**Introduction**

Glucose is a monosaccharide or simple sugar also known as grape sugar or corn sugar an important carbohydrate in biology .The living cell uses it as a source of energy and metabolic intermediate. Glucose is one of the main products of photosynthesis and starts cellular respiration in both prokaryotes and eukaryotes.

Two stereoisomers of the aldohexose sugar are known as glucose, only one of which (D-glucose) is biologically active .this form (D-glucose) is often referred to as dextrose monohydrate or especially in the food industry, simply dextrose (from dextrorotary glucose). The mirror image of the molecule L-glucose cannot be metabolized by cells in the biochemical process known as glycolysis.

**AS A PRECURSOR:**

Glucose is critical in the production of proteins and in lipid metabolism. Also, in plants and most animals, it is a precursor for vitamin C (ascorbic acid) production. It is modified for use in these processes by the glycolysis pathway.

Glucose is used as a precursor for the synthesis of several important substances. Starch, cellulose and glycogen are common glucose polymers (polysaccharides). Lactose, the predominant sugar in mills, is a glucose-galactose disaccharide. In sucrose, another important disaccharide, glucose is joined to fructose.

**Structure**

Glucose (C6H12O6  contains six carbon atoms, one of which is part of a sugar group and is therefore referred to as an aldohexose. In solution, the glucose molecule can exist in an open –chain (acyclic) form and a ring (cyclic) form (in equilibrium). The cyclic form is the result of a covalent bond between the aldehyde C atom and the c5 hydroxyl group to form a six- membered cyclic hemiacetal. At PH the cyclic form is predominant. In the solid phase, glucose assumes the cyclic form because the ring contains five carbon atoms and one oxygen atom, which resembles the structure of pyran, the cyclic form of glucose.

In this ring, each carbon is linked to a hydroxyl side group with the exception of the fifth atom, which thinks to a sixth carbon atom outside the ring, forming a ch3oh group. Glucose is commonly available in the form of a white substance or as a solid crystal. It can also be dissolved in water as an aqueous solution.

**FUNCTION**

Scientists can speculate on the reasons why glucose and not another monosaccharide such as fructose, is so widely used in evolution, the ecosystem and metabolism. Glucose can form from formaldehyde under abiotic conditions, so it may well have been available to primitive biochemical systems. Probably more important to advanced life is the low tendency of glucose, by comparison to other hexose sugars, to non-specifically react with the amino group of proteins. This reaction (glycation) reduces or destroys the function of many enzymes. The low rate of glycation is due to glucose’s preference for the less reactive cyclic isomer. Nevertheless, many of the long-term complications of diabetes (example: Blindness, kidney failure and perispheral neuropathy) are probably due to the glycation of proteins or lipids. In contrast, enzyme regulated addition of glucose to proteins by glycosylation is often essential to their function.

**Sources**

All major dietary carbohydrates contain glucose, either as their only building block, as in starch and glycogen, or together with another monosaccharide, as in sucrose and lactose. Glycogen is the body’s auxiliary energy source, tapped and converted back into glucose when there is need for energy.

**Reducing Property of Glucose**

One of the most important and useful chemical property of glucose is its capability of reducing oxidizing agents. This property can be used to find the percentage composition by titrating it against Fehling’s solution to form a real precipitate of Cuprous oxide.

A known volume of Fehling’s solution is titrated against a standard as well as sample solution of glucose. The significant use of this property is in the field of medicine in the diagnosis of Diabetes Mellitus, Blood and wine can be analyzed for their contents and the amount of glucose present can be found.

**EXPERIMENT**

**Aim:**

To find the percentage purity of a given samples of glucose

**Apparatus:**

Measuring Flask, Burette, beakers, pipette, conical flask, physical balance and weights.

**Chemicals:**

Standard glucose, Fehling’s solution A, Fehling’s solution B and Glucose samples namely Glucon-D and Electral

**Preparation of Materials**

1. Preparation of Standard Glucose solution

Prepare a solution (known standard solution) of glucose AR by weighing accurately 1.30gm and dissolving it in 250 mL standard flask in water. Make up the volume to the mark.

2. Preparation of solution of sample

Prepare a solution (known standard solution) of glucose AR by weighing accurately 1.30gm and dissolving it in 250 mL standard flask in water.

**EQUATION OF TITRATION**

A freshly prepared Fehling’s solution is first standardized by titration against a standard solution of pure glucose A.R. The standardized Fehling’s solution is then used to determine the amount of glucose in an unknown sample or solution by direct titration. The Fehling’s solution being a solution of cupric ions is blue in colour and at the end point changes to red color precipitate of cuprous oxide.

C6H12O6 + 2CuO     →    C6H11O5.COOH + Cu2O

Glucose     Cupric Oxide    Gluconic Acid Cuprous oxide

**PROCEDURE**

Prepare a solution (known standard solution) of glucose AR by weighing accurately 1.30gm and dissolving it in 250 mL standard flask in water. Make up the volume to the mark.

Pipette out 10 mL each of Fehling’s A & B in a dry conical flask and shake thoroughly. Pipette out 20 mL of this freshly mixed Fehling’s solution in a clean conical flask. Heat the solution up to 70° over wire gauze. Take the standard solution of glucose prepared in a burette and run this solution slowly into the boiling Fehling’s solution until the blue color has completely disappeared. Take care to maintain this temperature for every addition of glucose solution i.e. after adding 1 ml of glucose the Fehling’s solution in the conical flask should be heated to the solutions boiling point. Repeat the above titration by running the glucose solution steadily into the boiling Fehling’s solution until the end point is approached and then cautiously add glucose solution drop-by-drop till the end point is reached.

Preserve this sample of reddish brown color of standard solution of glucose. Now repeat the process by taking other sample-glucose solutions in burette one by one and comparing the indicating point with the sample of glucose solution and note down readings in table. Repeat the experiment till two concordant readings are obtained.