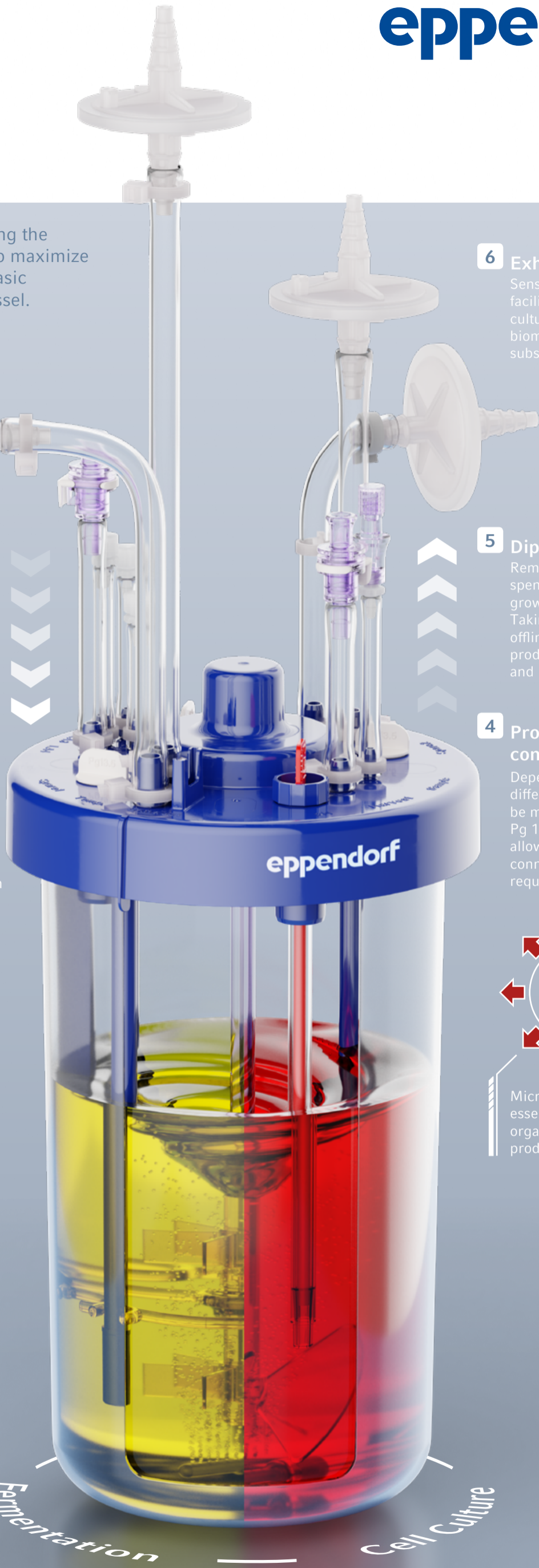


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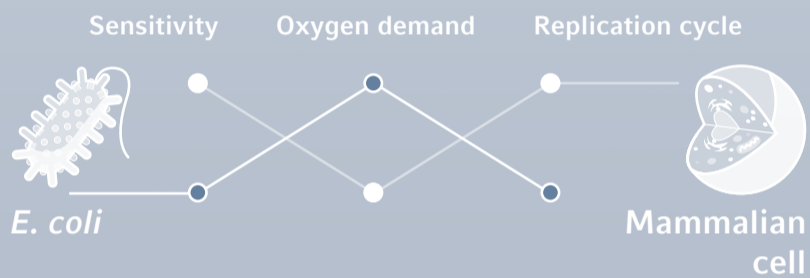
# The Basic Components of a Bioreactor

Bioreactors are more than a just a vessel. Understanding the individual components and which role they play help to maximize the efficiency of your process. Learn more about the basic components of a bioreactor to get more out of your vessel.



