Carbohydrate

Carbohydrates

- **Definition**

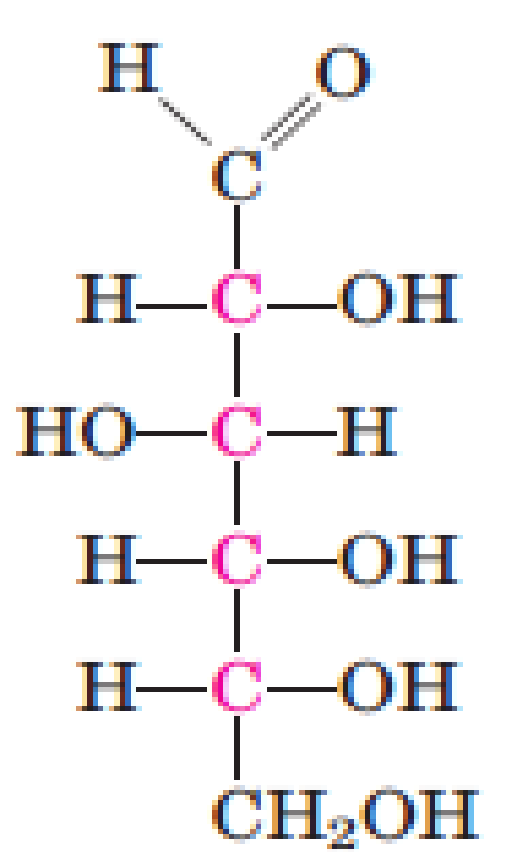
Polyhydroxy aldehydes or ketones, or substances that yield such compounds on hydrolysis. Many, have the empirical formula $(CH_2O)_n$

Carbohydrates

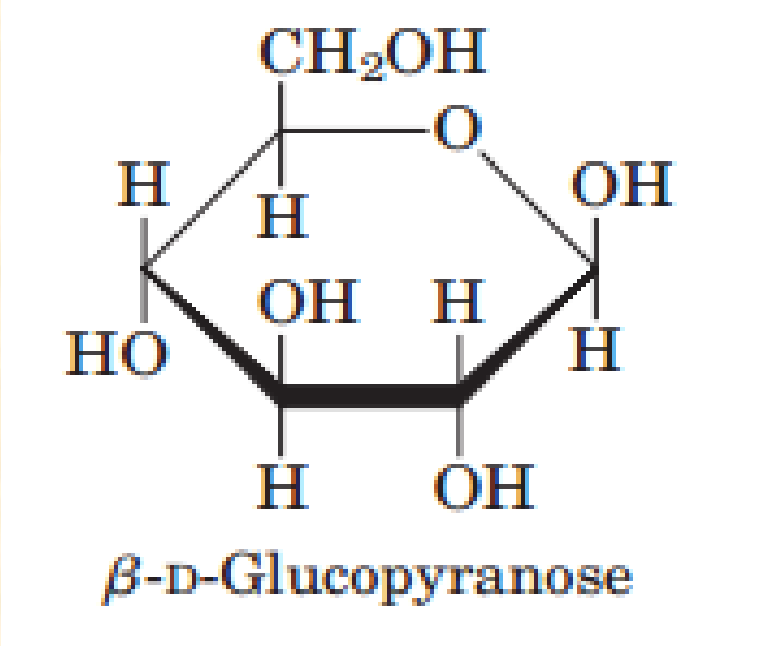
- **Classification**

1. Number of carbon atoms in the sugar
2. Terminal function group in the sugar
3. Number of sugar subunits
4. Reducing activity of the sugar

