3438	. . {with use of isotopes, e.g. radiorespirometers, scintillometers}	23/20	. {Material Coatings (Immunocoatings C12M 25/00)}
1/3446	. . {Photometry, spectroscopy, laser technology}	23/22	. {Transparent or translucent parts (glassware for laboratory use B01L 3/00)}
1/3453	. . . {Opacity, turbidity or light transmission measure; Nephelometry}	23/24	. {Gas permeable parts}
1/3461	. . . . {Bio- or chemi-luminescence}	23/26	. {flexible (flexible containers for laboratory use B01L 3/505)}
1/3469	. . . . {Infra red spectroscopy}	23/28	. {disposable or single use}
1/3476	. . . . {Fluorescence spectroscopy}	23/30	. {biodegradable}
1/3484	. . {Pen or contact colony counters}	23/32	. {Frangible parts}
1/3492	. . {with use of lecture and interpretation devices, grids}	23/34	. {Internal compartments or partitions}
1/36	. including condition or time responsive control, e.g. automatically controlled fermentors (controlling or regulating in general G05)	23/36	. {Means for collection or storage of gas; Gas holders}
1/38	. . Temperature-responsive control	23/38	. {Caps; Covers; Plugs; Pouring means}
1/40	. Apparatus specially designed for the use of free, immobilised, or carrier-bound enzymes, e.g. apparatus containing a fluidised bed of immobilised enzymes		
1/42	. Apparatus for the treatment of micro-organisms or enzymes with electrical or wave energy, e.g. magnetism, sonic waves		
3/00	Tissue, human, animal or plant cell, or virus culture apparatus		
3/003	. {for culture in eggs}		
3/006	. {Cell injection or fusion devices}		
3/02	. with means providing suspensions		
3/04	. with means providing thin layers		
3/043	. . {rotatably mounted}		
3/046	. . . {Roller bottles}		
3/06	. with filtration, ultra-filtration, inverse osmosis or dialysis means		
3/062	. . {with flat plate filter elements}		
3/065	. . {with hollow fibres or tubes}		
3/067	. . {with moving or mobile filter elements}		

23/40	• {Manifolds; Distribution pieces (fluid transfer means B01L 3/563)}	29/06	• {Nozzles; Sprayers; Spargers; Diffusers (per se B01F 3/04106, B01J 19/26)}
23/42	• {Integrated assemblies, e.g. cassettes or cartridges}	29/08	• • {Air lift}
23/44	• {Multiple separable units; Modules}	29/10	• {Perfusion}
23/46	• {Means for fastening}	29/12	• {Pulsatile flow}
23/48	• {Holding appliances; Racks; Supports (holding devices for laboratory apparatus B01L 9/00)}	29/14	• {Pressurized fluid}
23/50	• {Means for positioning or orientating the apparatus (C12M 41/08 takes precedence)}	29/16	• {Hollow fibers (hollow fiber modules in general B01D 63/02)}
23/52	• {Mobile; Means for transporting the apparatus (transportable laboratories B01L 99/00)}	29/18	• {External loop; Means for reintroduction of fermented biomass or liquid percolate (loop type reactors for chemical or physical processes B01J 19/2435)}
23/54	• {hand portable}	29/20	• {Degassing; Venting; Bubble traps (means for collection or storage of gas C12M 23/36; gas collection apparatus for laboratory use B01L 5/02)}
23/56	• {Floating elements}	29/22	• • {Oxygen discharge}
23/58	• {Reaction vessels connected in series or in parallel (combinations of bioreactors with other apparatus, C12M 43/00)}	29/24	• {Recirculation of gas}
25/00	{Means for supporting, enclosing or fixing the microorganisms, e.g. immunocoatings}	29/26	• {Conditioning fluids entering or exiting the reaction vessel}
25/01	• {Drops}	31/00	{Means for providing, directing, scattering or concentrating light (C12M 41/06 takes precedence)}
25/02	• {Membranes; Filters (filters or filtration in general B01D 24/00-B01D 41/00)}	31/02	• {located outside the reactor}
25/04	• • {in combination with well or multiwell plates, i.e. culture inserts}	31/04	• • {Mirrors}
25/06	• {Plates; Walls; Drawers; Multilayer plates}	31/06	• • {Lenses}
25/08	• • {electrically charged}	31/08	• {by conducting or reflecting elements located inside the reactor or in its structure}
25/10	• {Hollow fibers or tubes (hollow fiber modules in general B01D 63/02)}	31/10	• {by light emitting elements located inside the reactor, e.g. LED or OLED}
25/12	• • {the culture medium flowing outside the fiber or tube}	31/12	• {Rotating light emitting elements}
