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Effect of Temperature, Ph and Number of Days on Citric Acid Production from Molasses Fermentation

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ABSTRACT

Carboxylic acids are manufactured without the use of fossil fuels and have a wide range of applications. Various parameters are investigated in this article, and an analysis is performed as a result. This work examines the long-term processing of molasses to produce citric acid, as well as the effects of various parameters on citric acid synthesis..

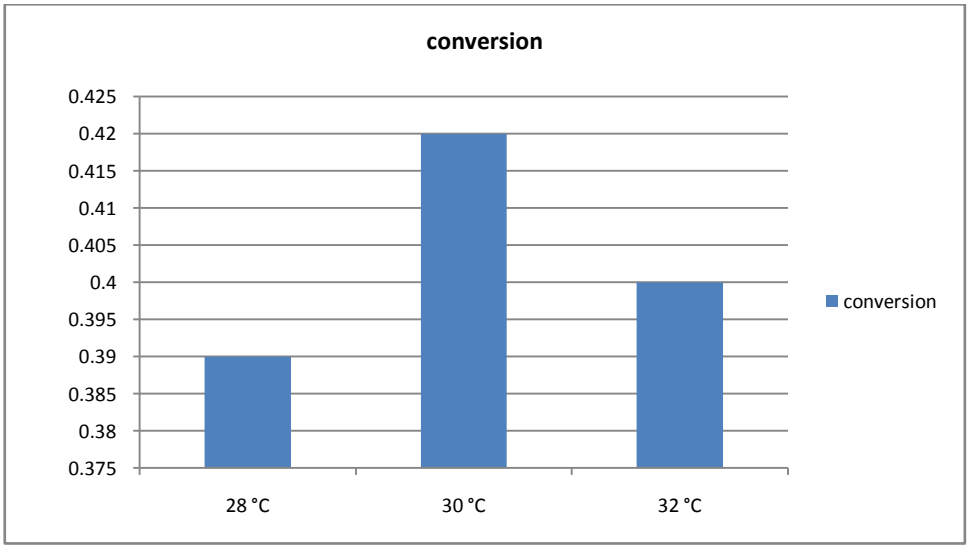
Keywords: Citric acid, Ph, fermentation, temperature and fermentation.

Methodology-Citric Acid

In a conical flask, predetermined amounts of alcohol derived from molasses from the first step of citric acid synthesis were combined with sterile yeast A.niger culture. In a fermentation incubator, it is preserved. Temperatures are maintained in a variety of study ranges. The pH is held at the same level of 6 throughout. Batch 3 has a three-day fermentation phase. For batch 1, they were allowed to come to test temperature of 30℃, which was used as the initial temperature for two days after each batch was completed, and a sample was taken and titrated against 1 N NaOH solution. On day 3, the temperature was reduced to 28°C, and a sample was taken and titrated once more. Temperatures in batch 2 are raised to 30 degrees Celsius. The process is still in progress. Finally, on days two and three, the temperature is maintained at 30℃. Similarly, the sample is tested. Stock cultures were grown on a synthetic medium with a pH of 6 that included demineralized water, 20 g liter1 glucose, 5 g liter1 (NH4)2SO4, vitamins, and trace elements (set with KOH).

Table 1- Effect of temperature on fermentation

Sr no	Batch	Day	Temperature	Ph	conversion
1	Batch 1	6 days	28 ℃	6	0.39
4	Batch 2	6 days	30 ℃	6	0.42
6	Batch 3	6 days	32 ℃	6	0.40