Glucose

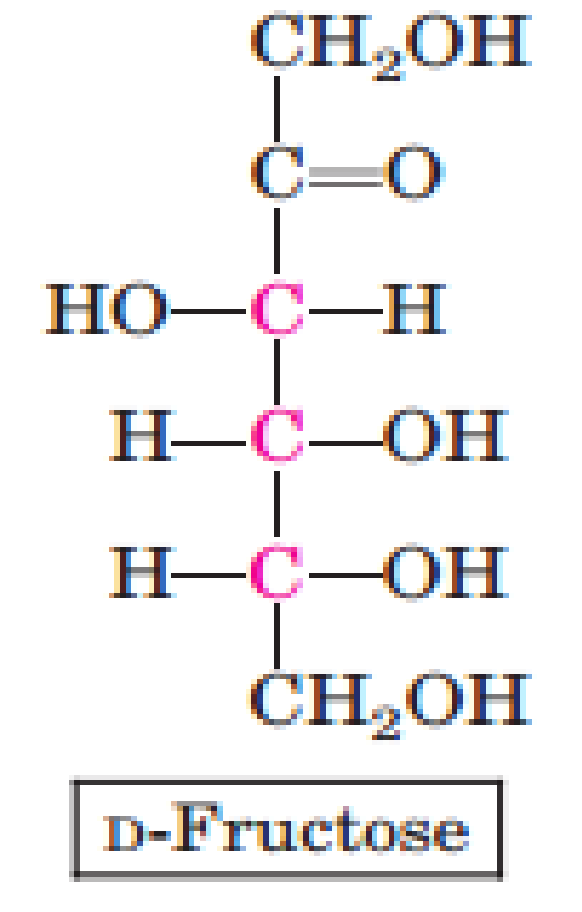


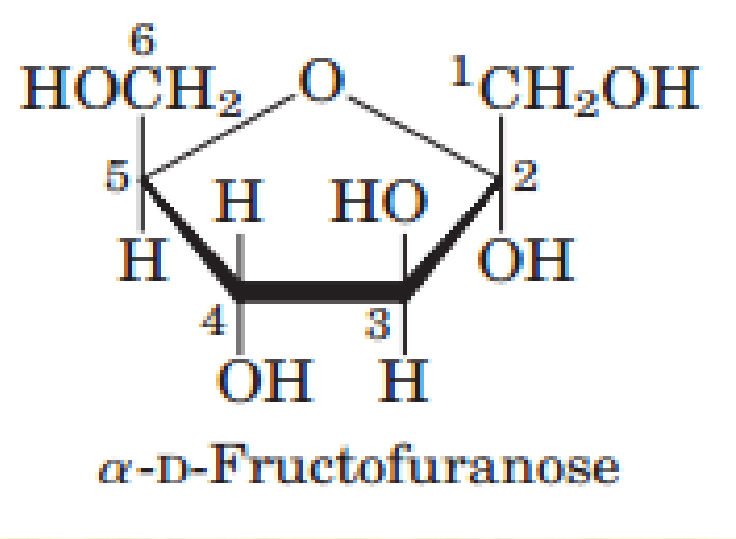
D-Glucose



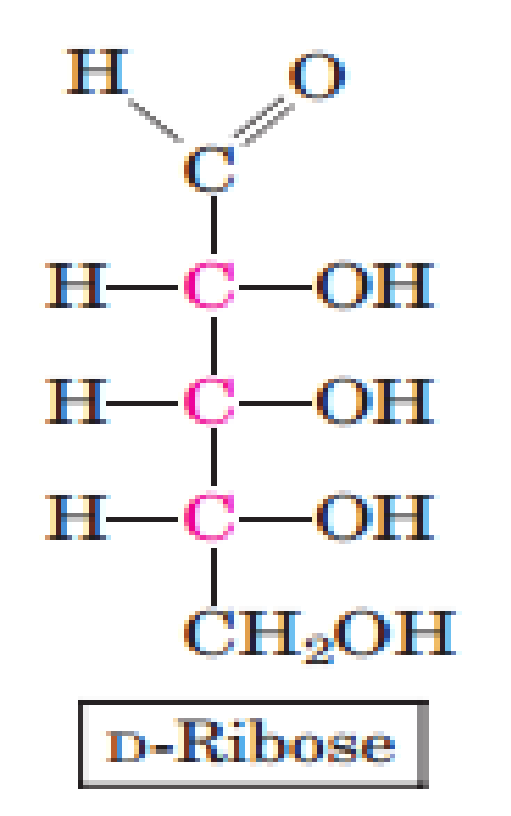
β-D-Glucopyranose

Fructose

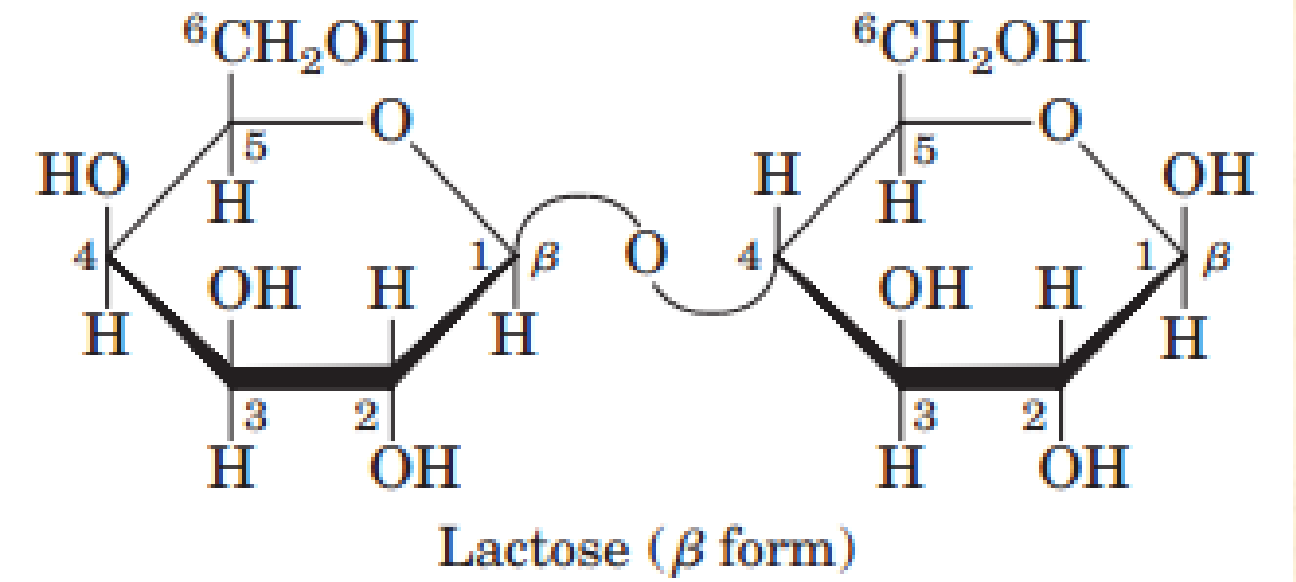

