

**ECLA****EUROPEAN CLASSIFICATION****C12M****APPARATUS FOR ENZIMOLOGY OR MICROBIOLOGY; [N: APPARATUS FOR CULTURING MICROORGANISMS FOR PRODUCING BIOMASS, FOR GROWING CELLS OR FOR OBTAINING FERMENTATION OR METABOLIC PRODUCTS, i.e. BIOREACTORS OR FERMENTERS**

[N: **WARNING**  
[N1108] [M1203]

1. Groups [C12M1/00](#) to [C12M3/10](#), and the indexing scheme under [M12M508/00](#) to [M12M540/00](#), are no longer used for the classification of new documents as from August 1, 2011. The backlog of these groups is being reclassified to groups [C12M21/00](#) to [C12M99/00](#).
2. Groups [C12M21/00](#) to [C12M99/00](#) do not correspond to former or current IPC groups.  
Concordance ECLA : IPC for these groups is as follows:

- [C12M21/00](#) : [C12M1/00](#)
- [C12M21/02](#) : [C12M1/00](#)
- [C12M21/04](#) : [C12M1/107](#)
- [C12M21/06](#) : [C12M3/00](#)
- [C12M21/08](#) : [C12M3/00](#)
- [C12M21/10](#) : [C12M3/10](#)
- [C12M21/12](#) : [C12M1/00](#)
- [C12M21/14](#) : [C12M1/00](#)
- [C12M21/16](#) : [C12M1/16](#)
- [C12M21/18](#) : [C12M1/40](#)
- [C12M23/00](#) : [C12M1/00](#)
- [C12M23/02](#) : [C12M1/00](#)
- [C12M23/04](#) : [C12M1/12](#)
- [C12M23/06](#) : [C12M1/12](#)
- [C12M23/08](#) : [C12M1/24](#)
- [C12M23/10](#) : [C12M1/22](#)
- [C12M23/12](#) : [C12M1/32](#)
- [C12M23/14](#) : [C12M1/00](#)
- [C12M23/16](#) : [C12M3/06](#)
- [C12M23/18](#) : [C12M1/00](#)
- [C12M23/20](#) : [C12M1/00](#)
- [C12M23/22](#) : [C12M1/00](#)
- [C12M23/24](#) : [C12M1/04](#)
- [C12M23/26](#) : [C12M1/00](#)
- [C12M23/28](#) : [C12M1/00](#)
- [C12M23/30](#) : [C12M1/00](#)
- [C12M23/32](#) : [C12M1/00](#)
- [C12M23/34](#) : [C12M1/00](#)
- [C12M23/36](#) : [C12M1/107](#)
- [C12M23/38](#) : [C12M1/00](#)
- [C12M23/40](#) : [C12M1/00](#)
- [C12M23/42](#) : [C12M3/00](#)
- [C12M23/44](#) : [C12M3/00](#)
- [C12M23/46](#) : [C12M3/00](#)
- [C12M23/48](#) : [C12M3/00](#)
- [C12M23/50](#) : [C12M1/00](#)
- [C12M23/52](#) : [C12M1/00](#)
- [C12M23/54](#) : [C12M3/00](#)
- [C12M23/56](#) : [C12M1/09](#)
- [C12M23/58](#) : [C12M1/00](#)
- [C12M25/00](#) : [C12M1/12](#)

- [C12M25/02](#) : [C12M1/12](#)
- [C12M25/04](#) : [C12M1/12](#)
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- [C12M27/00](#) : [C12M1/02](#)
- [C12M27/02](#) : [C12M1/06](#)
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- [C12M33/02](#) : [C12M1/30](#)
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- [C12M33/20](#) : [C12M1/26](#)
- [C12M35/00](#) : [C12M1/42](#)
- [C12M35/02](#) : [C12M1/42](#)
- [C12M35/04](#) : [C12M1/42](#)
- [C12M35/06](#) : [C12M1/42](#)
- [C12M35/08](#) : [C12M1/42](#)
- [C12M37/00](#) : [C12M1/12](#)
- [C12M37/02](#) : [C12M1/12](#)
- [C12M37/04](#) : [C12M1/12](#)

