



# Citric Acid Bio-Reactor

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## Introduction

Citric acid is an important industrial metabolite produced via fermentation. The bioreactor system provides a controlled environment for optimal microbial growth and citric acid production.

## Problem Statement

Conventional citric acid production methods face challenges related to efficiency, cost, and consistency. Improving bioreactor performance is key to meeting growing industrial demands.

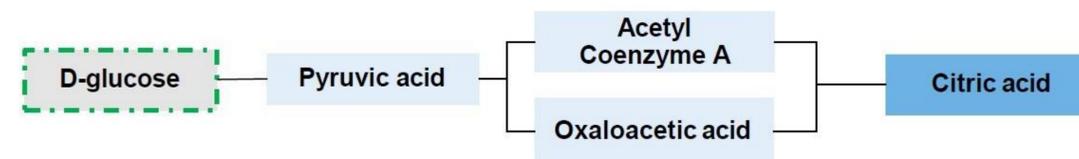
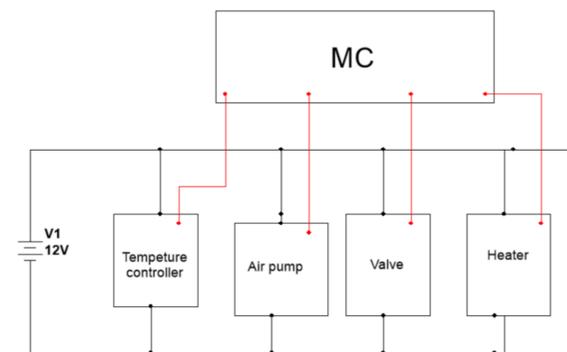
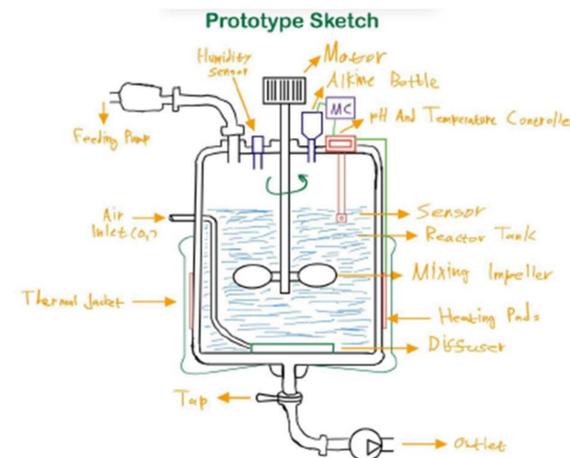
## Constrains

1. Material of the Reactor must be Corrosion resistance.
2. Control of the Humidity.
3. Control of the Temperature.
4. Control of the pH.
5. Shaft rotation speed.

## Target Specifications

-  Corrosion resistance of B-grade or above.
-  Rotation speed of 0.3 RPM.
-  pH Range: 3.0-4.0.
-  Temperature range: 31-34°C.
-  Humidity lower than 50%.

## Final Design Details



## Validation

- ✓ Material is stainless steel.
- ✓ Shaft speed: 0.3 RPM.
- ✓ pH maintained at range 3.5-4.0.
- ✓ Temperature maintained at range of 31-34°C.
- ✓ Humidity maintained at lower than 45%.

## Project Impact

- Economic.
- Global.
- Environmental.

## Conclusion

The developed bioreactor system enhances citric acid production by increasing yield, reducing costs, and improving process stability. Its scalable design and efficient resource usage offer significant environmental and economic benefits, making it a promising solution for sustainable industrial-scale production in various sectors like food, pharmaceuticals, and biotechnology.