CH2OH
C=O
HO—C—H
H—C—OH
H—C—OH
CH2OH
D-Fructose


6
HOCH2
O
1CH2OH
5
2
H
HO
H
OH
4
3
OH
H
α-D-Fructofuranose

Pentose

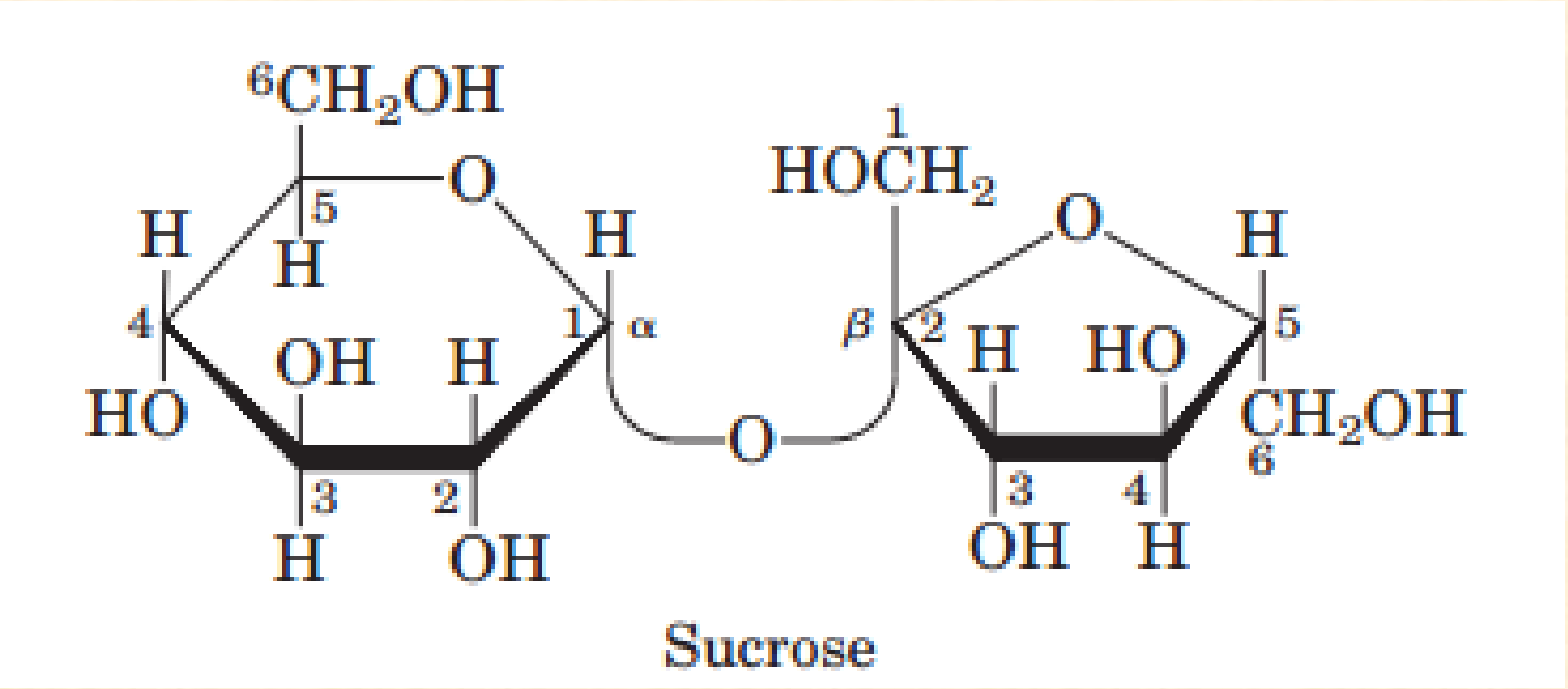


Lactose



Lactose (β form)