- [C12M37/06](#) : [C12M1/12](#)  
- [C12M39/00](#) : [C12M1/00](#)  
- [C12M41/00](#) : [C12M1/34](#)  
- [C12M41/02](#) : [C12M1/21](#)  
- [C12M41/04](#) : [C12M1/34](#)  
- [C12M41/06](#) : [C12M1/00](#)  
- [C12M41/08](#) : [C12M1/00](#)  
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- [C12M41/18](#) : [C12M1/02](#)  
- [C12M41/20](#) : [C12M1/02](#)  
- [C12M41/22](#) : [C12M1/02](#)  
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- [C12M41/48](#) : [C12M1/36](#)  
- [C12M43/00](#) : [C12M1/00](#)  
- [C12M43/02](#) : [C12M1/00](#)  
- [C12M43/04](#) : [C12M1/00](#)  
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- [C12M43/08](#) : [C12M1/00](#)  
- [C12M45/00](#) : [C12M1/00](#)  
- [C12M45/02](#) : [C12M1/33](#)  
- [C12M45/04](#) : [C12M1/00](#)  
- [C12M45/06](#) : [C12M1/00](#)  
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- [C12M47/02](#) : [C12M1/00](#)  
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- [C12M47/16](#) : [C12M1/00](#)  
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- [C12M47/20](#) : [C12M1/00](#)

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[N: **Notes**  
[C1111]

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 [C12M21/00](#), classification should also be given in at least one of the groups [C12M23/00](#)-[C12M99/00](#).
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 [A01H4/00B](#);
  - apparatus for preservation of living parts of bodies of humans or animals, which are covered by [A01N1/02M2](#);
  - apparatus or devices for testing sterility conditions not linked to a bioreactor or fermenter growing biomass, which are covered by [A61L2/00](#), [G01N31/22F](#);
  - apparatus for biological treatment of water, waste water, sewage or sludge, which are covered by [C02F3/00](#), [C02F11/00](#);
  - apparatus for brewing of beer, which are covered by C12C;
  - apparatus for production of wine or vinegar, which are covered by C12G, [C12J1/10](#);
  - apparatus or devices for DNA and RNA technology, which are covered by [B01L7/00D](#), [B01J19/00C](#), [C12N15/10A](#);
  - fermentation processes, which are covered by C12P;
  - apparatus for bioleaching of ores, which are covered by [C22B3/18](#);
  - 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 [G01N33/48](#);
  - apparatus for automatic analysis not linked to a bioreactor or fermenter growing biomass, which are covered by [G01N35/00](#);
  - testing or evaluating the effect of a chemical or biological compound involving human or animal cells, which are covered by [G01N33/50D](#);
  - apparatus for immunological test processes, which are covered by [G01N33/53B](#).

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**C12M1/00 Apparatus for enzymology or microbiology****Notes**

This group covers:

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

- C12M1/00C . [N: Photo bio reactors]
- C12M1/00D . [N: Incubators]
- C12M1/00E . [N: Flexible bags or containers] [N9611]
- C12M1/02 . with agitation means; with heat exchange means
- C12M1/04 . with gas introduction means
- C12M1/04B . . [N: providing an anaerobic atmosphere]
- C12M1/06 . . with agitator, e.g. impeller
- C12M1/06B . . . [N: on a horizontal axis] [N9611]
- C12M1/08 . . with draft tube
- C12M1/09 . . Flotation apparatus
- C12M1/10 . rotatably mounted
- C12M1/107 . with means for collecting fermentation gases, e.g. methane (producing methane by anaerobic treatment of sludge [C02F11/04](#))
- C12M1/113 . . with transport of the substrate during the fermentation
- C12M1/12 . with sterilisation, filtration or dialysis means
- C12M1/12B . . [N: with sterilisation means]
- C12M1/12C . . [N: with flat plate filter elements] [N9611]
- C12M1/12C2 . . . [N: Culture inserts] [N9611]
- C12M1/12D . . [N: with hollow fibres or tubular filter elements] [N9611]
- C12M1/12E . . [N: with moving or mobile filter elements] [N9611]
- C12M1/14 . with means providing thin layers or with multi-level trays
- C12M1/16 . containing, or adapted to contain, solid media

