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LIQUID-LIQUID CENTRIFUGAL EXTRACTOR

The present invention proposes a new design for a liquid-liquid centrifugal extractor, providing controlled mixing and highly efficient separation. This novel two-in-one device allows for extraction in a continuous, automated, remotely controlled process. The compact combined design of reduced mechanical parts minimises dead volume and required space, increases separation efficiency, and makes operation and maintenance more time, cost and space efficient.

BACKGROUND

Liquid-liquid separation and extraction technology is applied in analytical and microchemical engineering for the production, purification or analysis of fine organic compounds and is widely used in key industries such as petrochemistry, biochemistry, pharmaceuticals, food, life sciences, health, cosmetics, hydrometallurgy or paper.

Extraction is a two-step process - mixing and separating - that requires laborious handling and, unless a multistage process on an industrial scale, yields limited and discontinuous batch production.

Centrifugal extractors are widely used in separation of multiphase mixtures. They offer several advantages, such as low residence time, low hold up and a high mass transfer coefficient and area.

The proposed one-step device achieves advanced mixing and separation quality by controlling intensity and back mixing, and by its reduced design (three chambers built around a single shaft), thus minimising the dead volume, required parts and providing more efficient and robust operation, e.g. less vibration and noise emissions.

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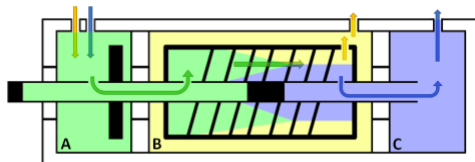


Fig.1: Phases flow paths and phase distribution in the device.

The two fluids to be mixed (blue and yellow) are entering the mixing chamber (A). The mixture (green) is transferred from chamber A to the separator through the shaft. The mixture is guided through the separator and gets separated using the centrifugal force of the rotating separator. The two separated phases are guided to chamber B (heavy phase – yellow) and chamber C (light phase – blue), respectively.

ADVANTAGES

The suggested design can be used directly in analytical-scale laboratories or scaled up for industrial applications.

- Extractor (mixing and separation), not just separator
- Continuous, automated, remotely controlled process
- Separation chamber internal structure (helix) for back mixing prevention
- Internal structure for controlled mixing
- Optimised design

REFERENCE

M016/2021

DEVELOPMENT STATUS

Prototype in operation

APPLICATIONS

Microchemical engineering, waste water analyses, food analyses, biotechnology, pharmaceuticals, life sciences, healthcare, cosmetics, petrochemistry, metal industry, paper industry

KEYWORDS

Liquid-liquid extraction, LLE, solvent extraction, partitioning, decanter, centrifugal extractor

IPR

Austrian patent pending

OPTIONS

R&D – cooperation, license agreement, patent sale

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Fig.2: Opened assembly of the sample detailed design

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