

CE 310.04

Discontinuous stirred tank reactor



Description

- discontinuous stirred tank reactor for connection to supply unit CE 310
- transparent materials to observe the process
- isothermal operation
- determination of the conversion in a saponification reaction

Discontinuously operated stirred tank reactors are mostly used if the product quantities to be produced are small or the reactions are slow.

CE 310.04 is part of a device series that enables experiments with different reactor types. In conjunction with the supply unit CE 310, it is possible to examine the function and behaviour of a discontinuous stirred tank reactor. The supply unit CE 310 has a heating water circuit as well as all necessary connections, pumps, tanks for reactants and a product tank.

CE 310.04 is mounted onto the supply unit and held by two pins in position. Quick-release couplings enable easy connection of the reactor to the supply unit.

The reactants are preheated in the supply unit at the beginning. After that the reactants are delivered into the stirred tank reactor. A stirrer ensures a homogeneous mixture and thus increases the direct contact of the reactants.

In isothermal operation, a chambered bottom in the stirred tank reactor serves as the heat exchanger to examine the influence of the temperature on the reaction.

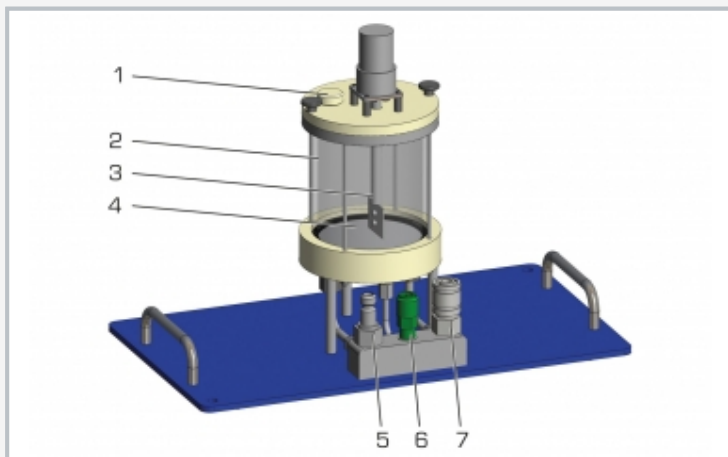
The conversion in the stirred tank reactor is determined by measuring the conductivity. A combined conductivity/temperature sensor is included in CE 310. Conductivity and temperature are digitally displayed on the switch cabinet of the supply unit. In addition, the measured values can be captured and processed with data acquisition software (included in CE 310).

Learning objectives/experiments

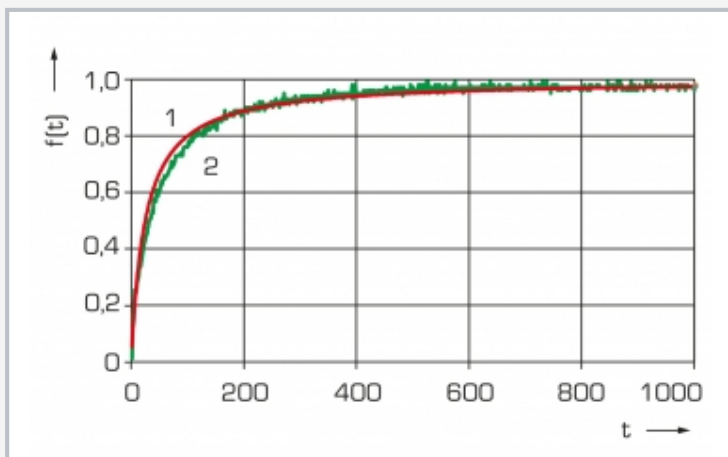
- fundamentals of a saponification reaction
 - ▶ determination of reaction rate constant
 - ▶ determination of temperature dependence of reaction rate constant
- conversion depending on
 - ▶ reaction time
 - ▶ temperature
 - ▶ concentration

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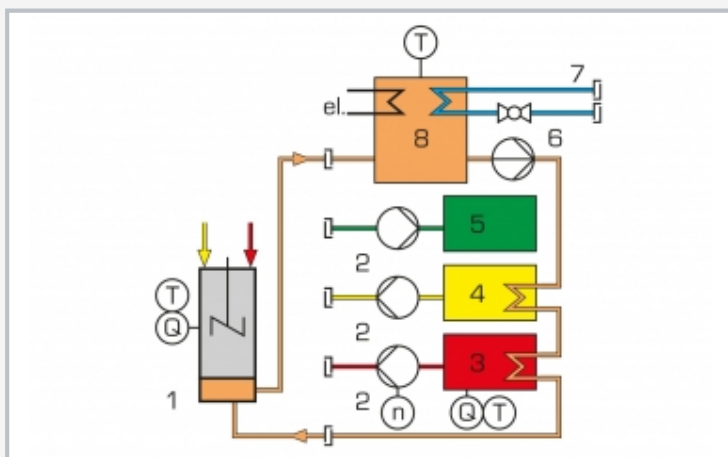
Discontinuous stirred tank reactor



1 hole for sensor for conductivity and temperature (included in CE 310), 2 stirred tank reactor, 3 stirrer, 4 chambered bottom as heat exchanger, 5 water supply, 6 product drain, 7 water drain



Course of conversion over time
1 theoretical conversion, 2 measured conversion; $f(t)$ conversion, t' time



Process schematic with supply unit CE 310
1 stirred tank reactor, 2 peristaltic pump, 3 reactant A, 4 reactant B, 5 product, 6 water pump, 7 water connection, 8 water tank; Q conductivity, n speed, T temperature

Specification

- [1] discontinuous stirred tank reactor for connection to supply unit CE 310
- [2] reactor with stirrer
- [3] chambered bottom made of stainless steel as heat exchanger for connection to CE 310
- [4] sensor for measuring the conductivity and temperature via CE 310
- [5] temperature control in the reactor via CE 310

Technical data

- Reactor
- outer diameter: 110mm
 - inside diameter: 100mm
 - height: 140mm
 - capacity: approx. 750mL

Speed stirrer: approx. 330min^{-1}

LxWxH: 440x250x320mm
Weight: approx. 10kg

Scope of delivery

- 1 discontinuous stirred tank reactor
- 2 beakers
- 1 funnel

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Required accessories

083.31000 CE 310 Supply unit for chemical reactors