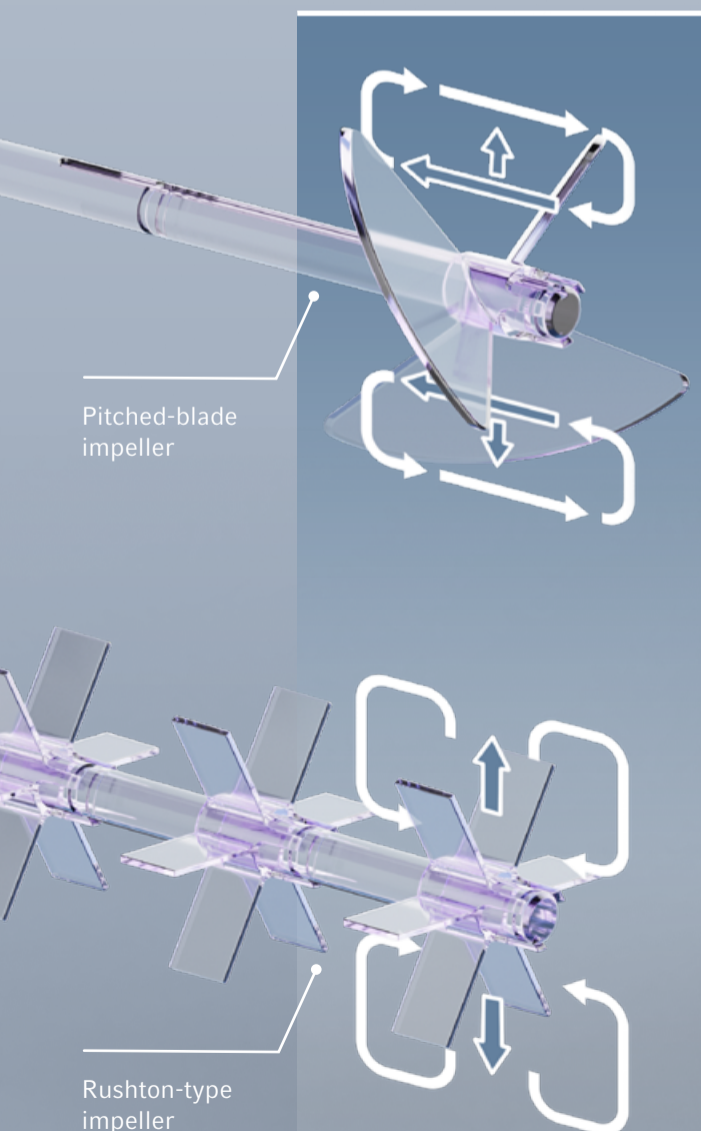
## 1 Feed lines

Feeding is the essential step to keep your culture happy. Nutrients, carbon sources, but also acids and bases to regulate the pH value can be added continuously or in batches.



## 2 Agitation system

Proper mixing is essential to ensure that the cells stay in suspension and that the culture medium is mixed homogenously. The selection of different impeller shapes can be used to influence the medium flow, but also have a direct impact on the culture.



## 6 Exhaust gas

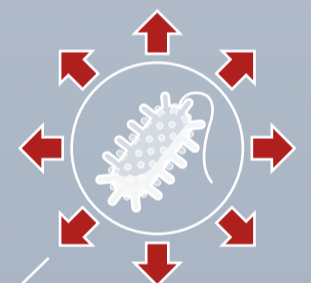
Sensors for exhaust gas facilitate insights into critical culture parameters, such as biomass development and substrate consumption.

## 5 Dip tube

Removal of waste products in spent medium prolongs cell growth and product formation. Taking samples allows for offline analysis of cells, product formation, and medium composition.

## 4 Process control elements

Depending on the process, different parameters need to be monitored and controlled. Pg 13.5 ports in the headplate allow inserting sensors or connections that may be required for the process.



Microbiology: Cooling is essential! Depending on the organism, 1 L of culture can produce 100 W of energy.

## 3 Gas control

Gas control is important to ensure optimal cell growth and product formation. Overlay or submerged gassing strategies can be chosen to influence the dissolved oxygen (DO) concentration, an important parameter for optimal cell growth. Carbon dioxide (CO<sub>2</sub>) sparging is used to control the pH values in cell culture processes.



Fermentation Cell Culture