- C12M1/16B . . [N: treated with gel punching devices]
- C12M1/18 . . Multiple fields or compartments
- C12M1/20 . . . Horizontal planar fields
- C12M1/20B . . . . [N: Disc dispensing devices therefor]
- C12M1/20C . . . . [N: Multiple discs supporting devices]
  
- C12M1/21 . Froth suppressors
  
- C12M1/22 . Petri type dish
  
- C12M1/24 . Tube or bottle type ([anaerobic jars C12M1/04B](#))
  
- C12M1/26 . Inoculator or sampler
- C12M1/26B . . [N: Airborne micro-organism samplers]
- C12M1/26C . . [N: Handle streaking devices] [N0210]
- C12M1/26D . . [N: Replica plating devices] [N0210]
- C12M1/26E . . [N: Devices involving centrifugal, centripetal or rotational forces] [N0210]
- C12M1/26F . . [N: Pipettes; Syringes; Suction devices] [N0210]
- C12M1/26G . . [N: Magnetic separators] [N0210]
- C12M1/26H . . [N: Biofilm separators] [N0210]
- C12M1/26L . . [N: Positioning tools for sampling or inoculating devices] [N0210]
- C12M1/28 . . being part of container
- C12M1/30 . . . Sampler being a swab
- C12M1/32 . . Multiple field or continuous type
  
- C12M1/33 . Disintegrators
  
- C12M1/34 . Measuring or testing with condition measuring or sensing means, e.g. colony counters
- C12M1/34B . . [N: Measure of electrical or magnetical factor]
- C12M1/34D . . [N: Pressure measure, e.g. with manometers, respirometers]
- C12M1/34E . . [N: Calorimetry]
- C12M1/34F . . [N: Mass spectrometry]
- C12M1/34G . . [N: with use of isotopes, e.g. radiorespirometers, scintillometers]
- C12M1/34H . . [N: Photometry, spectroscopy, laser technology]
- C12M1/34H2 . . . [N: Opacity, turbidity or light transmission measure; Nephelometry]
- C12M1/34H3 . . . [N: Bio- or chemi-luminescence]
- C12M1/34H4 . . . [N: Infra red spectroscopy]
- C12M1/34H5 . . . [N: Fluorescence spectroscopy]
- C12M1/34K . . [N: Pen or contact colony counters]
- C12M1/34L . . [N: with use of lecture and interpretation devices, grids]
  
- C12M1/36 . including condition or time responsive control, e.g. automatically controlled fermentors ([controlling or regulating in general G05](#))
- C12M1/38 . . Temperature-responsive control
  
- C12M1/40 . Apparatus specially designed for the use of free, immobilised, or carrier-bound

enzymes, e.g. apparatus containing a fluidised bed of immobilised enzymes

- C12M1/42 . Apparatus for the treatment of micro-organisms or enzymes with electrical or wave energy, e.g. magnetism, sonic waves