25/14	• {Scaffolds; Matrices (in general C12N 5/0068)}	33/00	{Means for introduction, transport, positioning, extraction, harvesting, peeling or sampling of biological material in or from the apparatus (chemical or physical laboratory apparatus in general B01L, devices for taking cell samples A61B 10/0045, withdrawing or distributing predetermined quantities of fluid B01L 99/00)}
25/16	• {Particles; Beads; Granular material; Encapsulation (chemical or physical processes conducted in the presence of fluids and solid particles B01J 8/00)}	33/02	• {by impregnation, e.g. using swabs or loops (fluid transport using swabs B01L 3/5029)}
25/18	• • {Fixed or packed bed}	33/04	• {by injection or suction, e.g. using pipettes, syringes, needles (pipettes in general B01L 3/02)}
25/20	• • {Fluidized bed (in chemical or physical processes B01J 8/18)}	33/06	• • {for multiple inoculation or multiple collection of samples}
27/00	{Means for mixing, agitating or circulating fluids in the vessel (by introduction of gas C12M 29/06, C12M 29/14, mixing in general or mixers per se B01F; mixing in apparatus for chemical or physical processes B01J)}	33/07	• • {Dosage or metering devices therefore}
27/02	• {Stirrer or mobile mixing elements}	33/08	• {by vibration}
27/04	• • {with introduction of gas through the stirrer or mixing element}	33/10	• {by centrifugation (centrifuges in general B04B); Cyclones (cyclones in general B04C)}
27/06	• • {with horizontal or inclined stirrer shaft or axis}	33/12	• {by pressure}
27/08	• • {with different stirrer shapes in one shaft or axis}	33/14	• {with filters, sieves or membranes}
27/10	• {Rotating vessel}	33/16	• {Screw conveyor}
27/12	• • {Roller bottles; Roller tubes}	33/18	• {Rollers}
27/14	• {Rotation or movement of the cells support, e.g. rotated hollow fibers}	33/20	• {Ribbons}
27/16	• {Vibrating; Shaking; Tilting}	33/22	• {Settling tanks; Sedimentation by gravity (settling tanks per se B01D 21/02)}
27/18	• {Flow directing inserts}		
27/20	• • {Baffles; Ribs; Ribbons; Auger vanes}		
27/22	• • {Perforated plates, discs or walls}		
27/24	• • {Draft tube (C12M 29/08 takes precedence)}		
29/00	{Means for introduction, extraction or recirculation of materials, e.g. pumps (pumps per se F04B)}		
29/02	• {Percolation}		
29/04	• {Filters; Permeable or porous membranes or plates, e.g. dialysis}		

35/00	{Means for application of stress for stimulating the growth of microorganisms or the generation of fermentation or metabolic products; Means for electroporation or cell fusion (machines for extracting juice from animal or plant tissue by electroporation A23N 1/006, processes employing electric or wave energy B01J 19/08; treatment of microorganisms or enzymes with electrical or wave energy C12N 13/00; methods for cell fusion C12N 15/02; introduction of foreign genetic material C12N 15/87)}	41/28	• {of redox potential}
		41/30	• {of concentration}
		41/32	• • {of substances in solution}
		41/34	• • {of gas}
		41/36	• • {of biomass, e.g. colony counters or by turbidity measurements (electrooptical investigation of individual particles G01N 15/14, flow cytometers G01N 15/1404)}
35/02	• {Electrical or electromagnetic means, e.g. for electroporation or for cell fusion}	41/38	• • {of metabolites or enzymes in the cells}
35/04	• {Mechanical means, e.g. sonic waves, stretching forces, pressure or shear stimuli}	41/40	• {of pressure}
35/06	• {Magnetic means (C12M 35/02 takes precedence)}	41/42	• {of agitation speed}
35/08	• {Chemical, biochemical or biological means, e.g. plasma jet, co-culture}	41/44	• {of volume or liquid level}
		41/46	• {of cellular or enzymatic activity or functionality, e.g. cell viability}
		41/48	• {Automatic or computerized control (automatic analysis G01N 35/00)}
37/00	{Means for sterilizing, maintaining sterile conditions or avoiding chemical or biological contamination (C12M 23/38 takes precedence; filtration in general and filters per se B01D 24/00-B01D 41/00; autoclaves B01J 3/04; treatment of microorganisms with electrical or wave energy C12N 13/00)}	43/00	{Combinations of bioreactors or fermenters with other apparatus}
37/02	• {Filters}	43/02	• {Bioreactors or fermenters combined with devices for liquid fuel extraction; Biorefineries}
