IDENTIFICATION OF ORGANIC COMPOUNDS AS CARBOHYDRATES AND CHEMICALS CONTAINED IN THEM

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ABSTRACT

This study aims to observe the structure of some carbohydrates through their reaction properties with multiple test reagents and know and understand various carbohydrate tests. Research methods used Research methods used are analytics with experimental design (pre experimental), Object of research is milk, honey, sago, flour and amylum. Then to five samples each added with NaOH, HCL, Aquades to find out if the five samples contain carbohirat or not.

The results showed that Carbohydrates are nutrients in the form of organic compounds consisting of carbon atoms, hydrogen, and oxygen used as energy-forming materials. In this carbohydrate study, an iodine test was conducted to prove the presence of carbohydrate content in 5 samples of foodstuffs, namely iodine test on sago, honey, amylum, flour and milk. In the first experiment milk added NaOH, HCL, aquades the result did not change the layer and color, then the second experiment on honey in the pond NaOH, HCL, Aquades the result is two layers and the change of color to blackish yellow, then the third experiment on flour added NaOH, HCL, Aquades the result there are two layers and discoloration in each organic compound mixed in the sample, next experiment to the fourth on sago added NaOH, HCL,

Keywords: carbohydrates, naoh, hcl, aquades

INTRODUCTION

Indonesia is a megadiversity country, including in the wealth of flora (plants) that ranks Indonesia in fifth place in the world. So Indonesia is one of the producers of horticulture commodities that are quite important [1]. Horticulture commodities in Indonesia is one of the commodities produced by agriculture that has a high economic value. One of its uses is used as food to meet the source of nutrition needed by humans. According to Government Regulation no. 28 of 2004, food is everything that comes from biological sources and water, both processed and unprocessed, intended as food or drink for human consumption.

The development of food products through various forms of processed is one way to increase the economic value of food products. Carbohydrates are compounds consisting of carbon atoms, hydrogen, and oxygen.

The result of carbohydrate metabolism is glucose contained in the blood and glycogen is a carbohydrate that is synthesized by cells in muscle tissue as a source of energy [10]. Carbohydrates in the diet are commonly found in the form of starch, lactose, sucrose, and cellulose. In the oral cavity, the enzyme alpha amylase saliva works on starch substances randomly producing maltose, some glucose, small units of starch molecules. Inside the stomach due to high acidity

then the work of alpha amylase is stopped. In the small intestine food will become alkaline by secretions from the pancreatic ducts. The digestion of starch is continued by the work of the same pancreatic alpha amiase enzyme as the saliva enzyme.

The alpha amylase enzyme works perfectly so the lumen of the small intestine will contain glucose, maltose, isomaltose, lactose, and sucrose from the diet. Hydrolysis by the work of specific disaccharide enzymes produces monosaccharides. The resulting monosaccharides (glucose, fructose, galactose) along with glucose from the lumen will enter the portal system and then be transported to the liver. Carbohydrates are compounds formed from molecules of carbon, hydrogen and oxygen. As one type of nutrient, the main function of carbohydrates is energy generation in the body.

Carbohydrates play an important role in nature because it is the main source of energy for humans and animals that are relatively cheap. All carbohydrates come from herbs. Through the process of photosynthesis, plant chlorophyll with the help of sunlight is able to form carbohydrates from carotene dioxide (CO2) derived from water and water (H2O) from the soil. Carbohydrates produced are simple carbohydrates glucose. In addition, it is produced by oxygen (O2) released in the air [4].

Understanding Carbohydrates

Carbohydrates are polyhydroxic aldehydes or ketones, or compounds that produce this compound can be in hydrolysis. In general, there are three kinds of carbohydrates based on the results of hydrolysis, namely monosaccharides, logosaccharides, and polysaccharides [1] In the biological world, we can recognize various types of carbohydrates, both those that serve as structural builders and that play a functional role in metabolic processes. Various tests have been developed for qualitative and quantitative analysis of the presence of carbohydrates, starting from those that distinguish specific types of carbohydrates [1].