**C12M3/00 Tissue, human, animal or plant cell, or virus culture apparatus**

- C12M3/00C . [N: for culture in eggs]
- C12M3/00E . [N: Cell injection or fusion devices] [C0210]
- C12M3/02 . with means providing suspensions
- C12M3/04 . with means providing thin layers
- C12M3/04B . . [N: rotatably mounted]
- C12M3/04B2 . . . [N: Roller bottles]
- C12M3/06 . with filtration, ultra-filtration, inverse osmosis or dialysis means
- C12M3/06B . . [N: with flat plate filter elements]
- C12M3/06C . . [N: with hollow fibres or tubes]
- C12M3/06D . . [N: with moving or mobile filter elements]
- C12M3/08 . Apparatus for tissue disaggregation
- C12M3/10 . for culture in eggs
- C12M21/00** [N: Bioreactors or fermenters specially adapted for specific uses (digesters for manure [A01C3/02C](#); apparatus for PCR [B01L7/00D](#); destroying or transforming solid waste [B09B3/00](#); methods for genetic engineering [C12N15/00](#), [C12Q1/68](#); nucleic acid amplification reactions [C12Q1/68D](#))] [N1108] [C1203]
- C12M21/02 . [N: Photobioreactors (culturing algae [A01G33/00](#), [A01H4/00B](#), [C12N1/12](#))] [N1108] [C1203]
- C12M21/04 . [N: for producing gas, e.g. biogas (digesters for manure with production of biogas [A01C3/02E](#), biological treatment of water, waste water or sewage [C02F3/00](#), [C02F11/02](#), preparation of natural gas or syngas [C10L3/06](#), [C10L3/10](#))] [N1108] [C1203]
- C12M21/06 . [N: for in vitro fertilization] [N1108]
- C12M21/08 . [N: for producing artificial tissue or for ex-vivo cultivation of tissue (prostheses [A61F2/00](#), grafts [A61L27/00](#))] [N1108] [C1203]
- C12M21/10 . [N: adapted for the cultivation of avian eggs or in avian eggs, e.g. for vaccine production] [N1108]
- C12M21/12 . [N: for producing fuels or solvents ([C12M21/04](#) takes precedence; liquid carbonaceous fuels [C10L1/00](#), solid fuels [C10L5/00](#))] [N1108]
- C12M21/14 . [N: for producing enzymes] [N1108]

- C12M21/16 . [N: Solid state fermenters, e.g. for koji production] [N1108]
- C12M21/18 . [N: Apparatus specially designed for the use of free, immobilized or carrier-bound enzymes] [N1108]
- C12M23/00** [N: Constructional details, e.g. recesses, hinges (flow directing inserts in [C12M27/18-C12M27/24](#); apparatus for chemical or physical processes in general B01J, chemical or physical laboratory apparatus in general B01L)] [N1108] [C1203]
- C12M23/02 . [N: Form or structure of the vessel (large containers [B65D88/00](#))] [N1108] [C1203]
- C12M23/04 . . [N: Flat or tray type, drawers ([C12M23/10](#), [C12M23/12](#), [C12M23/16](#) take precedence)] [N1108]
- C12M23/06 . . [N: Tubular ([C12M23/08](#), [C12M23/16](#) take precedence)] [N1108]
- C12M23/08 . . [N: Flask, bottle or test tube] [N1108]
- C12M23/10 . . [N: Petri dish (crystallising dishes [B01L3/06](#))] [N1108] [C1203]
- C12M23/12 . . [N: Well or multiwell plates ([C12M25/04](#) takes precedence)] [N1108]
- C12M23/14 . . [N: Bags] [N1108]
- C12M23/16 . . [N: Microfluidic devices; Capillary tubes (integrated microfluidic structures [B01L3/5027](#); microreactors [B01J19/00R](#))] [N1108] [C1204]
- C12M23/18 . . [N: Open ponds; Greenhouse type or underground installations] [N1108]
- C12M23/20 . [N: Material Coatings (Immunocoatings [C12M25/00](#))] [N1108] [C1204]
- C12M23/22 . [N: Transparent or translucent parts (glassware for laboratory use [B01L3/00B8](#))] [N1108] [C1204]
- C12M23/24 . [N: Gas permeable parts] [N1108]
- C12M23/26 . [N: flexible (flexible containers for laboratory use [B01L3/00C4](#))] [N1108] [C1204]
- C12M23/28 . [N: disposable or single use] [N1108]
- C12M23/30 . [N: biodegradable] [N1108]
- C12M23/32 . [N: Frangible parts] [N1108]
- C12M23/34 . [N: Internal compartments or partitions] [N1108]
- C12M23/36 . [N: Means for collection or storage of gas; Gas holders] [N1108]
- C12M23/38 . [N: Caps; Covers; Plugs; Pouring means] [N1108]
- C12M23/40 . [N: Manifolds; Distribution pieces (fluid transfer means [B01L3/00B3](#))] [N1108] [C1204]
- C12M23/42 . [N: Integrated assemblies, e.g. cassettes or cartridges] [N1108]
- C12M23/44 . [N: Multiple separable units; Modules] [N1108]
- C12M23/46 . [N: Means for fastening] [N1108]

