PHILIPPINE SCIENCE HIGH SCHOOL WESTERN VISAYAS
Doña Lawaan H. Lopez Campus
Iloilo City

PRODUCTION OF ACTIVATED CARBON UTILIZING CORN COBS AND CHICKEN FEATHERS

A Research Paper Presented to the
Faculty of Philippine Science High School Western Visayas
Iloilo City

In Partial Fulfillment
of the Requirements in
Science Research II

By

John Andrew T. Camposano
Charisse Marie O. Seguera
Regie S. Taytayon

March 2001

PHILIPPINE SCIENCE HIGH SCHOOL WESTERN VISAYAS

Doña Lawaan H. Lopez Campus
Iloilo City

PRODUCTION OF ACTIVATED CARBON UTILIZING

CORN COBS AND CHICKEN FEATHERS

APPROVAL SHEET

A Research Paper Requirement

for Science Research II

By:

John Andrew T. Camposano
Charisse Marie O. Seguera
Regie S. Taytayon

Approved by the Research Committee:

MARVIN L. CADORNIGARA, Adviser/Chairperson

YZ V. BARRIENTOS, Member

ROSE ELIZABETH A. ESPINOSA, Member

ROWENA R. MAGNO, Member

PROF. REBECCA V. YANDOG
Director

March 2001

PHILIPPINE SCIENCE HIGH SCHOOL WESTERN VISAYAS
Doña Lawaan H. Lopez Campus
Iloilo City

ACKNOWLEDGEMENT

The researchers would like to extend their unending gratitude and appreciation to the following:

Mr. Marvin Cadornigara, research adviser, for the time, patience and guidance he had afforded the research.

The PSHSWV faculty and staff, especially Ms. Yz Barrientos, Mrs. Rose Elizabeth Espinosa, and Ms. Rowena Magno, our research panelists, for the superior intellect and logic they have shared to draw out the genius in our research.

Mr. Leo Pedregosa, for his generous support and understanding in the statistical scope of the research.

The class of IV - Graviton, especially Claudette Mae Cordero, Monalisa Sunio, Rowena Zabala, Daystar Sedillo and Lorie Therese Locara for the ingenious brilliance that kept our mental normalcy and got us through.

Our parents, for the unending support and unquestioning love.

The Almighty, without whom all our efforts and this study would have not for naught.

John Andrew T. Camposano

Charisse Marie O. Seguera

Regie S. Taytayon

Researchers

March 2001

PHILIPPINE SCIENCE HIGH SCHOOL WESTERN VISAYAS
Doña Lawaan H. Lopez Campus
Iloilo City

Camposano, John Andrew T.; Seguera, Charisse Marie O.; Taytayon, RegieS.; "production of Activated carbon from Corn cobs and Chicken feathers." Unpublished Research Paper. Philippine Science High School Western Visayas, Iloilo City, March 2001.

Abstract

This study aimed to produce activated carbon from corn cobs and chicken feathers. It also aimed to determine the feasibility of corn cobs and chicken feathers as raw materials for activated carbon production. Furthermore, it sought to determine and compare the Methylene Blue adsorption values of the different concentrations of corn cobs and chicken feathers. It was hypothesized that there is no significant difference in the Methylene Blue values of the different ratios of corn cobs and chicken feathers. The independent variables of this study were the different ratios of corn cobs and chicken feathers, while the dependent variables were the Methylene Blue values of corn cobs and chicken feathers. The positive test control was the commercial activated carbon, Diatabs. The study was conducted in the Science Research Laboratory of the Philippine Science High School Western Visayas Campus. Three replicates prepared for greater accuracy in the analysis of the data. The One-way Analysis of Variance (ANOVA), set at 0.05 alpha level of significance, was employed to determine the significant differences in the Methylene blue adsorption values of the activated

carbon produced from three preparations and the commercial activated carbon.

This study disclosed that corn cobs and chicken feathers, when used as raw materials for the production of activated carbon, was feasible. It was noted that the 25 % corn cob: 50% chicken feather ratio of activated carbon achieved the highest value, while the commercial activated carbon attained the lowest, making it the most proficient adsorber. Nevertheless, tests showed that the produce activated carbon did not vary significantly with Diatabs and with each other, showing that they may be substituted with each other without affecting their observed degree of effectiveness.

