PDF - COMPARATIVE ANALYSIS OF SODIUM HYDROXIDE, CHLORINE AND DILUTION EFFECTS ON CASSAVA WASTEWATER CYANIDE REMOVAL - researchcub.info**ABSTRACT**

This project, compared three different oxidizing agents in thereduction of cyanide content of cassava wastewater in order to facilitatecassava wastewater degradation. Analysis of Variance was used to verify ifthere is a significant difference on their rates of reaction with cyanide. Asecond test using the Scheffé law was carried out to further investigate whichof them reacts faster with cyanide if at all there is a significant differenceon rates of reaction of Sodium Hydroxide, Chlorine and Water with cyanide. Someparameters like BOD_5, Cyanide, COD and Coliform were analyzed alsoto support the investigation. From the results of the analysis, it can be concludedthat Sodium Hydroxide (NaOH) is a better oxidizing agent for cassava wastewaterpre – treatment since it results in greater removal of BOD_5.

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1.1 Background Of The Study
Wastewater is categorized according to the source of dischargelike domestic wastewater,

industrial wastewater, sanitary wastewater etc. Theeffluent from industries is known as industrial wastewater and is noticed inall industries, leather industries, textile industries, paper industries,chemical industries, steel industries (Chanlett, 1979). In 1961 approximately69 percent of all industries discharged their wastes into municipal sewers andmost of these did not provide any treatment at all (Chanlett, 1979). Somestandard methods for sampling, analyzing, reporting and testing industrialwastewater have been developed over the years by international bodies like theAmerican Society for Testing Materials (ASTM) committee. There are seven basiccategories of industrial wastewater use, namely steam generation, heattransfer, solvent action, raw materials, nuclear energy and kinetic energy.Wastewater treatment has posed a very pressing problem in both rural and urbancities especially in our country Nigeria.

Owing to change in technology, population and mode ofliving, the effects of various physical, chemical and biological factors on thetreatment of the wastewater has been deemed necessary to review. It isequally pertinent to explore the effect of cyanide on the degradation ofcassava wastewater. Since cassava, together with its various associatedproducts, is the most widely used stable food in many parts of the country, muchwaste is generated during cassava processing. The environmental effect ofthe cassava wastewater therefore should be taken into account because a greaterpart of the wastewater generated during the process will turn into domesticwaste while others will percolate into the soil. Cassava wastewater is aninevitable substance released during cassava starch processing. They are eithera by – product of initial production process, or they arise when the cassavatubes are indiscriminately discharged to a nearby water body. Of course, alarge percentage of African dwellers use cassava tubers as food when processedin different forms depending on the specie. During cassava starch production,large amounts of cyano – glycosides are released and hydrolyzed by plant borneenzymes, leading to Cyanide concentration in the wastewater as high as 200mg/l.If this cassava wastewater is not properly treated to eliminate the cyanide andis discharged indiscriminately, an acute health condition can result due to thetoxicity of the cyanide. Thus, the treatment of the cassava wastewater has tobe efficiently done before discharging it to a nearby stream or river sincemost communities in Africa (Nigeria in particular) produce large quantities ofcassava wastewater as a result of the use of the cassava for food.

Cyanide is a substance that is formed in combination with otherchemicals in the environment. It refers to the CN^{-} anionradical. Compound that release cyanide can be inorganic or organic in nature,but the one present in cassava wastewater is free and organic in nature. Ofthese compounds, the one people are most likely to come into contact with are:Hydrogen cyanide, Sodium cyanide and Potassium cyanide. Hydrogen cyanideis a colourless gas or liquid with a faint bitter almond odour. Sodium cyanidesand Potassium cyanide are both colourless solids that have a slight odour ofbitter almonds in damp air.

Cyanide can be man – made or free naturallyoccurring substance. They are found in a number of foods which includes:cassava, sweet potatoes, yams, maize, millet, bamboo, sugarcane, peas and beansas well as kernel of almond, lemon, lime, apple, pear, cherry, apricot, andplum. Examples of cyanides levels measured in selected foods include:0.001 to 0.45µg/g for say protein products, 1mg/l for cassava and 0.1 to 3mg/lfor lima beans. The presence of cyanide in food of plant origin has beenattributed to natural production within the plants and uptake from thesurrounding.

Free cyanide is found in cassava wastewater. During degradationof cassava wastewater, the presence of this free Cyanide inhibits theactivities of micro – organisms that degrade cassava wastewater. Degradation ofcassava wastewater simply means the breaking down of cassava wastewaterinto simpler molecule by micro – organisms such as pseudomonas. It can beaerobic or anaerobic. Pseudoalaligenes breaks cyanide into carbondioxide andammonia, cyanide can also be broken down by oxidation into cyanate and nitrogenby ozone.

1.1.1 Effects Of Cassava Toxic Chemicals On Nigerians

Although it was concluded that despite the pathologicalconditions in Nigerian, cases of Tropical Ataxic Neuropathy(TAN) are similar tothose observed else where, it is not justifiable to assume that those representclinical variants of the same disease. Since, when a diet is poor, multiplenutritional deficiencies usually occur together although one single factor manyexercise overriding influence in association with others that combines toproduce the final picture. TAN was observed to be prevalent in areas of intensecultivation of cassava, high frequency of cassava consumption, and highthiocyanate levels. The disease was rare among 1 – 10 years old, and althoughit tended to run in some families, there was no evidence to indicate it wasgenetically inherited. In one village, the average incidence was 3%, but was 8%among those 50 – 60 years old. Goiter was observed to be 2% – 5% higher amongpatient with TAN. It has been observed that certain local cassava preparationsuch as purupuru may contain 50mg of cyanide per 3kg of product compared to alethal dose of 60mg. There is no inverse relationship observed between iodinecontent of drinking water and incident of goiter in areas where TAN occurs. Asurvey revealed a high correlation between intake of dry, smoked, unfermentedcassava and goiter incidence. Kwashiorkor among children is another conditionthat may result form cassava dependency due to imbalance.

1.2 STATEMENT OF THE PROBLEM

As the activities of man undoubtedly results in the accumulationof wastes, our concern therefore is to drastically reduce, treat and ifpossible eliminate completely the danger imposed by the discharge of thesewastes. Pollution caused by cassava wastewater is a threat to life and needurgent attention, if not properly treated before disposal. Cyanide in cassavawastewater has ability to cause significant social disruption and demandsspecial

attention to public health preservation. Exposure to highconcentrations of cyanide can cause death within seconds to minutes. Hence thisresearch on how to reduce or if possible eliminate completely, the dangerimposed by the discharge of this wastewater.

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