A COMPARITIVE STUDY ON RATES OF FERMENTATION OF SOME SELECTED SAMPLES (WHEAT FLOUR,GRAM FLOUR,RICE FLOURAND POTATO)

Project submitted for the award of Degree of
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In the Deparment of Chemistry

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BONAFIDE CERTIFICATE

Certified that this project STUDY and analysis of mutual funds is the Bonafide work of Ravuri Babu Rao (Y193099008), KANDE JAGADEESH (Y193099006), M Balakotaiah (Y193099014), Nukathoti Sudharani (Y193099015), T. Siva Prasad (Y193099016), who carried out the project work under my supervision.

Supervisor

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DECLARATION

I, here by declare that this project work entitled "A Comparitive Study on Rates of Fermentation of some Selected Samples (Wheat Flour, Gram Flour, Rice Flour and Potato)*" is the Original work done by me and it has not been submitted for any Diploma or Degree of any other University.*

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AIM:

To compare the rate of fermentation of some selective samples of wheat flour, gram flour, rice flour and potato using yeast.

OBJECTIVE

The purpose of the experiment is - to compare the rate of fermentation of the some selective samples of wheat flour, gram flour, rice flour and potatoes.

We have interested in this idea when we saw some experiments on fermentation and wanted to find out some scientific facts about fermentation. The primary benefit of fermentation is the conversion of sugars and other carbohydrates, e.g., converting juice into wine, grains into beer, carbohydrates into carbon dioxide to leaven bread, and sugars in vegetables into preservative organic acids.

INTRODUCTION

Fermentation typically is the conversion of carbohydrates to alcohols and carbon dioxide or organic acids using yeasts, bacteria, or a combination thereof, under anaerobic conditions. A more restricted definition of fermentation is the chemical conversion of sugars into ethanol. The science of fermentation is known as zymology. Fermentation usually implies that the action of microorganisms is desirable, and the process is used to produce alcoholic beverages such as wine, beer, and cider. Fermentation is also employed in preservation techniques to create lactic acid in sour foods such as sauerkraut, dry sausages, kimchi and yoghurt, or vinegar for use in pickling foods.

History: Since fruits ferment naturally, fermentation precedes human history, since ancient times, however, humans have been controlling the fermentation process. The earliest evidence of winemaking dates from eight thousand Years ago in Georgia, in the Caucasus area. Seven thousand years ago jars containing the remains of wine have been excavated in the Zagros Mountains in Iran, which are now on display at the University of Pennsylvania .There is strong evidence that people were fermenting beverages in Babylon circa 5000 BC, ancient Egypt circa 3150 BC, pre-Hispanic Mexico circa 2000 BC, and Sudan circa 1500 BC. There is also evidence of leavened bread in ancient Egypt circa1500 BC and of milk fermentation in Babylon circa 3000 BC. French chemist Louis Pasteur was the first known zymology's, when in 1854 he connected yeast to fermentation. Pasteur originally defined fermentation as "respiration without air". Contributions to biochemistry

When studying the fermentation of sugar to alcohol by yeast Louis Pasteur concluded that the fermentation was catalyzed by a vital force, called "ferments," within the yeast cells. The

"ferments" were thought to function only within living organisms. "Alcoholic fermentation is an act correlated with the life and organization of the yeast cells, not with the death or putrefaction of the cells, "he wrote nevertheless, it was known that yeast extracts ferment sugar even in the absence of living yeast cells. While studying this process in 1897, Eduard Buchner of Humboldt University of Berlin, Germany, found that sugar was fermented even when there were no living yeast cells in the mixture , by a yeast secretion that he termed zymase. In 1907 he received the Nobel Prize in Chemistry for his research and discovery of "cell-free fermentation."One year prior, in 1906, ethanol fermentation studies led to the early discovery of NAD+. Uses Food fermentation has been said to serve five main purposes:

1. Enrichment of the diet through development of a diversity of flavors, aromas, and textures in food substrates
2. Preservation of substantial amounts of food through lactic acid, alcohol, acetic acid and alkaline fermentations
3. Biological enrichment of food substrates with protein, essential amino acids, essential fatty acids, and vitamins
4. Elimination of ant nutrients.
5. A decrease in cooking times and fuel requirements Risks of consuming fermented
6. Foods that is improperly fermented has a notable risk of exposing the eater to botulism.