TABLE OF CONTENTS

Chapter 1		Page
1	INTRODUCTION TO THE STUDY	1
	Background of the Study	1
	Statement of the Problem and the Hypothesis	2
	Significance of the Study	4
	Definition of Terms	5
	Scope and Delimitation of the Study	6
2	REVIEW OF RELATED LITERATURE	8
	Carbon	8
	Charcoal	9
	Corn	10
	Feathers	12
	Adsorption	13
	Summary	13
3	RESEARCH DESIGN AND METHODOLOGY	14
	Research Design	14
	Materials and Equipment	15
	Site of Experimentation	15
	Gathering of Materials	15
	Production of Char	15
	Activation of Char	16
	Testing of Activated Carbon Products	16
	Statistical Data Analysis	17

4 RESULTS 19

Production of Activated Carbon from Corn Cobs and Chicken Feathers 19

Methylene Blue Values of Activated Carbon products 19

Difference in the Methylene Blue values of the different ratios of Corn cobs and Chicken feathers 20

5 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS 22

Findings 22

Conclusions 23

Recommendations 23

REFERENCES 25

List of Tables

Table | Page

Chapter 4

1 Means of the Methylene Blue Values of the different ratios of corn cobs and chicken feathers compared with the commercial activated carbon 20

2 One-Way ANOVA of the differences in the Methylene Blue values of the different activated carbon ratios 20

LIST OF FIGURES

Figure

Page

1 The Methylene Blue values of activated carbon from different ratios of corn cobs and chicken feathers, and the commercial activated carbon, Diatabs 3

PHILIPPINE SCIENCE HIGH SCHOOL WESTERN VISAYAS
Doña Lawaan H. Lopez Campus
Iloilo City

PRODUCTION OF ACTIVATED CARBON UTILIZING CORN COBS AND CHICKEN FEATHERS

Chapter 1

Introduction to the Study

In almost every corner of our society, garbage is seen, smelled and felt. It had caused many diseases that burden and harm thousands of Filipinos every year. This problem has prompted the government to launch programs concerning waste disposal. Some of which are anti-littering campaigns, garbage collection, development of dumping areas and, of course, recycling.

Of the many methods of garbage disposal, recycling is one, which we should practice. In consonance with this belief, the researchers opted to conduct a study that will utilize waste materials, specifically corn cobs and chicken feathers. Admittedly, these materials are already used as fuel as well as for decorative purposes. However, finding an alternative for these still usually wasted materials would be of help. Converting these materials to activated carbon is probably one of the better things to do about them.

Activated carbon is an amorphous carbon-based material obtained in residue from destructive distillation of various organic materials treated with heat, chemicals, and oxidizing gas to increase selective

adsorptive property. It is used in decolorization, refining, gas adsorption, deodorization and medicinal purposes.

In this study, the independent variable was the different ratios of corn cobs and chicken feathers that were carbonized to produce activated carbon. The dependent variables were the Methylene Blue values. The relationship of these variables is shown in Figure 1.

Statement of the Problem and Hypothesis

This study aimed to produce and analyze activated carbon obtained from corn cobs and chicken feathers.

Specifically, it aimed to:

1. produce activated carbon using 100% corn cobs, 75% corn cobs and 25% chicken feathers, 50% corn cobs and 50% chicken feathers, 75% corn cobs and 25% chicken feathers, and 100% chicken feathers.

2. determine the Methylene Blue values of the aforementioned ratios.

3. compare the Methylene Blue values of the aforementioned ratios.

It was hypothesized that there is no significant difference between the Methylene Blue values among the different ratios of corn cobs and chicken feathers used for the production of activated carbon.