- C12M23/48 . [N: Holding appliances; Racks; Supports (**holding devices for laboratory apparatus B01L9/00**)] [N1108] [C1204]
- C12M23/50 . [N: Means for positioning or orientating the apparatus (**C12M41/08 takes precedence**)] [N1108]
- C12M23/52 . [N: Mobile; Means for transporting the apparatus (**transportable laboratories B01L99/00K**)] [N1108] [C1204]
- C12M23/54 . [N: hand portable] [N1108]
- C12M23/56 . [N: Floating elements] [N1108]
- C12M23/58 . [N: Reaction vessels connected in series or in parallel (**combinations of bioreactors with other apparatus, C12M43/00**)] [N1108]
  
- C12M25/00** [N: Means for supporting, enclosing or fixing the microorganisms, e.g. immunocoatings] [N1108] [C1204]
- C12M25/01 . [N: Drops] [N1111]
- C12M25/02 . [N: Membranes; Filters (**filters or filtration in general B01D24/00-B01D41/00**)] [N1108] [C1204]
- C12M25/04 . . [N: in combination with well or multiwell plates, i.e. culture inserts] [N1108]
- C12M25/06 . [N: Plates; Walls; Drawers; Multilayer plates] [N1108]
- C12M25/08 . . [N: electrically charged] [N1108]
- C12M25/10 . [N: Hollow fibers or tubes (**hollow fiber modules in general B01D63/02**)] [N1108] [C1204]
- C12M25/12 . . [N: the culture medium flowing outside the fiber or tube] [N1108]
- C12M25/14 . [N: Scaffolds; Matrices (in general **C12N5/00S**)] [N1108] [C1204]
- C12M25/16 . [N: Particles; Beads; Granular material; Encapsulation (**chemical or physical processes conducted in the presence of fluids and solid particles B01J8/00**)] [N1108] [C1204]
- C12M25/18 . . [N: Fixed or packed bed] [N1108]
- C12M25/20 . . [N: Fluidized bed (**in chemical or physical processes B01J8/18**)] [N1108] [C1204]
  
- C12M27/00** [N: Means for mixing, agitating or circulating fluids in the vessel (**by introduction of gas C12M29/06, C12M29/14, mixing in general or mixers per se B01F; mixing in apparatus for chemical or physical processes B01J**)] [N1108] [C1204]
- C12M27/02 . [N: Stirrer or mobile mixing elements] [N1108]
- C12M27/04 . . [N: with introduction of gas through the stirrer or mixing element] [N1108]
- C12M27/06 . . [N: with horizontal or inclined stirrer shaft or axis] [N1108]
- C12M27/08 . . [N: with different stirrer shapes in one shaft or axis] [N1108]
- C12M27/10 . [N: Rotating vessel] [N1108]

- C12M27/12 . . [N: Roller bottles; Roller tubes] [N1108]
- C12M27/14 . [N: Rotation or movement of the cells support, e.g. rotated hollow fibers] [N1108]
- C12M27/16 . [N: Vibrating; Shaking; Tilting] [N1108]
- C12M27/18 . [N: Flow directing inserts] [N1108]
- C12M27/20 . . [N: Baffles; Ribs; Ribbons; Auger vanes] [N1108] [C1204]
- C12M27/22 . . [N: Perforated plates, discs or walls] [N1108]
- C12M27/24 . . [N: Draft tube ([C12M29/08](#) takes precedence)] [N1108]
  