Alaska has witnessed a steady increase of cases of botulism since 1985. Despite its small population, it has more cases of botulism than any other state in the United States of America. This is caused by the traditional Eskimo practice of allowing animal products such as whole fish, fish heads, walrus, sea lion and whale flippers, beaver tails, seal oil, birds, etc., to ferment for an extended period of time before being consumed. The risk is exacerbated when a plastic container is used for this purpose instead of the old-fashioned method, grass-lined hole, as the botulinum bacteria thrive in the anaerobic conditions created by the air-tight enclosure in plastic.

Safety of Fermented Foods

Fermented foods generally have a very good safety record even in the developing world where the foods are manufactured by people without training in microbiology or chemistry in unhygienic, contaminated environments. They are consumed by hundreds of millions of people every day in both the developed and the developing world. And they have an excellent safety record. What is there about fermented foods that contribute to safety? While fermented foods are themselves generally safe, it should be noted that fermented foods by themselves do

not solve the problems of contaminated drinking water, environments heavily contaminated with human waste, improper personal hygiene in food handlers, flies carrying disease organisms, unfermented foods carrying food poisoning or human

Pathogens and unfermented foods, even when cooked if handled or stored improperly. Also improperly fermented foods can be unsafe. However, application of the principles that lead to the safety of fermented foods could lead to an improvement in the overall quality and the nutritional value of the food supply, reduction of nutritional diseases and greater resistance to intestinal and other diseases in infants.

Theory

Wheat flour, gram flour, rice flour and potatoes contain starch as the major constituent. Starch present in these food materials is first brought into solution. in the presence of enzyme diastase, starch undergo fermentation to give maltose.

Starch gives blue-violet colour with iodine where as product of fermented starch does not give any characteristic colour. When the fermentation is complete the reaction mixture stops giving blue-violet colour with iodine solution. By comparing the time required for completion of fermentation of equal amounts of different substances

Containing starch the rates of fermentation can be compared. The enzyme diastase is obtained by germination of moist barley seeds in dark at 15 degree Celsius .When the germination is complete the temperature is raised to 60 degree Celsius to stop further growth. The seeds are crushed into water and filtered. The filtrate contains enzyme diastase and is called malt extract.

EXPERIMENTAL ASPECTS

MATERIALS REQUIRED

1. Conical flask
2. Test tube
3. Funnel
4. Filter paper
5. Water bath
6. 1 % Iodine solution
7. Yeast
8. Wheat flour
9. Gram flour
10. Rice flour
11. Potato
12. Aqueous NaCl solution

PROCEDURE

Take 5 gms of wheat flour in 100 ml conical flask and add 30 ml of distilled water. Boil the contents of the flask for about 5 minutes. Filter the above contents after cooling; the filtrate obtained is wheat flour extract. To the wheat flour extract. taken in a conical flask. Add 5 ml of 1% aq. NaCl solution. Keep this flask in a water bath maintained at a temperature of 50-60 degree Celsius. Add 2 ml of **malt extract**. After 2 minutes take 2 drops of the reaction mixture and add to diluted iodine solution. Repeat step 6 after every 2 minutes. When no bluish colour is produced the fermentation is complete. Record the total time taken for completion of fermentation. Repeat the experiment with gram flour extract, rice flour extract, potato extract and record the observations

OBSERVATIONS

Time taken for the fermentation of the selected samples have been mentioned below

1. Wheat flour -- 10 hours
2. Gram flour -- 12.5 hours
3. Rice flour -- 15 hours
4. Potato -- 13 hours

Rate of Fermentation of the four samples is in the following order

Wheat flour > Gram flour > Potato > Rice flour

CONCLUSIONS

The difference in rate of fermentations in the four selected samples may be due to the different ability to undergo fermentation in presence of the enzyme diastase of the malt added. The composition of the carbohydrate perhaps might have effected differently on the rates of fermentations.

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