INDEPENDENT VARIABLE

DEPENDENT VARIABLE

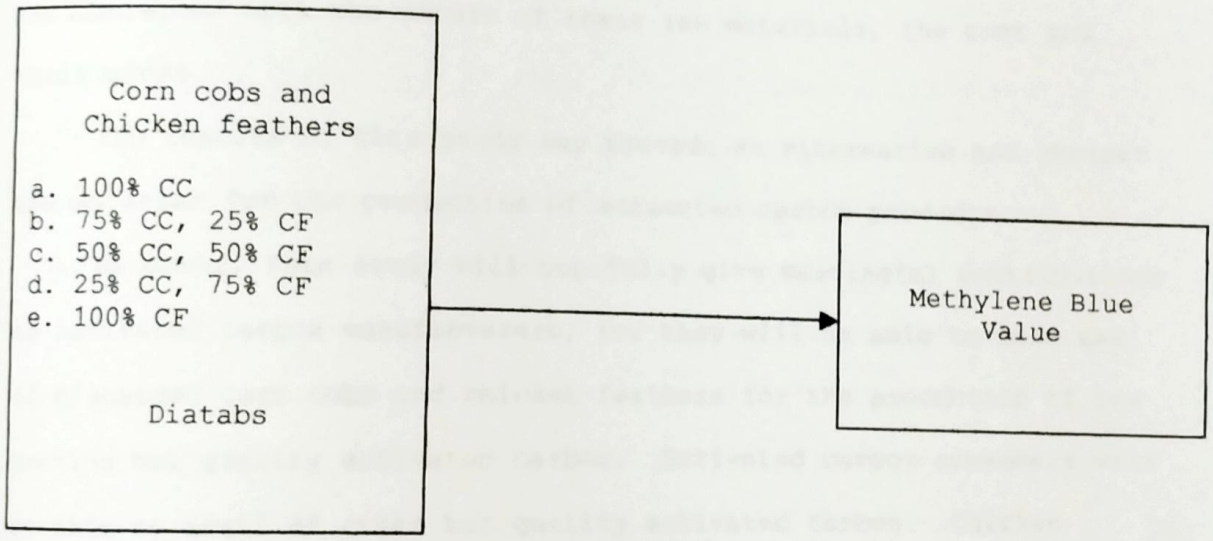

Figure 1. The Methylene Blue values of activated carbon from different proportions of corn cobs and chicken feathers, and the commercial activated carbon, Diatabs.

Significance of the Study

With the plunging value of the peso and the sky-rocketing cost of raw materials, manufacturers, specifically activated carbon producers, are concerned with the nature of their raw materials, the cost and their gross.

The results of this study may provide an alternative and cheaper raw material for the production of activated carbon products.

Moreover, this study will hopefully give meaningful contributions to activated carbon manufacturers, for they will be able to make use of discarded corn cobs and chicken feathers for the production of low costing but quality activated carbon. Activated carbon consumers will be able to avail of cheap but quality activated carbon. Chicken growers will find another use for chicken feathers, which is a waste material in the processing of chicken, and corn growers, another use for corn cobs which is a waste material in the growing and processing of corn products. Researchers in the field of energy utilization will be able to gather additional information on the development of this form of energy.

Definition of Terms

The conceptual and operational definitions of the key terms in this study may be of help to better understand this study:

Activated Carbon- is a highly adsorbent powdered or granular carbon or charcoal made usually by carbonization of carbonaceous material and chemical activation, and used chiefly for adsorbing gases, purifying syrups, improving undesirable colors and odors, and for solvent recovery (Webster's Third New International Dictionary, 1993).

In this study it was the product of the carbonized and activated corn cobs and chicken feathers.

Adsorption- is a taking up by physical or chemical forces of the molecules of gases, of dissolved substances or of liquids by the surfaces of solids or liquids with which they are in contact (Webster's Third New International Dictionary).

In this study, it was the quality measured to test the quality of the activated carbon produced.

Chicken feather- is one of the light, horny outgrowths that form the external covering of the body of a bird (Webster's New Encyclopedic Dictionary, 1993).

In this study, it was one of the raw materials that was charred and activated to produce activated carbon.

Corn cob- is the axis on which the kernels of Indian corn are arranged (Webster's Third new International Dictionary, 1993).

In this study, it was the other raw material that was charred and activated to produce activated carbon.

Methylene blue value- a measure used to evaluate the ability of the substances to decolorize (Webster's Third New International Dictionary).

In this study, it was the measure used to determine the decolorizing ability of the activated carbon produced.

Scope and delimitation of the Study

This study considered only the use of corn cobs and chicken feathers as the raw materials for the production of activated carbon. The different ratios were (a) 100% corn cobs, (b) 75% corn cobs and 25% chicken feathers, (c) 50% corn cobs and 50% chicken feathers, (d) 75% corn cobs and 25% chicken feathers, and (e) 100% chicken feathers.

