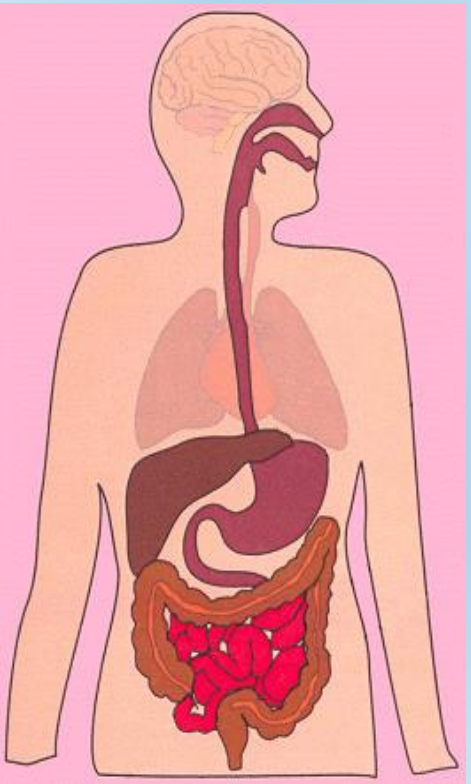
Biology Grade 9

CHAPTER 1: FROM FOOD TO NUTRIENTS: DIGESTION



Activity 2: Chemical Transformation of Food

INSTRUCTOR: SUHAIB AUDI

Activity 2: Chemical Transformation of Food

❖ In-vitro Digestion of Starch

1. Iodine solution on a piece of bread gives dark blue color which indicates that bread contains:

Protein Starch Reducing sugar Lipid

2. What do you taste upon placing a piece of bread (cooked starch) in your mouth?

Salt Sweet Spice Acid Chicken

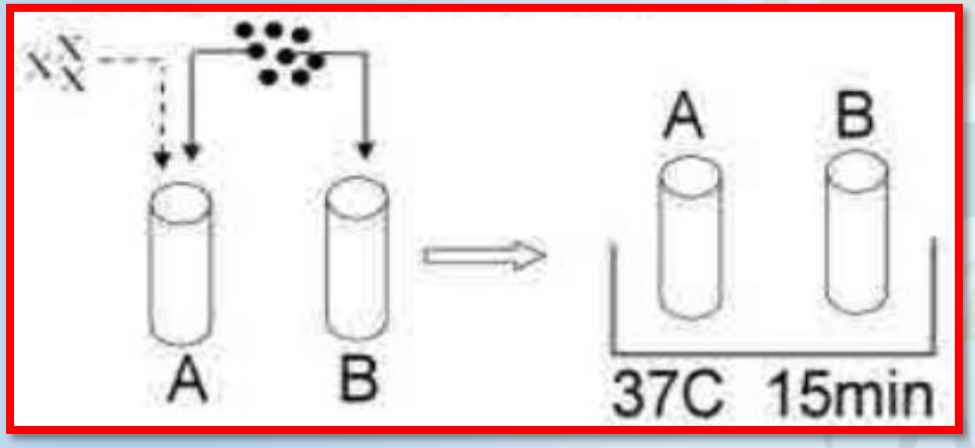
3. Formulate a hypothesis to explain such taste.

Hypothesis: starch in bread is transformed into sugar.

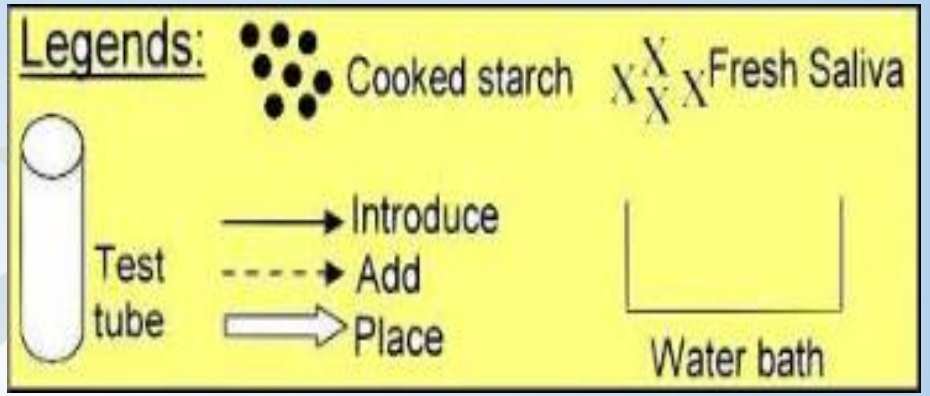
To verify this hypothesis, we extracted fresh saliva from a mouth and then conducted the following experiment:

Cooked starch with water **was introduced** into both tubes A and B, then fresh saliva **was added** into tube A only, then both tubes **were placed** in water bath at 37°C for 15mins.

