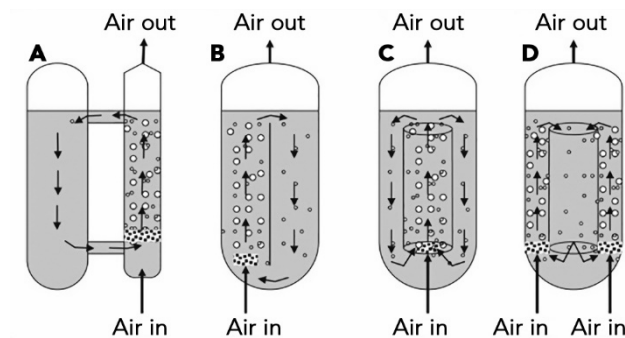


## Types of bioreactors

### 1- Airlift Bioreactors

#### Airlift Bioreactor Applications

- Culturing sensitive organisms/cells and single-cell protein production
- Methanol productions
- Wastewater treatment
- Aerobic bioprocessing



### 2 Bubble Column Bioreactors

#### Bubble Column Bioreactor Applications

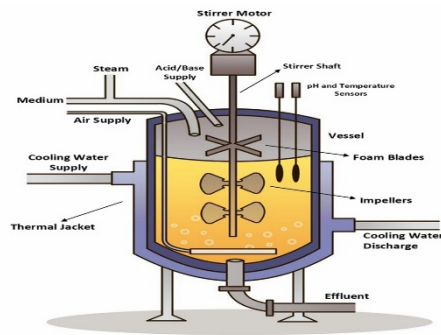
- Fermentation processes
- Producing pharmaceuticals and chemicals
- Culturing sensitive organisms/cells like plant cells



### 3-Continuous Stirred-Tank Bioreactors

#### Continuous Stirred Tank Bioreactor Applications

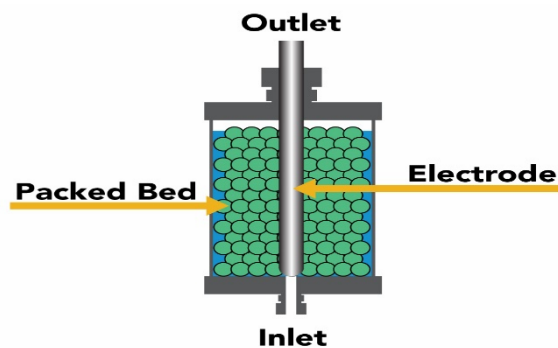
- Hydrocarbon-rich industrial wastewater treatments
- Pharmaceutical industry
- Fermentation processes
- Biological processes, such as cell cultures



## 4- Packed Bed Bioreactors

### Packed Bed Bioreactor Applications

- Immobilized/particular biocatalysts
- Wastewater treatments
- Catalytic reactors; fermentors
- Can handle high-density cultures



## 5- Photobioreactors

### Photobioreactor Applications

- Pharmaceutical industry
- growing algae and cyanobacteria
- Food additives
- Wastewater treatments (remediation)
- Aerobic and anaerobic processes

