CHAPTERONE

INTRODUCTION

Due to the rapidurbanization and industrialization the municipality water and industrialeffluent water are contaminated with the presence of organic compounds as wellas inorganic compounds. Organic compounds originate from domestic sewage, urbanrun-off, industrial effluents and agriculture wastewater. These organiccompounds are released as industrial effluent from palm oil refineries, pulpand paper mills, chemical spills, pharmaceuticals, and agricultural pesticides.Organic pollutants are present in the waste water as pesticides, fertilizers,hydrocarbons, phenols, plasticizers, biphenyls, detergents, oils, greases,pharmaceuticals, proteins and carbohydrates [Ali et al., 2012; Berrios, 2012;Crini, 2005]. Wastewater with organic pollutants contains large quantities ofsuspended solids which reduce the photosynthesis due to light availability tophotosynthetic organisms and on settling out alter the characteristics of theriver bed. During the decomposition process of these organic compounds thedissolved oxygen in the water may be consumed at a greater rate so that it canbe replenished, also causing oxygen depletion and having several consequencesfor the water stream [Ali et al., 2012].

Toxic organicpollutants cause several problems to our environment. These are most commonpollutants of great concern because of their toxicity, persistence, long-rangetransportability and bioaccumulation in animals [Burkhard and Lukasewycz, 2008;Ali et al., 2012], and travel long distances and persists in living organisms.Pollutants are carbon-based chemical compounds and mixtures that includeindustrial chemicals such as heavy metals, dyes, and phenolic compounds.

In Organicpollutants, the phenolic compound is one of the major pollutants present inwastewater. The commercial production of a wide variety of resins occur byphenol as a source material. The phenolic resins, which are used asconstruction materials for automobiles and appliances, epoxy resins andadhesives, and polyamide for various applications. Phenolic compoundscontaining waste water comes from certain industries, like high-temperaturecoal conversion, petroleum refining, resin, and plastics, etc. Such aromatichydroxyl compounds are considered as priority pollutants since they are harmfulto organisms especially human as well as aquatic life, at low concentrationsalso it can be toxic when elevated present levels and are known or suspected tobe carcinogens [Ozkaya, 2006].Due to these unacceptable effects of the phenoliccompound in water the World Health Organization (WHO) has set an upperpermissible limit of 1mg/l to regulate the phenol concentration in drinkingwater [WHO report, 2010]. To deal with the problem, we need to treat thewastewater and reuse it instead of leaving that as such. Dyes consider asanother type of organic pollutants. The textile, pulp, and paper industries arereported to utilize large quantities of a number of dyes; these pollutants maybe found in wastewaters of many industries generating considerable amounts ofcolored wastewaters, toxic and even carcinogenic, posing a serious hazard toaquatic living organisms [Roozbeh et al., 2013]. Dyes are one of the problematicgroups; they are emitted into wastewater from various industries, mainly fromthe dye manufacturing and textile finishing and also from food colouring,cosmetics, papers and carpet industries. It is well known that the dyeeffluents from dyestuff manufacturing and textile industries may exhibit toxiceffects on microbial populations. It can be toxic and carcinogenic to themammalian animal. Most dyes used in textile industries are stable to light andare not bio-degradable. Furthermore, they are resistant to aerobic digestion[Ardejani et al., 2007].