- C12M29/00** [N: Means for introduction, extraction or recirculation of materials, e.g. pumps (pumps per se F04B)] [N1108] [C1204]
  
- C12M29/02 . [N: Percolation] [N1108]
- C12M29/04 . [N: Filters; Permeable or porous membranes or plates, e.g. dialysis] [N1108] [C1204]
- C12M29/06 . [N: Nozzles; Sprayers; Spargers; Diffusers (per se [B01F3/04C1](#), [B01J19/26](#))] [N1108] [C1204]
- C12M29/08 . . [N: Air lift] [N1108]
- C12M29/10 . [N: Perfusion] [N1108]
- C12M29/12 . [N: Pulsatile flow] [N1108]
- C12M29/14 . [N: Pressurized fluid] [N1108]
- C12M29/16 . [N: Hollow fibers ([hollow fiber modules in general B01D63/02](#))] [N1108] [C1204]
- C12M29/18 . [N: External loop; Means for reintroduction of fermented biomass or liquid percolate ([loop type reactors for chemical or physical processes B01J19/24D8](#))] [N1108] [C1204]
- C12M29/20 . [N: Degassing; Venting; Bubble traps (means for collection or storage of gas [C12M23/36](#); gas collection apparatus for laboratory use [B01L5/02](#))] [N1108] [C1204]
- C12M29/22 . . [N: Oxygen discharge] [N1108]
- C12M29/24 . [N: Recirculation of gas] [N1108] [C1204]
- C12M29/26 . [N: Conditioning fluids entering or exiting the reaction vessel] [N1108] [C1204]
  
- C12M31/00** [N: Means for providing, directing, scattering or concentrating light ([C12M41/06](#) takes precedence)] [N1108]
  
- C12M31/02 . [N: located outside the reactor] [N1108]
- C12M31/04 . . [N: Mirrors] [N1108]
- C12M31/06 . . [N: Lenses] [N1108]
  
- C12M31/08 . [N: by conducting or reflecting elements located inside the reactor or in its structure]

- 1108]
- C12M31/10 . [N: by light emitting elements located inside the reactor, e.g. LED or OLED] [N1108]
- C12M31/12 . [N: Rotating light emitting elements] [N1108]
- C12M33/00** [N: 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 [A61B10/00L](#), withdrawing or distributing predetermined quantities of fluid [B01L99/00G](#))] [N1108] [C1204]
- C12M33/02 . [N: by impregnation, e.g. using swabs or loops (fluid transport using swabs B01L3/00C6S)] [N1108] [C1204]
- C12M33/04 . [N: by injection or suction, e.g. using pipettes, syringes, needles (pipettes in general [B01L3/02](#))] [N1108] [C1204]
- C12M33/06 . . [N: for multiple inoculation or multiple collection of samples] [N1108]
- C12M33/07 . . [N: Dosage or metering devices therefore] [N1204] [C1204]
- C12M33/08 . [N: by vibration] [N1108]
- C12M33/10 . [N: by centrifugation (centrifuges in general B04B); Cyclones (cyclones in general B04C)] [N1108] [C1204]
- C12M33/12 . [N: by pressure] [N1108]
- C12M33/14 . [N: with filters, sieves or membranes] [N1108]
- C12M33/16 . [N: Screw conveyor] [N1108]
- C12M33/18 . [N: Rollers] [N1108]
- C12M33/20 . [N: Ribbons] [N1108]
- C12M33/22 . [N: Settling tanks; Sedimentation by gravity (settling tanks per se [B01D21/02](#))] [N1111]
- C12M35/00** [N: 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 electroplasmolysis [A23N1/00F](#), processes employing electric or wave energy [B01J19/08](#); treatment of microorganisms or enzymes with electrical or wave energy [C12N13/00](#); methods for cell fusion [C12N15/02](#); introduction of foreign genetic material [C12N15/87](#))] [N1108] [C1204]
- C12M35/02 . [N: Electrical or electromagnetic means, e.g. for electroporation or for cell fusion] [N1108]
- C12M35/04 . [N: Mechanical means, e.g. sonic waves, stretching forces, pressure or shear stimuli] [N1108]
- C12M35/06 . [N: Magnetic means ([C12M35/02](#) takes precedence)] [N1108]
- C12M35/08 . [N: Chemical, biochemical or biological means, e.g. plasma jet, co-culture] [N1108]