The One-Spot Case Study was employed in this research study. The research design consisted of one group. It was exposed to a treatment and after which given a post-test. The commercial activated carbon, Diatabs was used as a positive control.

The mean and standard deviation were used as descriptive statistical tools. The One-Way ANOVA and Scheffe Test were used as inferential statistical tools.

The raw materials were gathered from different plantations and poultry farms, after which charred and activated. The finished product was then subjected to subsequent testing and analysis.

Manufacture of the product and subsequent testing were done at the PSHS-WV Research Laboratory, in a period of 3 months.

Chapter 2

Review of Related Literature

Chapter 2 is divided into 5 parts, namely: Carbon, which discusses the element, is the main component of the activated carbon to be produced in this study; Charcoal, the specific form of carbon to be produced; Corn, the plant from which the corn cobs, a component of the product of this study comes from; Feathers, which discusses the other component of the product of the study; Adsorption, the main use for activated carbon.

Carbon

Carbon is a nonmetallic element found widely in nature. The sixth most abundant element in the universe, carbon plays an essential role in the thermonuclear "burning" of hydrogen in the hotter stars. On earth, carbon is found mostly in native form and in compounds with other elements, making up about 0.2% by weight of the Earth's crust. The element is found in its purest form as diamond and graphite, in less pure form as constituent of natural coal, coke and charcoal (Grolier International Encyclopedia, 1991).

Carbon has the unique ability to link with other carbon atoms to form chains and rings. This property leads to an almost infinite

number of carbon compounds, the most common being those containing carbon and hydrogen. The first carbon compounds were identified in living matter in the beginning of the 19th century, and therefore the study of carbon compounds was called organic chemistry (Funk and Wagnalls New Encyclopedia, 1990).

Each of the forms of carbon has its own specific character; hence, each has its own particular application. All are products of oxidation and other forms of decomposition of organic compounds. Coal and coke for example, are used extensively as fuels; carbon is used as an adsorptive and filtering agent, as fuel, and in the manufacture of gunpowder. In addition to its uses in making inks, carbon papers, typewriter ribbons, and paints, carbon black is also used in tires to improve its wearing qualities (The New Encyclopedia Britannica, 1993).

Charcoal

Porous form of carbon is produced by heating organic materials such as wood or bones, in the absence of air. Wood charcoal is used as fuel, animal (bone) charcoal is used to adsorb gases or purify liquids (Larousse Desk Reference Encyclopedia, 1993).

Charcoal is a porous, solid product obtained when carbonaceous materials such as cellulose, wood, peat, or bituminous coal are partially burned in the absence of air. Charcoal was the chief fuel

used in blast furnaces, as well as in glassmaking, blacksmithing, and metalworking (Grolier International Encyclopedia, 1991).

Blackish residue consisting of impure carbon obtained by removing the volatile constituents of animal and vegetable substances. A porous solid, it burns without flame or smoke. It is obtained by the imperfect combustion of organic matter. Various kinds are produced from wood, sugar, bone and coal (21st Century Universal Encyclopedia, 1994).

The use of special manufacturing technique results in highly porous charcoals that have surface areas of 300-2000 sq. meters per gram. Those so-called active, or activated, charcoals are widely used to adsorb odorous or colored substances from gases or liquids, as in purification of drinking water, sugar, and many other products, in the recovery of solvents and other volatile materials, and in gas masks for the removal of toxic compounds from the air (The New Encyclopedia Britannica, 1993).

Corn

Corn is the cereal plant of the grass family Graminae. It is an annual, tall, with thick stalks and broad leaves. The male inflorescence is on top of the stalk, and the female inflorescence, which develop into the ear are enclosed in the leaves, called shucks

or husks, and occur along the sides of the stem. The white, yellow, or red central stalk, the cob (21st Century Universal Encyclopedia).

Corn was unknown on the New World during 1492, but the plant was extensively cultivated, in all its present forms, by the Indians of the North and South America. Seed grains of Indian maize, brought to Europe and Africa by 16th century explorers, were planted and thrived throughout most of the world. Since the 1930's, the development of the hybrid varieties of corn has resulted in greatly increased yields and improved quality. Today, corn is considerably larger in cob size and in the number and weight of the kernels than the corn grown by the Indians (Grolier International Encyclopedia, 1991).

