Date:- 2021.08.28

Practical no:- 03

Title:- To detect the presence of Carbohydrates in sample

Objective:- To identify forms of carbohydrates

To learn how that to do benedict test for carbohydrates

To learn how that to do iodine test for carbohydrates

Introduction:-

A macromolecule is a very large molecule. They are composed of thousands of covalently bonded atoms. The most common macromolecules in biochemistry are biopolymers what that carbohydrates, proteins and nucleic acid and large non polymeric molecules such as lipids and macrocycles.

Polysaccharides are nothing but complex carbohydrates, formed with a chain of monosaccharides. The simplest carbohydrates are monosaccharides and carbohydrates include sugar and the polymers of sugars. Glycosidic linkage is what keeps the chain of monosaccharides bonded together. Molecule of a polysaccharides has a certain number of sugar molecules that come together to form a large molecule. polysaccharides, the polymers of sugars have storage and structural roles.

A disaccharides formed when a dehydration reaction joins two monosaccharides. This covalent bond is called glycosidic bond. Lactose (Glu+Gal) , Moltose (Glu+Glu), Sucrose(Glu+Fru) are some of examples.

Polysaccharides are high molecular weight polymers or copolymers of monosaccharide repeat units joined through glycosidic bonds. Polysaccharides, the polymers of sugars, have storage and structural roles. Starch and glycogen are highly compact polymers that are used for energy storage. Cellulose and chitin are liner polymers that are used for structural support in plants and animals, respectively. Like starch, cellulose is a polymer of glucose, but the glycosidic linkages differ. Polymers with alpha glucose are helical and beta glucose are straight. Some microbes use enzymes to digest cellulose.

Chitin another structural polysaccharides, is found in the exoskeleton of arthropods and also provides structural support for the cell walls of many fungi. Carbohydrates are very important in living being.

Material and methods:-

Material:- A onion bulb, A potato, some of sucrose, some of glucose, distil water, 5 test tubes, Benedict's solution, Hot plate, beaker, Iodine solution, Dropper of pipette

Methods:- Benedict test for carbohydrates

1. Firstly, five test tubes were taken and numbered them since 1 to 5.
2. Each tube was added the material to be tested. There were distilled water, onion solution, potato solution, sucrose solution and glucose solution.
3. Benedict's solution was added 2ml to each tube and was mixed.
4. All of the tubes were placed in a boiling water bath for three minutes.
5. Test tubes were observed color changes in during time.
6. After three minutes, the tubes were removed from the water bath.
7. They were left cool to room temperature.
8. Each test tubes were recorded the color in a table.

Materials:- A onion bulb, A potato, some of sucrose, some of glucose, distil water, 5 test tubes,

Methods:- Iodine test for carbohydrates

1. Test tube were given solution about 2ml.
2. Iodine reagent was added 2-3 drops in the above test tube.
3. Sometime was waited.

Results:-

Solution	**Benedict's color reaction**	**Iodine's color reaction**
Distilled water	Blue → Blue	Yellowish brown (No color change)
Onion solution	Blue → Orange	Yellowish brown (No color change)
Potato solution	Blue → Dark Greenish	Yellowish brown → purple
Sucrose solution	Blue → Blue	Yellowish brown

Glucose solution	Blue ⟶ Dark Reddish	Yellowish brown (No color change)

Discussion:-

Benedict test is based on the ability of reducing sugars to undergo oxidation in alkaline solution. Benedic solution is blue in colour. Enediols reduce the cupric ions (Cu2+) to form cuprous ions (Cu2+). The cuprous ions from cuprous hydroxide. Upon heating it is converted to cuprous oxide that forms precipitates. The citrate ions present in the reagent release the cuprous ions slowly for reduction and prevent the formation of Cu(OH)2 until the oxidation reduction process is completed.

Distill water is the control of the experiment and the color remains unchanged. Sucrose remains blue due to sucrose is a non reducing sugar. Onion solution give orange color. It has less reducing sugar. Potato solution turns into dark greenish color and glucose solution turn into dark reddish color and it has the most reducing sugar.

The iodine test is based on the absorptive properties possessed by large polysaccharide molecules. The glucose chain are organized to form helices and the space between the helix can hold small iodine molecules. This is seen with amylase chains found in starch. Glycogen and amylopectin can also absorb this iodine molecules on their surface. The absorptive property of polysaccharides decrease upon heating.

Sucrose, glucose, Distill water and onion solution do not react with Iodine solution and no color change because there are not coiled polymer of glucose. Potato solution is somewhat brown color. When we added Iodine solution it may show a different color rather than purple color.

1. A source of error in the benedict's test could be when the test tubes placed in the heated water on the hot plate and not being in it for long time. Because it can given false result.
2. Adding too much benedict's reagent or test solution may give false results.
3. If too much iodine was added can give false results.
4. The color disappears on heating and reappears when the solution is cooled.
5. If the color does not appear upon cooling, it indicates that iodine has vaporized during heating.
6. Iodine test is highly specific for polysaccharides in solution.

Conclusion:-

Reducing sugars react with Benedict' solution and get into the color to green, yellow, orange or brick red precipitate.

Starch reacts with Iodine solution and get into the color to dark purple color.

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