## C1204]

- C12M37/00** [N: Means for sterilizing, maintaining sterile conditions or avoiding chemical or biological contamination ([C12M23/38](#) takes precedence; filtration in general and filters per se [B01D24/00-B01D41/00](#); autoclaves [B01J3/04](#); treatment of microorganisms with electrical or wave energy [C12N13/00](#))] [N1108] [C1111]
- C12M37/02 . [N: Filters] [N1108]
- C12M37/04 . [N: Seals] [N1108]
- C12M37/06 . [N: Means for testing the completeness of the sterilization (testing for sterility conditions [C12Q1/22](#))] [N1108] [C1204]
- C12M39/00** [N: Means for cleaning the apparatus or avoiding unwanted deposits of microorganisms (apparatus for cleaning laboratory receptacles or instruments [B01L99/00D](#); cleaning in general [B08B](#))] [N1108] [C1111]
- C12M41/00** [N: Means for regulation, monitoring, measurement or control, e.g. flow regulation (controlling or regulating chemical, physical or physicochemical processes [B01J19/00B](#); heating or cooling apparatus for laboratory use [B01L7/00](#); electro optical investigation of individual particles, flow cytometers [G01N15/14](#); automatic analysis [G01N35/00](#); controlling or regulating in general [G05N](#))] [N1108] [C1111]
- C12M41/02 . [N: of foam (foam prevention during gasification of liquids [B01D19/02](#))] [N1108] [C1204]
- C12M41/04 . . [N: Means for foam enhancement (making foam by mixing [B01F3/04C3](#))] [N1108] [C1204]
- C12M41/06 . [N: of illumination] [N1108]
- C12M41/08 . . [N: Means for changing the orientation] [N1108]
- C12M41/10 . . [N: Filtering the incident radiation] [N1108]
- C12M41/12 . [N: of temperature (controlling the temperature of chemical or physical processes [B01J19/00B2](#), heating or cooling apparatus for laboratory use [B01L7/00](#))] [N1108] [C1204]
- C12M41/14 . . [N: Incubators; Climatic chambers (per se [B01L1/00](#))] [N1108] [C1204]
- C12M41/16 . . [N: by recirculation of culture medium at controlled temperature] [N1108]
- C12M41/18 . . [N: Heat exchange systems, e.g. heat jackets or outer envelopes] [N1108] [C1204]
- C12M41/20 . . . [N: the heat transfer medium being a gas] [N1108]
- C12M41/22 . . . [N: in contact with the bioreactor walls] [N1108]
- C12M41/24 . . . [N: inside the vessel] [N1108]
- C12M41/26 . [N: of pH] [N1108]
- C12M41/28 . [N: of redox potential] [N1108]
- C12M41/30 . [N: of concentration] [N1108]

- C12M41/32 . . [N: of substances in solution] [N1108]
- C12M41/34 . . [N: of gas] [N1108]
- C12M41/36 . . [N: of biomass, e.g. colony counters or by turbidity measurements (**electrooptical investigation of individual particles [G01N15/14](#), flow cytometers [G01N15/14C](#)**)] [N1108] [C1204]
- C12M41/38 . . [N: of metabolites or enzymes in the cells] [N1108]
- C12M41/40 . [N: of pressure] [N1108]
- C12M41/42 . [N: of agitation speed] [N1108]
- C12M41/44 . [N: of volume or liquid level] [N1108]
- C12M41/46 . [N: of cellular or enzymatic activity or functionality, e.g. cell viability] [N1108]
- C12M41/48 . [N: Automatic or computerized control (**automatic analysis [G01N35/00](#)**)] [N1108] [C1204]
  