Carbohydrates or also called charcoal hydrates are the most widely found organic molecules in nature and have a very wide function. Carbohydrates serve as the main source of energy for most living things, are the body's energy reserves, and the membrane components of cells that act as intermediaries of various communication between cells. Based on the number of simple sugar molecules, carbohydrates can be classified into four, namely: monosaccharides (1 molecule), disaccharides (2 molecules), oligosaccharides (3-10 molecules), and polysaccharides (> 10 molecules). The simple sugars that make up carbohydrates are generally glucose, galactose and fructose.

Carbohydrates are the main source of energy that allows people to do their daily activities. The energy needs of the human body are about 60-70 percent obtained from carbohydrates, the rest comes from fats and proteins. Therefore, the staple foods of the entire population of the world (such as rice, corn, wheat, potatoes, sago, cassava) are a source of carbohydrates. Carbohydrates as a staple food, generally consumed after processing into rice, noodles, vermicelli, bread, porridge, various cakes, and others. Long carbohydrate structure (complex carbohydrates) result in its size being too large to penetrate the walls of the small intestine and enter the bloodstream. The position of carbohydrates is very important in humans and other high-level animals, namely as a source of calories.

Carbohydrates also have biological functions that are not important for low-level living things, yeast for example, converting carbohydrates (glucose) into

alcohol and carbon dioxide to produce energy [1].

C6H12O6 —>2C2H5OH + energy

Carbohydrates are the fastest food substances to supply energy as fuel for the body, especially when the body is hungry. In a hungry condition, the food chosen tends to immediately overcome hunger, so carbohydrate-containing foods become an option. After carbohydrate-containing foods are consumed, carbohydrates will soon be oxidized to meet energy needs [13]

The term carbohydrate, derived from the word hydrate carbon (hydrates of carbon) or popularly known as hydrate charcoal or saccharide (from the Greek sakcharon meaning sugar). Carbohydrates are nutrients in the form of organic compounds consisting of carbon atoms, hydrogen, and oxygen that are used as energy-forming materials. In plants, these three substances are involved in a process popularly known as the process of photosynthesis [13].

Carbohydrate levels are measured using the phenol sulfate method. The principle of this method is simple sugar and oligosaccharides can react with phenols in concentrated sulfuric acid resulting in a stable yellowish orange color. Where oligosaccharides are hydrolyzed into monosaccharides by concentrated sulfuric acid and hydrate them to form furfural compounds that react with phenols producing an orange color. Application of phenol-sulfate method is widely used to determine carbohydrates in the sample directly expressed as percent glucose [4].

Plants that are around us, using compounds karon dioxide (CO2) and water (H2O) with the help of energy (ray sun) and green pigment leaves (chlorophyll) to produce carbohydrates that we can eat. The chemical process that occurs naturally and complexly is the process of photosynthesis. Through the process of photosynthesis of compounds that are around plants, namely water derived from soil and carbon dioxide derived from the air, with the help of sunlight and the presence of green grains leaves (chlorophyll) react and allow the leaves to form glucose as baha energy and release oxygen [5].

Carbohydrates are classified in several different ways. Carbohydrates in food based on their chemical molecular structure can form both simple (monomeric andmeric) and complex (unearthic), while based on its digestibility, carbohydrates can be distinguished from digestible and inaccessible [5].

Types of carbohydrates in food based on their molecular structure (number of monomeric units) can be classified as monosaccharides, ologosaccharides and polysaccharides. The simplest form of carbohydrate molecules are called sugar or saccharides, while prefixes such as "mono" (one), "di" (two), "tri" (three), "oligo" (some), and "poly" (many) refer to the amount of sugar bonded. Sugar in the form of single sugar (single sugar) or double sugar (double sugar) is commonly called monosaccharides and disaccharides, while the complex form of carbohydrates are polysaccharides known among them are starch and fiber [5]. Monosaccharides are not used in hydrolysis to be a simple form anymore, while in saccharides can be hydrolyzed and produce 2 molecules of monosaccharides,

Use of Glucose for Energy

When glucose enters cells, enzymes will break it down into small parts that will eventually produce energy, carbon dioxide and water. These small parts can also be rearranged into fat. The human body always needs glucose for energy purposes, so we have to consume carbohydrate source foods every day, because the supply of glycogen only lasts for a few hours [2].