4. Schematize the steps of this experiment.



Title: In-vitro setup for starch digestion.



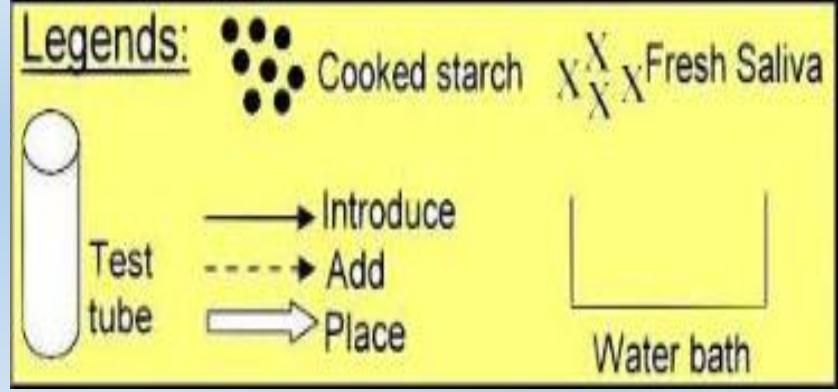
5. Draw the table of conditions of the experiment.

Conditions	Tube A	Tube B
Cooked starch	+	+
Fresh saliva	+	-
Temperature	37°C	37 °C
Duration	15 min	15 min

Key: (+) presence, (-) absence

Title: Table of conditions of the experiment.

6. Referring to the given schematized experiment, pick out:



6.1. The substrate (food):

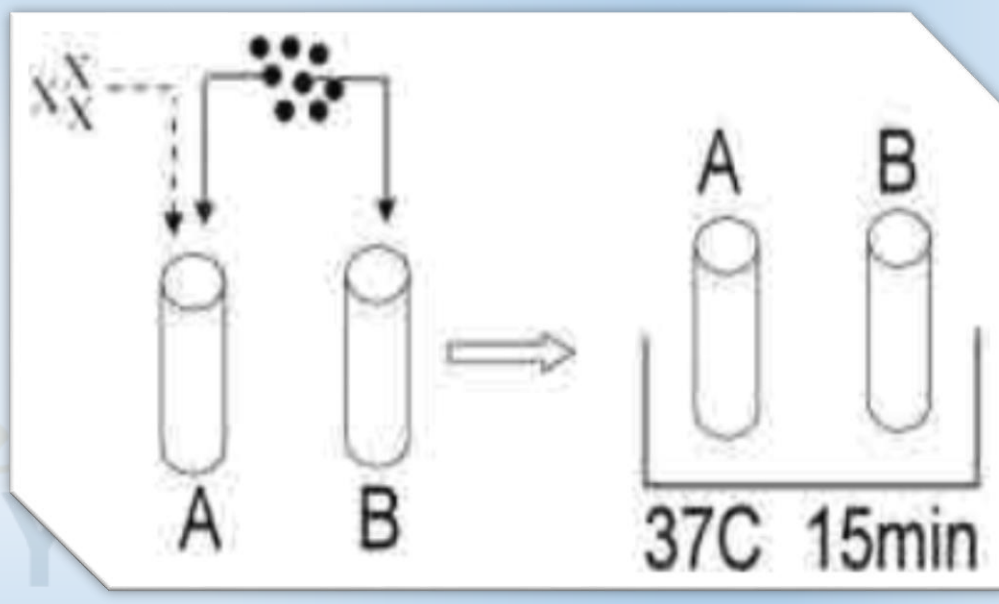
Cooked starch.

6.2. The variable factor (difference between tubes):

Fresh saliva in tube A only.

6.3. The temperature of the experiment:

37°C.



7. Referring to your acquired knowledge, justify the placement of both tubes in water bath at 37°C.

Since it is the normal temperature of the human body.

