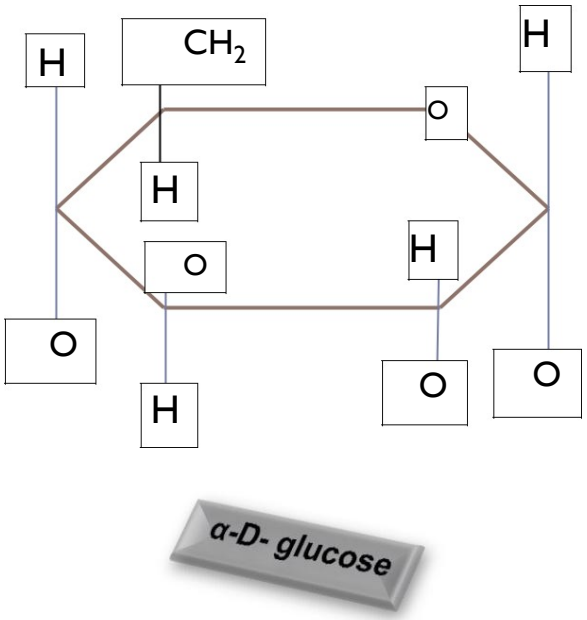
6) The Sixth Experiment:

SERUM GLUCOSE

The glucose belong to carbohydrates that are consider the major food supply and energy source for the people of the world.

Glucose is a monosaccharide.



Source of carbohydrates:

- Rice , corn and potatoes.
- Sucrose (cane and beet sugar).
- Lactose (milk and milk products).
- Glucose (honey , corn syrup and fruits).
- Fructose (fruits , honey).

Metabolism of Glucose :

Glycogenesis : conversion glucose ⟶ glycogen .

Glycogenolysis : breakdown glycogen ⟶ glucose and other intermediate products.

Glycolysis : the oxidation of glucose to lactate or pyruvate .

Gluconeogenesis : formation glucose from non – carbohydrate sources (amino acids and fatty acids).

Citric acid cycle : the final common pathway of oxidation of carbohydrates . lipids and proteins , through which acetyl CoA is completely oxidized to CO_2 and H_2O .

The hormones are important in the regulation of blood glucose concentration :

1. Insulin.
2. Growth hormone.
3. Hydrocortisone.
4. Epinephrine .
5. Glucagon .
6. Thyroxin .

Clinical significance :

The most common disease related to carbohydrate metabolism is diabetes mellitus which characterized by insufficient blood level of active insulin .

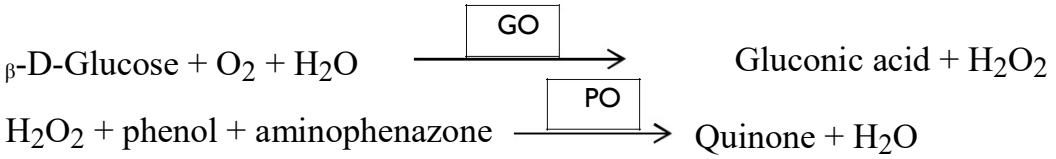
Deficiency of insulin is result in inability of glucose to enter muscle and liver cells.

Important Notes :

- FBS : Fasting blood sugar.
- RBS : Random blood sugar.
- PPG : Two hours postprandial glucose.
- The normal Cerebrospinal fluid (CS F) glucose concentration ranges from 40 -70mg/dl
- Glycolysis should be avoided and its prevented by fluoride-oxalate.
- Glucose is more stable in plasma when blood is drawn , permitted to clot and to stand uncentrifuged at room temperature . The average rate of decrease in serum glucose is approximately 7% in one hour.

Principle:

Glucose oxidase (GOD) catalysis the oxidation of glucose to gluconic acid .The formed hydrogen peroxide (H_2O_2) , is detected by a chromogenic oxygen acceptor phenol –aminophenazone in the presence of peroxidase (POD).



The intensity of the color formed is proportional to the glucose concentration in the sample .

Procedure:

Let stand reagent and specimens at room temperature.

	Blank	Standard	Sample
W.R	**1.0 ml**	**1.0 ml**	**1.0 ml**
Standard		**10 µl**	**--**
Sample	**--**	**--**	**10 µl**

Mix and incubate for 10 min at 37°C or 20 min at R. T.

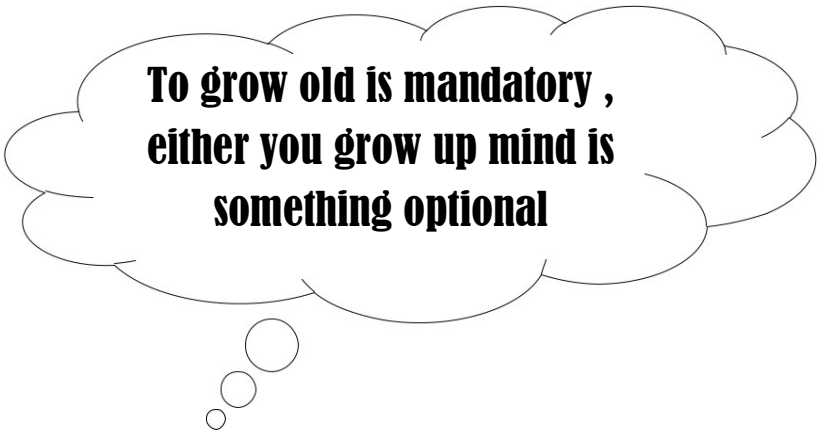
Read the absorbance of the samples and standard , against the blank at 505 nm (490-550) . the color is stable for at last 30 minutes.

Calculations:

Result = ———— ( ) mg/dL

- Conversion factor : mg/dL 0.0555 = mmol/L

Normal value :

Serum or plasma ;

80 -180 g/dl = 4.44 – 9.99 mmol/L