Inedible parts of the corn plant are used in the industry. Stalks are made into paper and wallboard; husks are used as filing material; cobs are used for fuel, to make charcoal, and in the preparation of industrial solvents. Corn grain is processed by wet milling, in which the grain is soaked in a dilute solution of sulfurous acid; by dry milling, in which the corn is exposed to the water spray or steam; and by fermentation, in which cornstarch are changed to sugar, and yeast is employed to convert the sugar to alcohol (The New Encyclopedia Britannica, 1993).

Corn cobs are important sources of furfural, liquid used in manufacturing nylon fibers and phenol-formaldehyde plastics, refining wood resin, making lubricating oils from petroleum, and purifying

butadiene in the production of synthetic rubber. Ground corn cobs are used as a soft-grit abrasive. Large, whole cobs from a special kind of corn, 'cob pipe' corn, are used for pipes for smoking tobacco (Funk and Wagnalls New Encyclopedia, 1990).

Feathers

The typical feather consists of a central shaft (rachis) with serial paired branches (barbs) forming a flattened, usually curved surface-the vane. The barbs posses further branches, the barbules, and the barbules of the adjacent barbs are attached to one another by hook, stiffening the vane (The New Encyclopedia Britannica, 1993).

A feather is a specialized epidermal outgrowth unique to the birds. It is composed of pigments and keratin, a protein that constitutes horny substances such as hair, nail, claws, and hooves. Strong, lightweight and flexible, feathers cover and shape the bird's body, making flying possible, and serve as attractive displays in courtship and mating rituals, provide balance, protective coloration and insulation (Grolier International Encyclopedia, 1990).

Feathers have been used by humans in three principal ways, as writing complements, in upholstery and bedding, and as ornaments in clothing and costumes (Funk and Wagnalls Encyclopedia).

Adsorption

Adsorption is the process of taking up by the surface of a solid or liquid of the atoms, ions or molecules of a gas or other liquid. Porous or finely divided solids can hold more adsorbate because of the relatively large surface exposed (Funk and Wagnalls Encyclopedia, 1990).

It is the capability of all solid substances to attract to their surface molecules of gases or solution with which they are in contact. Solid that are used to adsorb gases or dissolve substances are called adsorbents; adsorbed molecules are usually referred to as the adsorbate. An example of an excellent adsorbent is the charcoal used in the gas masks to remove poisons or impurities from a stream of air (The New Encyclopedia Britannica, 1993).

Summary

The gathered literature listed above clearly supported the possibility of the production of activated carbon from corn cobs and chicken feathers. It also stated the importance of the use of activated carbon, which clearly sustained the significance of this study.

Chapter 3

Research Design and Methodology

This study aimed to produce and analyze activated carbon from corn cobs and chicken feathers, specifically, it aimed to produce activated carbon using 100% corn cobs, 75% corn cobs and 25% chicken feathers, 50% corn cobs and 50% chicken feathers, 75% corn cobs and 25% chicken feathers, and 100% chicken feathers. Also, it sought to determine and compare the Methylene Blue values of the aforementioned ratios.

It was hypothesized that there is no significant difference between the Methylene Blue values between samples.

Research Design

The One-Spot Case Study was employed in this research study. The research design consisted of one group. It was exposed to treatment and after which given a post-test. The commercial activated carbon, Diatabs was used as a positive control. In this study, the corn cob and chicken feathers, in their different ratios, were activated. The activated carbon was then tested for their Methylene Blue values.

The independent variable was the different ratios of corn cobs and chicken feathers. The dependent variable was the Methylene Blue values of the activated carbon products.

Chapter 3

Research Design and Methodology

This study aimed to produce and analyze activated carbon from corn cobs and chicken feathers, specifically, it aimed to produce activated carbon using 100% corn cobs, 75% corn cobs and 25% chicken feathers, 50% corn cobs and 50% chicken feathers, 75% corn cobs and 25% chicken feathers, and 100% chicken feathers. Also, it sought to determine and compare the Methylene Blue values of the aforementioned ratios.