Glucose Storage

The main role of carbohydrates in the body is to provide glucose for the body's cells, which will then be converted into energy. Excess glucose will be stored in the liver in the form of glycogen. One of the functions of the liver is to store and secrete glucose according to the needs of the body. When the blood glucose supply decreases, the liver converts a portion of glycogen into glucose and secretes it into the bloodstream.

This glucose will be carried by blood to all parts of the body that require such as the brain, nervous system, heart, and other organs of the body. Muscle cells and other cells in addition to using glucose also use fat as a source of energy. Muscle cells also store glucose in glycogen form. Glycogen is used only as energy for muscle purposes only and cannot be returned as glucose into the bloodstream. Excess carbohydrates in the body can also be converted into fat. This change occurs in the heart.

Types and sources of simple and complex carbohydrates

Carbohydrates can be calcified based on the number of units of sugar or saccharides that become their constituent structure. Monosaccharides and disaccharides are categorized as simple carbohydrates because their size and structure are relatively small, while polysaccharides, starch, and certain types of fiber can be called complex carbohydrates based on large sizes and complex structures.

1. Monosaccharides ($C_6H_{12}O_6$), Monosaccharides or single sugars, are the simplest forms of sugar. Monosaccharides found in free form in food are glucose and fructose, while galactose and mannose are found in food-bound forms.
2. Glucose, glucose can be formed from the hydrolysis of starch, glycogen, and maltose. Glucose is very important to us because our body's cells use it directly to produce energy. Glucose can be oxidized by gentle oxidizing substances such as Tollens reagents so it is often referred to as reducing sugar. Glucose is the most important sugar for the metabolism of the body, which has the first 6 carbon (hexose) products in the form of complex carbohydrate hydrolysis in the digestive process, in cells, glucose in oxide to produce energy and stored in the liver and muscles as glycogen.
3. Fructose, fructose is a hexulose, also called levulose because it rotates the polarizing plane to the left. It is the only hexose found in nature. Fructose is the sweetest sugar, found in honey and fruits along with glucose. Fructose can be formed from the hydrolysis of a disaccharide called sucrose and fructose is one of the reducing sugars. Fructose is the sweetest sugar compared to other types of sugar. It is also known as the sugar of fruit origin and also has another name livosa. As with glucose, fructose also has 6 carbon (hexose). Sources of fructose with technology can be made from glucose, apart from beets or sugar cane.
4. Galactose, galactose is an aldohexose. Monosaccharides are rarely found free in nature. Generally binds to glucose in the form of lactose, which is the sugar contained in milk. Galactose has a less sweet taste when compared to glucose and less soluble in water. As with glucose, galactose is also a reducing sugar. Galactose is a special sugar that is not present in free form in nature, but is found in animals that is milk. Produced from lactose (sugar in milk) by means of hydrolysis in the digestive process.
5. Disaccharides ($C_{12}H_{22}O_{11}$), Disaccharides are a type of carbohydrates that are widely consumed by humans in daily life.

Each disaccharides molecule will be formed from a combination of 2 monosaccharides molecules. Examples of disaccharides commonly used in daily consumption are sucrose formed from a combination of 1 molecule of glucose and fructose and also lactose formed from a combination of 1 molecule of glucose &galactose. In food products sucrose is the shaper of almost 99% of granulated sugar or table sugar (table sugar) commonly used in daily consumption while lactose is a carbohydrate that is widely found in cow's milk with a concentration of 6.8 gr/100 ml. Disaccharides or double sugars are formed from a combination of two monosaccharides and water. There are 3 important types found in food, namely sucrose, maltose and lactose.

