

Title (en)

Apparatus for mixing and homogenizing emulsions

Title (de)

Vorrichtung zum Mischen und Homogenisieren von Emulsionen

Title (fr)

Dispositif de mélange et d'homogénéisation destiné à la production d'émulsions

Publication

EP 1338330 A3 20031029 (FR)

Application

EP 03290291 A 20030205

Priority

FR 0201575 A 20020208

Abstract (en)

[origin: EP1338330A2] Each stage (35-38) of a mixer contains a rotor with mixing paddles which exert axial and radial shear forces on the mixture, and a stator around the rotor not far (47) from the inside of the mixer wall (17). The stator is a ring (39) with parallel slits separating segments circumferentially, so the mixture projected radially by the rotor through the openings is subject to radial shear. The mixer comprises at least one mixing stage (10, 11, 12, 13), the stages separated by means forming dividers (40) making at least one mixture passage zone. The rotor is mounted on an axle (7). The stator has a fixing ring (40) connecting the annular ring and the stage wall. The rotor is a turbine wheel made of a transverse plate and a cylindrical boring to receive the axle, supporting at least four paddles on at least one face. The cross section of the paddles increases moving radially away from the central axle over half their length and then remains constant for the other half. Alternatively, the paddles are trapezoidal, connected to a cylindrical circular section receiving the axle and increasing in section as they move radially further from the axle. The segments extend parallel to the axial direction of the mixer or are inclined relative to the axial direction by an angle of 5 to 30 degrees. The vents are two to ten times longer in the axial direction than they are in the perpendicular direction. The space between the annular ring of the stator and the inside of the stage wall is between 0.2 and one times the size of the vents in the axial direction. Independent claims are also included for: (1) a mixer containing stages as described above, together with a motor and motor control to rotate the axle, and means of supplying and removing the fluids. Each stage includes a zone of strong turbulence under the action of the rotor/stator and a zone of homogenization without coalescing the particles between the turbulent zone and the divider from the next stage, before transfer to the next stage. Means of defloculation are placed in at least one mixing chamber to rehomogenize the flow and bring a supplementary shear in the homogenization zone. There are inlets and means of injection for the components of the mixture into the mixing stages. The mixer also has external reinforcing collars around the periphery of the walls of the principal body. There are means of controlling and regulating the speed of rotation of each rotor and the structure of each rotor/stator is defined as a function of the constraints of the desired shear forces; (2) a mixing installation containing a mixer as described above; (3) a continuous homogenization process including the mixing process described above with transfer of the fluid from mixing stage to mixing stage until a stable ultrafine emulsion has been obtained with a particle droplet size held between 100nm to several microns. The mixture has a viscosity of 1mPa.s to 10Pa.s; and (4) a product obtained using the above process or mixing device comprising water (0 to 15%) , emulsifier (0 to 10%) and the rest hydrocarbons (to 100%), chosen from the group containing fuel, diesel, fuel oil, petrol and kerosene, with particles of the order of 200nm to several micrometers. The mixture is stable in a way that avoids coalescence affecting its use.

IPC 1-7

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IPC 8 full level

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CPC (source: EP)

B01F 23/41 (2022.01); **B01F 27/271** (2022.01); **C10L 1/328** (2013.01); **B01F 27/191** (2022.01)

Citation (search report)

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- [A] EP 1108463 A1 20010620 - ADVANCED MOLECULAR TECHNOLOGIE [US]
- [A] WO 0104239 A1 20010118 - LUBRIZOL CORP [US]
- [XY] PATENT ABSTRACTS OF JAPAN vol. 008, no. 085 (C - 219) 18 April 1984 (1984-04-18)
- [X] PATENT ABSTRACTS OF JAPAN vol. 006, no. 015 (C - 089) 28 January 1982 (1982-01-28)

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