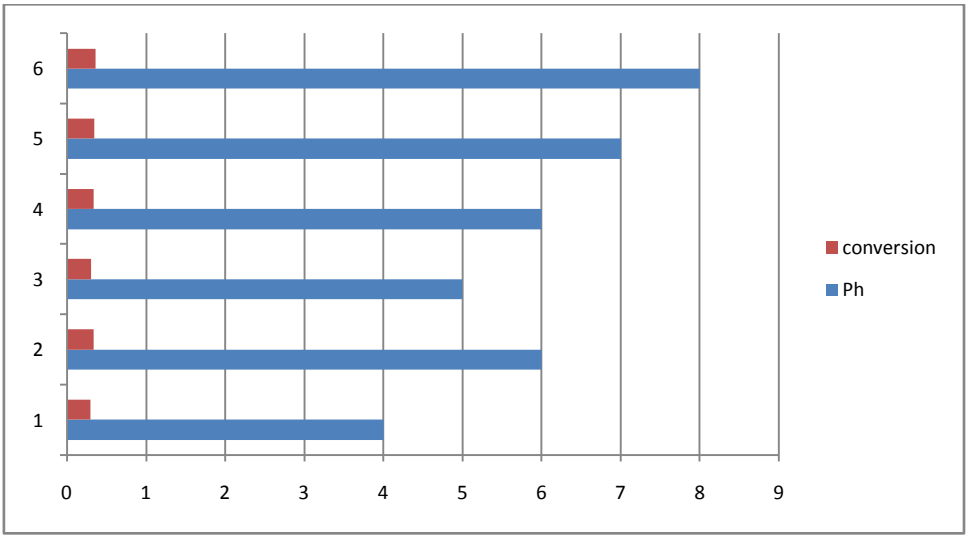


EFFECT OF TEMPERATURE ON FERMENTATION

Purification of Citric Acid - Leftover biomass, salts, sugar, and water contaminate the citric acid broth from the manufacturing fermenter. To neutralize the broth and generate the insoluble precipitate calcium citrate, the citric acid must first be treated with calcium carbonate. The citric acid content of calcium citrate is roughly 74%. The stoichiometric equation is as follows: CaCO 3 + Citric Acid → CO 2+ Calcium Citrate.
To eliminate any number of impurities, the calcium citrate is washed, boiled, and filtered. Filters can be used before the first calcium carbonate reaction, in series between the two precipitation reactions, or in any other combination that works, depending on the exact design of the purification scheme. It's also crucial to pick the right filter for the job. Larger impurities (sucrose and salts) will be removed first, followed by smaller contaminants

Effect of ph on fermentation

Sr no	Batch	Day	Temperature	Ph	conversion
1	Batch 1	3 days	30 °C	4	0.30
2			30 °C	6	0.34
3	Batch 2	3 days	30 °C	5	0.31
4			30 °C	6	0.34
5	Batch 3	3 days	30 °C	7	0.35
6			30 °C	8	0.36

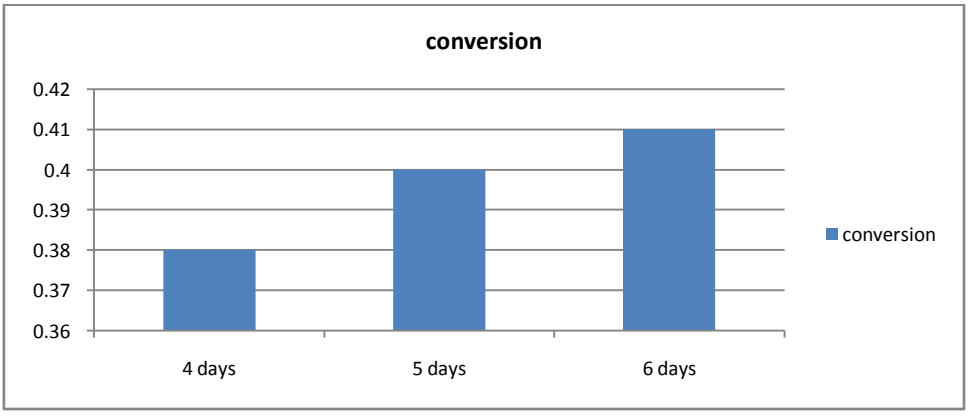


EFFECT OF Ph ON FERMENTATION

Citric acid bacteria thrive best at a pH of 6 and a constant temperature of 30 degrees Celsius, according to research. A. aceti can adapt to high acetic acid levels by generating 35 proteins that are activated throughout the acetate adaptation process. The conversion displays a less than positive temperature gradient in batch 3 because the temperature is held constant at 30℃. It can be seen from the given data that the best temperature gradient is +2℃, and the pH should be kept at 5

EFFECT OF DAYS ON FERMENTATION

Sr no	Batch	Day	Temperature	Ph	conversion
1	Batch 1	4 days	30 °C	6	0.38
4	Batch 2	5 days	30 °C	6	0.40
6	Batch 3	6 days	30 °C	6	0.41



EFFECT OF DAYS ON FERMENTATION

Citric acid bacteria thrive best at a pH of 6 and a constant temperature of 30 degrees Celsius, according to research. A. aceti can adapt to high acetic acid levels by generating 35 proteins that are activated throughout the acetate adaptation process. The conversion in batch 2 displays a less than positive temperature gradient because the temperature is kept constant for 30℃. The optimal temperature for 6 days is 30℃, according to the statistics above.

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Conclusion-

Based on the above experimental results and past research, it has been determined that a temperature of 30℃, a pH of 6, and a positive temperature gradient for 6 days provides the best conversion. Each variable is examined while the other parameters remain constant, and the optimum parameter for citric acid is determined to be 30 ℃ and Ph 6.

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