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Research Article

## Heat transfer characteristics of a stirred single-use bioreactor

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### Highlights

- Determination of overall heat transfer coefficients in single-use bioreactors
- Comparison of determination approaches: Transient vs. steady state measurements
- Application of Wilson plot technique for detail investigation and scale-up considerations

Abbreviations: stirred tank reactor (STR), diluted oxygen (DO)

### 1 Introduction

Stirred tank reactors represent an important class of reaction equipment, fulfilling various tasks within the chemical, food and biotechnology industries. Primary tasks are suspending, gas-liquid dispersion and generally mixing in order to reduce gradients and support (bio-) chemical conversion reactions. Based on this, heat transfer is a secondary task of a stirred tank to either quickly change the bulk temperature or keep it constant on a desired setpoint. Knowing the heat transfer capabilities of a system enables its comparison to the processes requirements, e.g. to check upfront if an exothermic reaction can be carried out safely.

Stirred tanks are operated in a wide range of process conditions. To adapt to a dedicated task, the detailed construction and existence of installations may vary strongly, which led to many

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