8. What is the importance of test tube B?

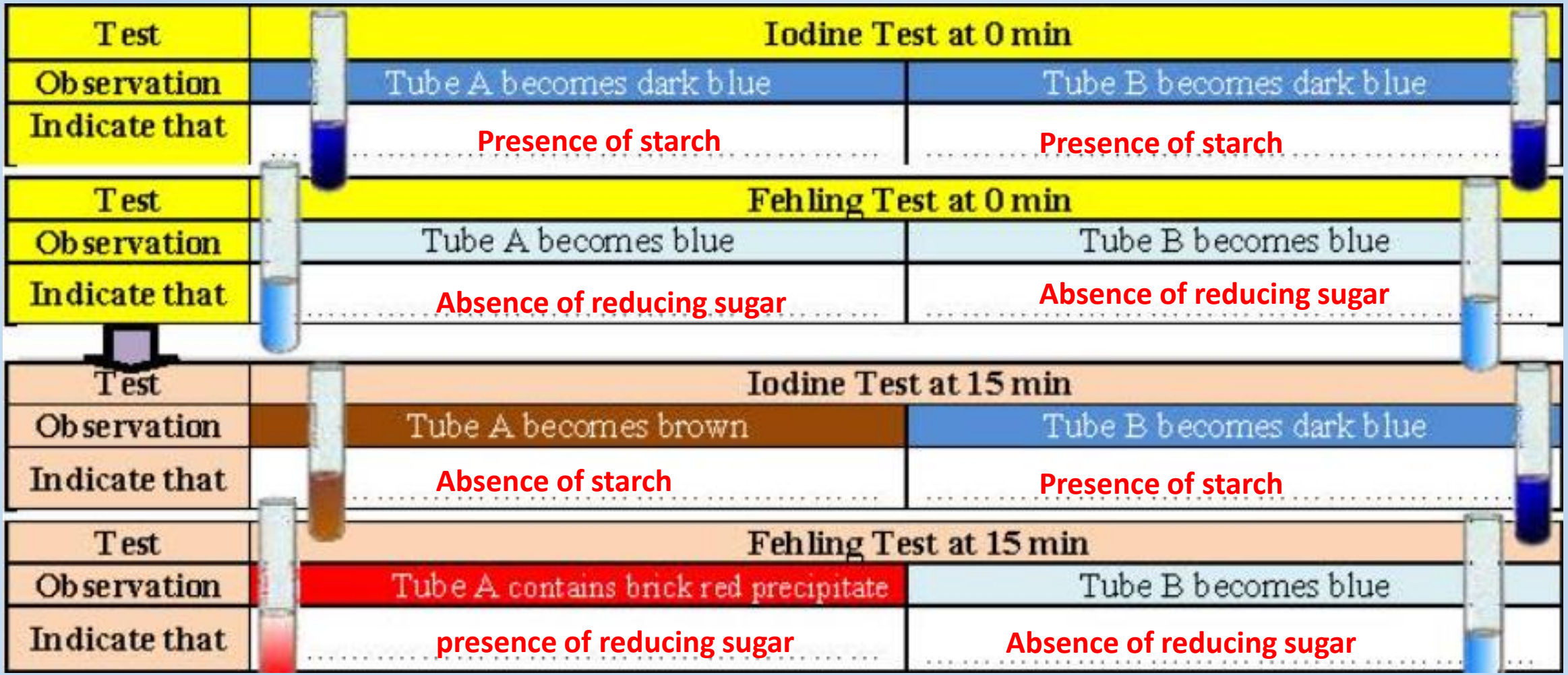
Control tube, to compare results.

9. Predict in which tube, digestion may take place. Justify you answer.

A, because it contains fresh saliva that may digest starch.

In order to validate the hypothesis, we conducted Iodine and Fehling tests for both tubes at the beginning of the experiment t=0 and after 15minutes, the results are illustrated in the figures below:

10. Give the "significance / relation/indication" of each of the given results.

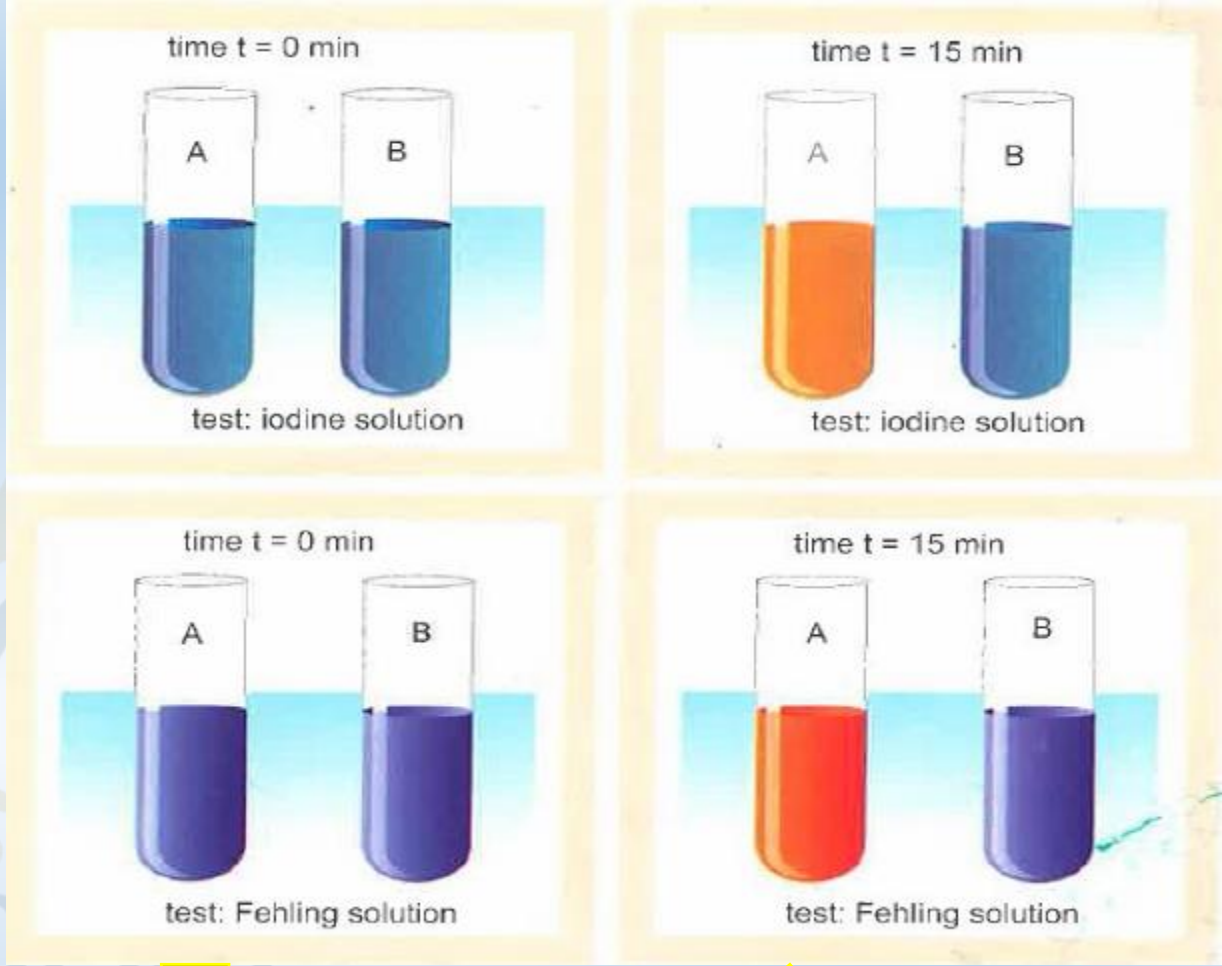


11. Interpret the results of the experiment.

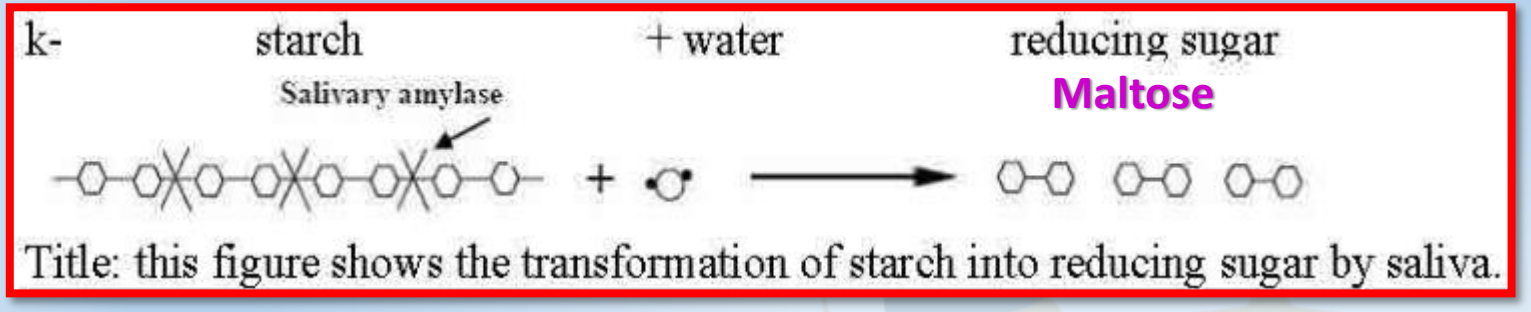
After 15 minutes, in tube A which contains cooked starch and fresh saliva, the color of iodine solution changes from **dark blue** to **brown orange,** and that of fehling solution changes from **blue** to **brick red.**