It was hypothesized that there is no significant difference between the Methylene Blue values between samples.

Research Design

The One-Spot Case Study was employed in this research study. The research design consisted of one group. It was exposed to treatment and after which given a post-test. The commercial activated carbon, Diatabs was used as a positive control. In this study, the corn cob and chicken feathers, in their different ratios, were activated. The activated carbon was then tested for their Methylene Blue values.

The independent variable was the different ratios of corn cobs and chicken feathers. The dependent variable was the Methylene Blue values of the activated carbon products.

Methodology

Materials and Equipment

The materials used in this study were corn cobs, chicken feathers, KOH, Methylene Blue solution.

The equipment used in this study were the furnace, mortar and pestle, petri dishes, test tubes, stirring rod, pH meter, filter paper, colorimeter, and a digital top balance.

Site of Experimentation

The charring of corn cob and chicken feathers was conducted at Hamtic, Antique. Carbon activation and activated carbon testing were done at the Philippine Science High School Science Research Laboratory.

Gathering of Materials

The corn cobs and chicken feathers were obtained from corn plantations and poultry farms, respectively in Leon, Iloilo and Makato, Aklan.

Production of Char

The char produced using corn cobs and chicken feathers was of five (5) different ratios, each ratio was charred at a temperature of 400 °C for thirty (30) minutes, in the absence of air using a furnace.

After which, it was discharged and allowed to cool at room temperature. The char produced was then pulverized and screened.

Activation of Char

The pulverized char was placed in a covered crucible, then mixed with KOH, the activating agent, and charged into the furnace. The mixture was then heated at a controlled temperature for 10 minutes, then discharged and cooled at room temperature. The resulting sample was leached with hot water, boiled and filtered. The residue, the activated carbon, was washed with hot water until the washing is pH 7. The collected activated carbon was dried.

Testing of Activated Carbon Products

Methylene Blue Value (MB). The Methylene Blue value was measured by the colorimeter. About 2.0 g sample of activated carbon was placed in a stoppered glass flask. 3 mL of standard Methylene Blue solution was added to the sample. The activated carbon was allowed to adsorb the color of the Methylene Blue for two weeks. The adsorbance of the final solution was measured by the colorimeter. The Methylene Blue value sample was expressed as mg/g.

Statistical Data Analysis

Statistical tools were used to treat the data gathered from the study. The mean and standard deviation were used as descriptive statistical tools. The One-Way Analysis of Variance (ANOVA) and Scheffe Test were used as inferential statistical tools.

Descriptive Statistics

Mean. The mean was used to determine the average Methylene Blue values of the five (5) samples of each treatment and the commercial activated carbon.

Standard Deviation. To determine the dispersion of the Methylene Blue values of the means of the five samples for each of the five samples for each treatment and the commercial activated carbon, the standard deviation was used.

Inferential Statistics

One-way ANOVA. The One-Way Analysis of Variance (ANOVA), set at 0.05 alpha level of significance was employed to determine the significance of differences in the Methylene Blue values of the activated carbon produced from five preparations and the commercial activated carbon.

Scheffe Test. The Scheffe test, also at 0.05 level of significance, was run for post hoc multiple comparison test.

Chapter 4

Results

This study aimed to produce and analyze activated carbon from corn cobs and chicken feathers, specifically, it aimed to produce activated carbon using 100% corn cobs, 75% corn cobs and 25% chicken feathers, 50% corn cobs and 50% chicken feathers, 75% corn cobs and 25% chicken feathers, and 100% chicken feathers. Also, it sought to determine and compare the Methylene Blue values of the aforementioned ratios.

It was hypothesized that there is no significant difference between the Methylene Blue values between samples.

Production of Activated Carbon from Corn Cobs and Chicken Feathers

The activated carbon produced from corn cobs and chicken feathers showed effectiveness as shown by their Methylene Blue values.

Under each proportion, three samples were made of the activated carbon, each sample weighing 2 grams in total.

Methylene Blue Values of Activated Carbon Products

The Methylene Blue values of the different proportions of activated carbon products were measured by the adsorbance of the colorimeter. The adsorbance indicates the amount of color adsorbed by

the activated carbon; the lower the adsorbance, the greater the ability of the activated carbon to decolorize.

