

Chemistry Of Carbohydrates Lab Answers Sheet Greeet

Chemistry Of Carbohydrates Lab Answers Sheet Greeet Chemistry of Carbohydrates Lab Answers Sheet Carbohydrates are essential biomolecules that play crucial roles in living organisms providing energy structural support and serving as precursors for other important molecules This lab aims to explore the chemical properties and reactions of carbohydrates focusing on monosaccharides disaccharides and polysaccharides Through a series of experiments we will investigate their solubility reducing properties and interactions with various reagents gaining a deeper understanding of their structure and functionality

Materials
Monosaccharides Glucose Fructose Disaccharides Sucrose Lactose Polysaccharides Starch Cellulose Reagents Benedicts reagent Fehlings solution Iodine solution Barfoeds reagent Seliwanoffs reagent Equipment Test tubes beakers graduated cylinders hot plates stirring rods water bath droppers

Procedures

1 Solubility Test
Purpose To observe the solubility of different carbohydrates in water
Procedure Add a small amount approximately 0.5 g of each carbohydrate to separate test tubes Add 5 mL of distilled water to each tube and shake well Observe the solubility of each carbohydrate at room temperature Record your observations

2 Reducing Properties Test
Benedicts Test
Purpose To identify carbohydrates with a free aldehyde or ketone group which can be oxidized
Procedure 2 Prepare a Benedicts reagent solution according to the instructions Add 1 mL of each carbohydrate solution to separate test tubes Add 2 mL of Benedicts reagent to each tube and heat in a water bath for 5 minutes Observe the color change in each tube Record the color changes and the corresponding carbohydrates

3 Fehlings Test
Purpose Similar to Benedicts test Fehlings test is used to detect reducing sugars
Procedure Prepare Fehlings solution A and Fehlings solution B separately Mix equal volumes of Fehlings A and Fehlings B to form Fehlings reagent Add 1 mL of each carbohydrate solution to separate test tubes Add 2 mL of Fehlings reagent to each tube and heat in a water bath for 5 minutes Observe the color change in each tube Record the color changes and the corresponding carbohydrates

4 Iodine Test
Purpose

To detect the presence of starch which forms a characteristic blueblack complex with iodine Procedure Prepare a dilute iodine solution Add a small amount of each carbohydrate solution to separate test tubes Add a few drops of iodine solution to each tube Observe the color change in each tube Record the color changes and the corresponding carbohydrates 5 Barfoeds Test Purpose To differentiate between monosaccharides and disaccharides based on their relative reducing abilities Procedure Prepare Barfoeds reagent according to the instructions Add 1 mL of each carbohydrate solution to separate test tubes Add 2 mL of Barfoeds reagent to each tube and heat in a water bath for 5 minutes Observe the color change in each tube Record the color changes and the corresponding carbohydrates 6 Seliwanoffs Test 3 Purpose To distinguish between ketohexoses like fructose and aldohexoses like glucose Procedure Prepare Seliwanoffs reagent according to the instructions Add 1 mL of each carbohydrate solution to separate test tubes Add 2 mL of Seliwanoffs reagent to each tube and heat in a water bath for 5 minutes Observe the color change in each tube Record the color changes and the corresponding carbohydrates Observations and Results Solubility Glucose Fructose Sucrose and Lactose Soluble in water at room temperature Starch Partially soluble in water at room temperature Cellulose Insoluble in water at room temperature Reducing Properties Benedicts Test Glucose Fructose and Lactose Show positive results resulting in a brickred precipitate Sucrose Shows negative results remaining bluegreen Starch Shows negative results remaining bluegreen Fehlings Test Glucose Fructose and Lactose Show positive results forming a redbrown precipitate Sucrose Starch and Cellulose Show negative results remaining blue Iodine Test Starch Shows a positive result turning dark blueblack Glucose Fructose Sucrose Lactose and Cellulose Show negative results remaining unchanged Barfoeds Test Glucose and Fructose monosaccharides Show a positive result forming a red precipitate within 23 minutes Sucrose and Lactose disaccharides Show negative results or a very slow reaction forming a red precipitate after prolonged heating Seliwanoffs Test 4 Fructose ketohexose Shows a positive result forming a bright red color within 12 minutes Glucose aldohexose Shows a negative result or a very slow reaction forming a light pink color after prolonged heating Discussion The observations from this lab provide insights into the chemical properties of different carbohydrates Solubility The solubility of carbohydrates in water is influenced by their

molecular structure and the presence of hydroxyl groups. Monosaccharides and disaccharides are generally soluble due to their relatively small size and the presence of numerous polar hydroxyl groups. Polysaccharides like starch and cellulose are less soluble due to their larger size and the formation of complex structures with hydrogen bonding.

Reducing Properties The reducing properties of carbohydrates are due to the presence of a free aldehyde or ketone group that can be oxidized. Monosaccharides like glucose and fructose possess a free aldehyde or ketone group exhibiting strong reducing properties. Disaccharides like lactose also have a free aldehyde group and show positive results in reducing tests. However, disaccharides like sucrose, in which both anomeric carbons are involved in glycosidic linkages, lack a free reducing group and show negative results.

Iodine Test The iodine test specifically identifies starch, which forms a blue-black complex with iodine due to the helical structure of amylose, a component of starch.

Barfoed's Test The different reducing abilities of monosaccharides and disaccharides are exploited in Barfoed's test. Monosaccharides, with their more readily available reducing groups, react faster with Barfoed's reagent, producing a red precipitate within a short timeframe. Disaccharides react slower due to their more complex structures and less accessible reducing groups.

Seliwanoff's Test This test differentiates between ketohexoses and aldohexoses based on their reactivity with Seliwanoff's reagent. Ketohexoses like fructose react faster, forming a cherry red color due to the formation of a hydroxymethylfurfural derivative. Aldohexoses like glucose react slower, producing a light pink color.

Conclusion This lab has provided a comprehensive understanding of the chemical properties and reactions of various carbohydrates. We have successfully distinguished between monosaccharides, disaccharides, and polysaccharides based on their solubility, reducing properties, and interactions with specific reagents. The results demonstrate the structural differences and functional properties of these essential biomolecules, highlighting their crucial roles in biological processes.

Further Exploration

- Investigate the effect of temperature on the solubility of carbohydrates.
- Explore the hydrolysis of disaccharides and polysaccharides using enzymes.
- Study the specific types of glycosidic bonds in various carbohydrates.
- Analyze the structural differences between amylose and amylopectin in starch.
- Examine the role of carbohydrates in food chemistry and their impact on human health.

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