- C12M43/00** [N: Combinations of bioreactors or fermenters with other apparatus] [N1108]
  
- C12M43/02 . [N: Bioreactors or fermenters combined with devices for liquid fuel extraction; Biorefineries] [N1108] [C1204]
- C12M43/04 . [N: Bioreactors or fermenters combined with combustion devices or plants, e.g. for carbon dioxide removal (**[C12M43/06](#) takes precedence; recovery of carbon dioxide [C12F3/02](#)**)] [N1108] [C1204]
- C12M43/06 . [N: Photobioreactors combined with devices or plants for gas production different from a bioreactor or fermenter] [N1108] [C1204]
- C12M43/08 . [N: Bioreactors or fermenters combined with devices or plants for production of electricity] [N1108] [C1204]
  
- C12M45/00** [N: Means for pre-treatment of biological substances] [N1108] [C1204]
  
- C12M45/02 . [N: by mechanical forces; Stirring; Trituration; Comminuting (crushing, pulverizing, disintegrating in general B02C)] [N1108] [C1204]
- C12M45/03 . [N: by control of the humidity or content of liquids; Drying] [N1204]
- C12M45/04 . [N: Phase separators; Separation of non fermentable material; Fractionation] [N1108] [C1204]
- C12M45/05 . [N: by centrifugation (centrifuges in general B04B)] [N1204]
- C12M45/06 . [N: by chemical means or hydrolysis] [N1108] [C1204]
- C12M45/07 . [N: by electrical or electromagnetic forces] [N1204]
- C12M45/09 . [N: by enzymatic treatment] [N1204]
- C12M45/20 . [Heating; Cooling (**heating or cooling apparatus for laboratory uses [B01L7/00](#)**)]

- ] [C1204]
- C12M45/22 . [N: Means for packing or storing viable microorganisms (casings for storing cell samples [A61B10/00S](#), preservation of living parts of the human or animal body [A01N1/02](#))] [N1108] [C1204]
- C12M47/00** [N: Means for after-treatment of the produced biomass or of the fermentation or metabolic products, e.g. storage of biomass (filters in general [B01D23/00-B01D41/00](#))] [N1108] [C1204]
- C12M47/02 . [N: Separating microorganisms from the culture medium; Concentration of biomass (separating microorganisms from their culture media [C12N1/02](#))] [N1108] [C1204]
- C12M47/04 . [N: Cell isolation or sorting (purging biological preparations of unwanted cells [C12N5/00Z](#), determining the presence or kind of microorganism [C12Q1/04](#))] [N1108]
- C12M47/06 . [N: Hydrolysis; Cell lysis; Extraction of intracellular or cell wall material (lysis of microorganisms [C12N1/06](#); extracting or separating nucleic acids from biological samples [C12N15/10A](#))] [N1108] [C1204]
- C12M47/08 . [N: Homogenizing] [N1108]
- C12M47/10 . [N: Separation or concentration of fermentation products (bioreactors combined with means for distillation or extraction of liquid fuel [C12M43/02](#))] [N1108] [C1204]
- C12M47/12 . [N: Purification ([C12M47/04](#) takes precedence)] [N1108] [C1111]
- C12M47/14 . [N: Drying] [N1108]
- C12M47/16 . [N: Sterilization (autoclaves in general [B01J3/04](#))] [N1108] [C1204]
- C12M47/18 . [N: Gas cleaning, e.g. scrubbers; Separation of different gases (separating dispersed particles from gases or vapours [B01D45/00](#); separation of gases or vapours [B01D53/00](#); gas washing apparatus for laboratory uses [B01L5/04](#))] [N1108] [C1204]
- C12M47/20 . [N: Heating or cooling (heating or cooling apparatus for laboratory uses [B01L7/00](#))] [N1108] [C1204]
- C12M99/00** [N: Subject matter not otherwise provided for in other groups of this subclass] [N1108]
- C12M99/02 . [N: Disc dispensing devices] [N1111]