Among the different ratios of corn cobs and chicken feathers, the 25% corn cob: 50% chicken feather ratio of the activated carbon achieved the highest value at 0.707667. The lowest adsorbance value was acquired by the commercial activated carbon, Diatabs.

The results showed that the activated carbons produced are proficient adsorbers of Methylene Blue.

Table 1 shows the data.

Difference in the Methylene Blue values of the different ratios of Corn cobs and Chicken feathers

The One-Way ANOVA showed that there was no significant difference in the Methylene Blue values of the different ratios of corn cobs and chicken feathers, as reflected by F (5)= 0.325, $p > 0.05$.

Table 2 shows the data.

Table 1

Means of the Methylene Blue values of the different ratios of corn cobs and chicken feathers compared with the commercial activated carbon

Category	N	Mean	SD
Diatabs	3	0.01	0.0078
50% CC: 50% CF	3	0.384333	0.4392
75% CC: 25% CF	3	0.05	0.034
100% CC	3	0.132	0.059
25% CC: 75% CF	3	0.707667	0.850004
100% CF	3	0.308611	0.483681

Table 2

One-Way ANOVA of the differences in the Methylene Blue values of the different activated carbon ratios

		Sum of Squares	df	Mean Square	F	Sig.
Methylene Blue Value	Between Groups	1.256	5	0.251	1.306	0.325
	Within Groups	2.308	12	0.192		
	Total	3.564	17			

Chapter 5

Findings, Conclusions, and Recommendations

This study aimed to produce and analyze activated carbon obtained from corn cobs and chicken feathers.

Specifically, it aimed to:

1. produce activated carbon from (a) 100% corn cobs, (b) 75% corn cobs and 25% chicken feathers, (c) 50% corn cobs and 50% chicken feathers, (d) 75% corn cobs and 25% chicken feathers, and (e) 100% chicken feathers.

2. determine the Methylene Blue values of the aforementioned ratios used in the production of activated carbon.

3. compare the Methylene Blue values of the aforementioned ratios used in the production of activated carbon.

It was hypothesized that there is no significant difference in the Methylene Blue values among the different ratios of corn cobs and chicken feathers used for the production of activated carbon.

Findings

This study was able to establish the following findings based on the data gathered:

1. Corn cobs, chicken feathers, and the combination of both were effective raw materials for the production of activated carbon product.

2. The One-Way Analysis of Variance proved that for all the proportions of activated carbon products from corn cobs and chicken feathers, as well as the commercial activated carbon, Diatabs, the Methylene Blue values showed no significant difference.

Conclusion

From the findings of this study, the following conclusions were drawn:

The production of activated carbon products from corn cobs and chicken feathers was feasible. The products were tested and found to have commendable results.

The activated carbons produced from different proportions were as effective as the commercial activated carbon, Diatabs, as measured by their Methylene Blue adsorption values.

Recommendations

Basing on the data and conclusions we have obtained from this study, the researchers seek to recommend the following:

That corn cobs and chicken feathers be used in the manufacture of activated carbon.

That other properties of activated carbon, such as the Benzene Gas adsorption value and the surface area, be tested on activated carbon made from corn cobs and chicken feathers.

That if other studies conducted along this line were pursued in the future, the number of samples be increased to ensure greater accuracy in the attainment of the data.

That other local materials which usually end up as were materials be used for the production of activated carbon, and tested for their color adsorbance qualities.

That if significant results were achieved in the testing, the feasibility of their becoming activated carbon products must also be pursued for the study's results to be put to more practical uses.

That other researchers perform the study again to extensively verify the data and results obtained from this study.

References

21st Century Universal Encyclopedia. (1994). Australia: Regency Publishing Group Pty. Limited.

Funk and Wagnalls New Encyclopedia. (1993). USA: Encyclopedia Britannica, Inc.

Grolier International Encyclopedia. (1991). USA: Grolier Incorporated.

Larousse Desk Reference Encyclopedia. (1993). London: Larousse plc.

The New Encyclopedia Britannica. (1993). USA: Encyclopedia Britannica, Inc.

Webster's New Encyclopedic Dictionary. (1993). New York: Black Dog and Leventhal Publishers.

Webster's Third New International Dictionary. (1993). USA: Merriam-Webster Incorporated.