37/04	• {Seals}	43/04	• {Bioreactors or fermenters combined with combustion devices or plants, e.g. for carbon dioxide removal (C12M 43/06 takes precedence; recovery of carbon dioxide C12F 3/02)}
37/06	• {Means for testing the completeness of the sterilization (testing for sterility conditions C12Q 1/22)}	43/06	• {Photobioreactors combined with devices or plants for gas production different from a bioreactor of fermenter}
		43/08	• {Bioreactors or fermenters combined with devices or plants for production of electricity}
39/00	{Means for cleaning the apparatus or avoiding unwanted deposits of microorganisms (apparatus for cleaning laboratory receptacles or instruments B01L 99/00; cleaning in general B08B)}	45/00	{Means for pre-treatment of biological substances}
41/00	{Means for regulation, monitoring, measurement or control, e.g. flow regulation (controlling or regulating chemical, physical or physicochemical processes B01J 19/0006; heating or cooling apparatus for laboratory use B01L 7/00; electro optical investigation of individual particles, flow cytometers G01N 15/14; automatic analysis G01N 35/00; controlling or regulating in general G06N)}	45/02	• {by mechanical forces; Stirring; Trituration; Comminuting (crushing, pulverizing, disintegrating in general B02C)}
41/02	• {of foam (foam prevention during gasification of liquids B01D 19/02)}	45/03	• {by control of the humidity or content of liquids; Drying}
41/04	• • {Means for foam enhancement (making foam by mixing B01F 3/04446)}	45/04	• {Phase separators; Separation of non fermentable material; Fractionation}
41/06	• {of illumination}	45/05	• {by centrifugation (centrifuges in general B04B)}
41/08	• • {Means for changing the orientation}	45/06	• {by chemical means or hydrolysis}
41/10	• • {Filtering the incident radiation}	45/07	• {by electrical or electromagnetic forces}
41/12	• {of temperature (controlling the temperature of chemical or physical processes B01J 19/0013, heating or cooling apparatus for laboratory use B01L 7/00)}	45/09	• {by enzymatic treatment}
41/14	• • {Incubators; Climatic chambers (per se B01L 1/00)}	45/20	• {Heating; Cooling (heating or cooling apparatus for laboratory uses B01L 7/00)}
41/16	• • {by recirculation of culture medium at controlled temperature}	45/22	• {Means for packing or storing viable microorganisms (casings for storing cell samples A61B 10/0096, preservation of living parts of the human or animal body A01N 1/02)}
41/18	• • {Heat exchange systems, e.g. heat jackets or outer envelopes}	47/00	{Means for after-treatment of the produced biomass or of the fermentation or metabolic products, e.g. storage of biomass (filters in general B01D 23/00-B01D 41/00)}
41/20	• • • {the heat transfer medium being a gas}	47/02	• {Separating microorganisms from the culture medium; Concentration of biomass (separating microorganisms from their culture media C12N 1/02)}
41/22	• • • {in contact with the bioreactor walls}	47/04	• {Cell isolation or sorting (purging biological preparations of unwanted cells C12N 5/0081, determining the presence or kind of microorganism C12Q 1/04)}
41/24	• • • {inside the vessel}		
41/26	• {of pH}		

- 47/06 . {Hydrolysis; Cell lysis; Extraction of intracellular or cell wall material (lysis of microorganisms [C12N 1/06](#); extracting or separating nucleic acids from biological samples [C12N 15/1003](#))}
- 47/08 . {Homogenizing}
- 47/10 . {Separation or concentration of fermentation products (bioreactors combined with means for distillation or extraction of liquid fuel [C12M 43/02](#))}
- 47/12 . {Purification ([C12M 47/04](#) takes precedence)}
- 47/14 . {Drying}
- 47/16 . {Sterilization (autoclaves in general [B01J 3/04](#))}
- 47/18 . {Gas cleaning, e.g. scrubbers; Separation of different gases (separating dispersed particles from gases or vapours [B01D 45/00](#); separation of gases or vapours [B01D 53/00](#); gas washing apparatus for laboratory uses [B01L 5/04](#))}
- 47/20 . {Heating or cooling (heating or cooling apparatus for laboratory uses [B01L 7/00](#))}
- 99/00 {Subject matter not otherwise provided for in other groups of this subclass}**
- 99/02 . {Disc dispensing devices}