While, in tube B which contains only cooked starch, the color of iodine solution and that of fehling solution remained unchanged.

This means that starch has been transformed into reducing sugar only in tube A <u>in the presence of fresh saliva.</u>



12. Schematize the biological phenomenon that occurred in tube A in the presence of water.



Title: this figure shows the transformation of starch into reducing sugar by saliva.

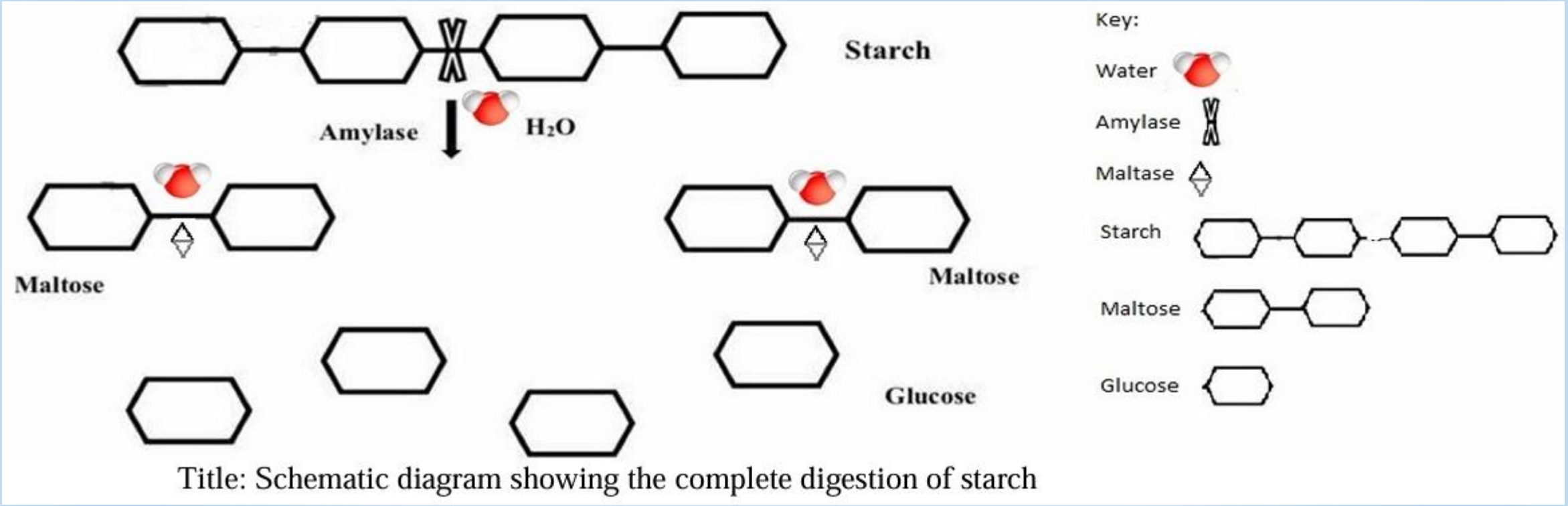
Conclusion:

Therefore, Salivary amylase in saliva transforms cooked starch into sugar.

Hence, enzymes facilitate the simplification of complex molecules (food) into simple substances (nutrients).

Summary

13. Draw a functional diagram of the molecular simplification of starch.



Title: Schematic diagram showing the complete digestion of starch

14. Specify the type of the reaction of the transformation of starch into maltose.

Hydrolysis reaction. In this reaction, the starch molecule is broken down or hydrolyzed into maltose molecules in the presence of water.