6. Sucrose, sucrose is found in cane sugar and in everyday life sucrose is known as granulated sugar. Sucrose is composed of glucose and fructose molecules connected by bonds 1.2 –α. Sucrose hydrolyzed by the enzyme invertase produces -D-glucose and -D-fructose. This sugar mixture is called inversion sugar, sweeter than sucrose. When considered the structure, anomeric carbon (carbonyl carbon in monosaccharides) from glucose or fructose in water is not used to bind so they do not have hemiacetal groups. As a result, sucrose in water is not in equilibrium with the form of aldehydes or ketones so that sucrose cannot be oxidized. Sucrose is not a reducing sugar. Known as table sugar, it is found mainly in cane juice, sugar beets, molasses and surgum.
7. Maltose, maltose is a disaccharide and is the result of partial hydrolysis of flour (amyloid). Maltose is composed of molecules -D-glucose and -D-glucose. From the maltose structure, it is seen that the cluster -O- as an interunit link is connecting C 1 of -D-glucose with C 4 of the -D-glucose. The configuration of glycoside bonding in maltose is always because maltose is hydrolyzed by -glucosidase. One maltose molecule is hydrolyzed into two glucose molecules. Maltose is not present in free form in nature. Maltose is known as malt sugar or seed sugar, because it is a digestive product of starch with the help of the enzyme diastase, an enzyme obtained from grain sprouts.
8. Lactose, lactose is the main sugar found in milk, lactose is not found in plants, but only found in the milk of lactating animals and breast milk (breast milk).
9. Oligosaccharidase, Oligosaccharides are sugars containing 3-9 simple sugar molecules.
10. Polysaccharidase, Complex carbohydrates (polysaccharides) consist of several simple sugars (monosaccharides) or groups of glucose units. In foodstuffs there will be two types of polysaccharides that can be digested (amyloid and dextrin) and can not be digested (cellulose and hemicellulose).

Carbohydrates have the main function of providing the body's energy needs. But the function of carbohydrates is not only as energy, but also another function in the continued metabolic processes in the body. Various functions of carbohydrates in the body's metabolism are [13].

1. Providing energy
2. Regulates fat metabolism
3. Save protein
4. Supplier of brain and nerve energy
5. Glycogen storage
6. Intestinal peristaltic regulators and food waste payers.

RESEARCH METHOD

Tools and materials, in this experiment, using a test tube rack, test tube, water bath, litmus paper, tube clamp, measuring cup, beaker, petri dish, dropper pipette. The ingredients used are honey, milk, sago, flour, concentrated sulfuric acid, 1% starch, tissue, concentrated HCL, 2% NaOH and aquades.

Work procedures

1. Iodine test
   a. Prepare 15 test tubes
   b. Label each test tube
   c. Weighing 5 grams of flour and sago
   d. Heat the flour that has been weighed
   e. Pour the sample that has been heated, namely flour into an Erlenmeyer glass and add 10 ml of distilled water
   f. Then enter the diluted flour into 3 tubes, 3 ml of each reaction in the first test tube are added 2 drops of distilled water, 2 drops of HCL are added to the second test tube and 2 drops of NaOH are added to the third test tube. Then put the diluted sago again into 3 test tubes as much as 3 ml, in the first tube add 2 drops of distilled water to the sago, add 2 drops of HCL in the second test tube and add 2 drops of NaOH to the third tube. Then put starch into 3 test tubes, add 2 drops of distilled water to the first test tube, add 2 drops of HCL to the second test tube and add 2 drops of NaOH to the third test tube.
   g. Then put milk into 3 test tubes of 3 ml each and add 2 drops of distilled water to the first tube, add 3 drops of concentrated HCL to the second tube and add 3 drops of 2% NaOH to the third tube.
   h. After that, put honey into three test tubes of 3 ml each. In the first test tube, 2 drops of distilled water were added to honey, 3 drops of concentrated HCL were added to the second tube and 3 drops of 2% NaOH were added to the third test tube.
   i. And observe the color formed in all samples that have been added with chemicals, namely concentrated HCl, 2% NaOH and aquades.

RESEARCH RESULT

After conducting several experiments, the following results were obtained:

Table 1. Iodine Test Results

No	Sample	RESULT			Information
		Added aquades	Added NaOH	Added concentrated HCL	
1	Milk	There is no coating and does not change color	There is no coating and does not change color	There is no coating and does not change color	No change in coating and color
2	Honey	There are 2 layers and the color changes to blackish yellow	There are 2 layers and the color changes to blackish yellow	There are 2 layers and the color changes to blackish yellow	There are 2 layers and color changes
3	Flour	There are 2 layers and it turns clear white	There are 2 layers and the color changes to yellowish white	There are 2 layers and the color changes to purplish white	There is a change in layer and color
4.	Sago	There are 2 layers and the color changes to clear white	There are 2 layers and the color changes to white to orange-orange	There are 2 layers and the color changes to bluish white	There are 2 layers and color changes
5.	starch	There is no coating and does not change color	There is no coating and does not change color	There is no coating and does not change color	No change in coating and color

Source: Practicum Report

DISCUSSION

Carbohydrates are nutrients in the form of organic compounds consisting of carbon, hydrogen, and oxygen atoms that are used as energy-forming materials.