Dyes are a group ofcomplex materials which enter the environment due to various processes likedynamic and completion in textile industry. Concerning usage, they are dividedinto different types of watt, reactive, direct, cationic, and disperse (AlMomani, 2002; Xu, 2004). High production and use of dyes generates colouredwastewater and pollute the environment. Textile, paper and food industries,tanneries, electroplating factories discharge colored wastewater (Mckay, et,al.1998). Dye being one of the recalcitrant, persist for long distances in flowingwater, retards photosynthesis, inhibit growth of aquatic biota by blocking outsunlight and utilizing dissolved oxygen. Some dyes may cause allergic dermatitis,skin irritation, cancer and mutation in man. Dyes also prevent lightpenetration and reduce photosynthesis activities of water streams and disturbaquatic equilibrium. Methylene blue (MB) is the most common among all otherdyes of its category. It is generally used in dying textile specially cottonand silk and in some medical treatments'. Through MB is not strongly hazardousit can cause some harmful effects. It can cause eye injury for both human andanimals. On inhalation, it can give rise to short periods of rapid or difficultbreathing while ingestion through the mouth produces a burning sensation andmay cause nausea, vomiting, profuse sweating, diarrhea, gastritis, mentalconfusion and methemoglobineamia. Acute exposure to MB can cause increasedheart rate, vomiting, Heinz body formation, cyanosis, jaundice, quadriplegiaand tissue necrosis in humans. Textile industries produce wastewater withdifferent chemical quality and quantity due to diversity of consumed dyes andproduction method. In these industries, a huge amount of coloreful wastewateris produce that is usally poisonous, resistant to biodegradation andsustainable in environment; thus, common biological methods aren't effectivefor removing almost all synthetic dyes due to complex chain structure and dyesustainable nature (Ledakowiez, 2001; Dincer, 2007). Studies has shown thattextile wastewater has low BOD/COD ratio (0.1) which is resulted fromnon-biodegradability of dyes (Chao, 2002). Discharge of colorful wastewaterresulted from textile industries to receiving waters will result in reducedpenetration of sunlight, occurrence of eutrophication and interference withreceiving water ecology; in addition to decrease photosynthesis of aquaticplants and algae in aqueous environment, it damages environment (Arsian, 200o;sauer, 2002; Nilson, 2006). To remove dyes from wastewater, physical, chemical,biological or compound methods can be used. Since dyes are susceptiblebio-degradation, physical and chemical methods like flocculation-coagulation,surface absorption, chemical oxidation and membrane process are used (Lopez2004; Tang 2004). Out of various activities in textile industry, they dischargea large variety of dyes and chemicals addition that makes the environmentalchallenge for textile industry not only liquid waste but also in its chemicalcomposition. Main pollution in textile wastewater came from dyeing andfinishing processes. These processes require the input of a wide range ofchemicals and dyestuff, which is generally are organic compound of complexstructure. Because all of them are not contained in the final product, becomewaste and it affect the aquatic ecosystem in number of ways such as depletingthe dissolved oxygen content or settlement of suspended substances aerobic aswell as anaerobic condition. The major pollutants in textile waste are highsuspended solid, COD, heat, color, acidity and other soluble substances, mostdyes used in textile industries are stable to light and not biologicallydegradable. Furthermore, they are resistant to aerobic digestion. Manyreseachers have studied the applicability of low cost alternative materialslike saw dust, coir pith, olive stone, pine bark, coconut shell, tropical grassalmond shells e.t.c as carbonaceous precusors from the removal of dyes fromwastewater (Arivoli, et al. 2007; sekar, et, al. 1995;Selvani, et al. 2000). Asynthetic dye in wastewater cannot be efficiently decolorized by traditionalmethods. This is because of the high cost and disposal problems for treatingdye wastewater at large scale industries. As earlier stated; adsorption is themost effective method of dyes removal technique using low cost adsorptions asit will be received in next section. Adsorption is well known equilibriumseparation process for water decontamination applications. Adsorption has beenfound to be superior to other techniques for water reuse in terms of initialcost, flexibility and simplicity and simplicity of design and use of separationas review. A researcher studies the adsorption of Congo red on Neem leaf littershowed the highest adsorption capacities compared to any other adsorbents. Itwas observed that the adsorbent is effective for the removal of anionic dyes ina wastewater treatment process.The present study undertaken to evaluate theefficiency of unactivated carbon from cassava fiber as an adsorbent for theremoval of methylene blue dye from aqueous solution.

1.2PROBLEM STATEMENT (HARMFUL EFFLUENTS) EXPENSE

A lot of research hasbeen reported for adsorption of dye using activated carbon from various lowcost materials. Usually, activated carbon prepared from teak leaf, maize corn,baboon tree bark, coir pith, & sun flower stalks. In industries such as rubber,plastics, printing leather etc., there is a waste strem (mostly aqueoussolution). The waste generation in this case is inevitable but the problem nowis how to depose off this waste without altering the normal condition. Thisresearch aims at making wastewater treatment more economical and environmentalfriendly by using manihot esculanta as adsorbent. This study show

How to reduce thecost of this treatment process

The possibility todetermine the maximum adsorptive capacity

To determine thecontact time

How reliable is thisadsorbent compared to other adsorbent in use.

1.3JUSTIFICATION OF STUDY

The study makesavailability of cheap and compitative and it also brings about low cost orcheaper to reduces expensive or increase profit.

1.4RESEARCH AIM AND OBJECTIVES

The main aim of thiswork is to investigate the modeling process in the adsorption of methylene blueusing unactivated carbon from cassava fiber.

The objectives of thestudy are as follows

To determine themodeling of particles size of cassava fiber on the adsorption

To determine thefactor that affect cassava fiber

To determine the time

To determine theproperties of the adsorbent

1.5SCOPE OF STUDY

This study is toinvestigate the modeling of kinetic batch adsorption of methylene blue using unactivatedcarbon from cassava fiber.

MODELING OF KINETIC BATCH ADSORPTION OF METHYLENE BLUE USING UNACTIVATED CARBON FROM CASSAVA FIBER

Regards!!!