ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 2, March 2016

CYANIDE REMOVAL IN SAGO STARCH USING OZONATION

D.Ranjith[a], and P.A.Balakrishnan[b]

[a]Department of Chemistry, [a]Bharathiyar Institute of Engg. For Women, Deviyakurichi – 636112, Tamilnadu, India.
[b]Department of EEE, Sri Ranganathar Institute of Engineering and Technology, Coimbatore, Tamilnadu, India.
[a]**Corresponding author**: raninorg09@gmail.com.

ABSTRACT

Sago starch and its finished products are used as food, animal feed and as raw material for several industrial products. Starch is considered as the cheapest source of Carbohydrates among the cereals, tubers and root crops and is a staple diet in many parts of Africa, South America & Asia. India is one of the leading countries in starch production. Manufacturing process of starch from tapioca starch involves peeling, washing, rasping, screening, dewatering, drying, pulverization, dry screening and packing. Tapioca Starch, like other foods, also has antinutritional and toxic factors. Of particular concern are the cyanogenic glucosides of cassava (linamarin and lotaustralin). These, on hydrolysis, release hydrocyanic acid (HCN). The presence of cyanide in tapioca is of concern for human and for animal consumption. The concentration of these antinutritional and unsafe glycosides varies considerably between varieties and also with climatic and cultural conditions. Selection of Tapiaco species to be grown, therefore, is quite important. Once harvested, bitter cassava must be treated and prepared properly prior to human or animal consumption, while sweet cassava can be used after simple boiling. Our present study involves in the application of ozone in Cyanide removal from sago starch by without causing any harmful byproducts.

Keywords: Starch**,** Ozonation, Cyanide, pH.

1. INTRODUCTION

Ozone is a pale blue gas, slightly soluble in water and much more soluble in inert non-polar solvents such as carbon tetrachloride or fluorocarbons, where it forms a blue solution. Most people can detect about 0.01 ppm of ozone in air where it has a very specific sharp odor. Ozone is one of the strongest oxidizing agent's known, exceeded in electronegative oxidation potential by F_2 and the oxygen atom, far stronger than O_2. Ozone is formed from oxygen in a strongly endothermic reaction and decomposes easily into molecular and atomic oxygen, with a half-life of about half an hour in atmospheric conditions.

There are numerous application areas of ozone in the industry such as Cyanide removal, bleaching, food surface hygiene (1), sanitation of food plant equipment, waste water treatment (2) and lowering biological oxygen demand (BOD) and chemical oxygen demand (COD) of food plant waste.

Only few researches were made with respect the cyanide removal using ozone.

Some of the applications of ozone related to cyanide removal are as follows.

1. It is used in the treatment of gold and silver cyanidation process (3),
2. It is used in the removal of cyanide from aqueous solutions in mining and metallurgical Effluents (4).

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3. It is used in the removal of cyanide from Sago Starch waste water (5).

Some research work is made on the removal of cyanide from sago waste water. We mainly focused on removal of cyanide from sago starch during the manufacturing process of starch itself.

2. EXPERIMENT

Figure 1. Experimental Set up

Figure 2. Cyanide & pH Measurement

The Ozone is generated through ozone generator which works under the principle of corona discharge method. The sample starch was taken in a container. For every one Kilogram of Starch three liters of water are added. Before ozone treatment the sample was filtered with fine mesh clothes to remove the suspended dust impurities. The outlet of the container was connected with the pump input. Delivery side of the pump was connected with the venture system (Figure 1). Oxygen is used as feed gas for Ozone. The Ozone gas generated from the ozone generator was injected in the sample through venture system. Concentration of Cyanide was monitored by using Cyanide Testing Kit and pH of the starch using pH meter (Figure 2).

3. RESULT AND DISCUSSIONS

Contents	O_3 Concentration Gms/Hr	Concentration of Cyanide mg/Kg	
		Initial	Final
Sample 1	1.66	15	10
Sample 2	3.2	10	6
Sample 3	4.98	6	2

The pH of the diluted starch sample was monitored at the initial stages of before ozone treatment, middle and final stages of ozone treatment. We found that only slight changes in pH occur.

After every one hour of the ozone treatment the sample was taken in a container and it was allowed to settle for few hours. After few hours the starch settles at the bottom. Then the starch was removed from the container.

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Then the wet starch was tested for Cyanide using cyanide testing kit. From the results (Table 1) of the cyanide test, we found that there was a remarkable decrease in the cyanide content of the starch.

4. CONCLUSIONS

From the above studies, we conclude that ozone reduces the cyanide content of the starch without affecting its original properties. Similarly this Ozone bleaching reaction does not involves in the formation of any other byproducts. Thus we can produce ecofriendly starch with high purity.

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