In this carbohydrate practicum, an experimental iodine test was conducted to prove the presence of carbohydrates in 5 food samples, namely the iodine test on sago, honey, starch, flour and milk.

In this practicum we have 5 samples where the first sample is milk, milk is

added with distilled water the result is no change in color and sediment or coating, so we can say that milk added with distilled water does not produce changes, then milk is added with NaOH what happens is that there is no change in either the color or the sediment or coating, then the milk is added with concentrated HCl the result is that there is no change in either color or coating.

So that we can know that milk is added to the three ingredients and the results are the same without producing changes. This is because the milk used here is a bear brand where this milk acts as a poison neutralizer so that when chemical substances are added to this milk, there will be no change in color or coating and the result is that the milk does not contain carbohydrates.

Then the second sample is honey, honey is added with aquadest the result is a color change and there are 2 layers, namely in the color there is a blackish yellow color we can say that honey is added with aquades produces changes with 2 layers formed and the color appears, then honey Added with NaOH, what happens is that there is a good change in the color, namely blackish yellow and there are also 2 layers, then honey is added with concentrated HCl the result is that there is a change in either the color or the layer is the same as that which has been added with distilled water, and NaOH, so I can say that honey is added to the three ingredients and the results are the same and produce the same changes.

This is because this honey has a high carbohydrate content and is low in fat and organic acids contained in honey are acetic acid, glycolic butyric acid and many more so that when honey is added with other substances it will form a change in color or there is a layer on the inside which layer is a sign that there is a change in the honey.

Then the third sample, namely flour, flour is added with distilled water, the result is a change in color and there are 2 layers, namely in the color there is a clear white color we can say that flour is added with distilled water resulting in a change with 2 layers formed and the color that appears, then flour is added with NaOH, there is a good change in the color, which is yellowish white and there are also 2 layers, then flour is added with concentrated HCl the result is that there is a change in either the color or the layer, namely in the color there is a purplish white color, so it can be seen that flour contains carbohydrates, because it is in accordance with the 2012 mustaqim theory; that if there is a purplish white color,

Then in the fourth sample, namely sago, sago is added with aquades the result is a color change and there are 2 layers, namely in the color there is a clear white color we can say that flour is added with aquades produces changes with 2 layers formed and the color appears, then flour is added add NaOH, what happens is that there is a good change in the color, namely orange and there are also 2 layers, then flour is added with concentrated HCl the result is that there is a change in either color or layer, namely the color has a bluish white color, so it can be seen that in sago contains carbohydrates, because it is in accordance with the 2012 mustaqim theory; that if there is a purplish white, or bluish color in the flour to which HCl solution is added, it means that the sample contains carbohydrates.

Furthermore, the fifth sample, namely starch, starch was added with distilled water, NaOH, and concentrated HCl as a result there was no change in color and sediment or coating, this was because the starch solution being tested was not stirred first, as a result the starch solution precipitated so that it did not produce color should be.

So that we can know that starch is added to the three ingredients and the results are the same and do not produce changes. We can conclude that starch does not contain carbohydrates but an error when the starch experiment was carried out.

CONCLUSSION

Based on the practicum carried out, it can be concluded that the five samples, namely milk, honey, flour, sago and starch containing carbohydrates, only 3 samples, namely sago, flour and honey, this is in accordance with the experiment where we get the results by looking at the color changes that occur. produced from each of these samples, then there is 1 sample that does not contain carbohydrates, namely milk, and starch instead of not containing carbohydrates but an error during the experimental process so that the blue color that should appear does not appear at all.

It is expected that the practitioner can be more orderly and skilled in conducting experiments and for the lecturer assistants are expected to be able to supervise and guide the practitioner so that he is not wrong in conducting experiments. And practitioners are expected to always use PPE (Personal Protective Equipment) when doing practicum in order to avoid accidents if they occur.

Practical Obstacles, and error occurred when conducting the starch test experiment and getting results that were not in accordance with what was expected because there was no mixing between starch and additives, namely distilled water, NaOH and concentrated HCl, so that the color did not form.

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