Sucrose


6CH2OH
O
5
H
H
4
OH
H
HO
1
α
3
2
H
OH
O
1
HOCH2
O
H
β
2
H
HO
5
CH2OH
6
3
4
OH
H
Sucrose

Tests for Carbohydrate

Principle of Molisch test

Is a general test for all CHO.Conc.H_2SO_4 break down the CHO molecules to produce furfural or hydroxyl methyl furfural which react with α-naphthol to give violet color complex.

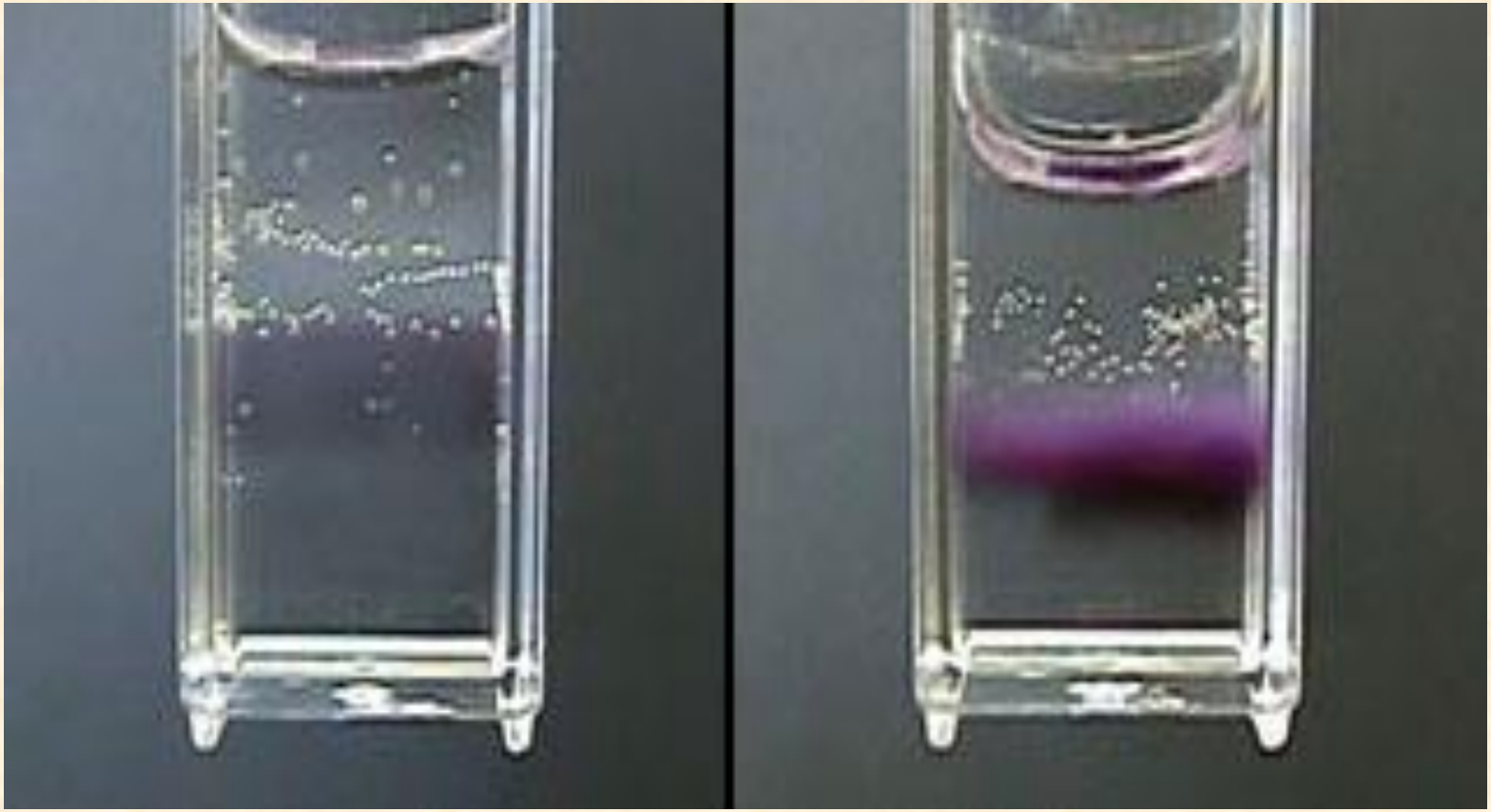
- **Molisch's Test**

General test for all carbohydrates

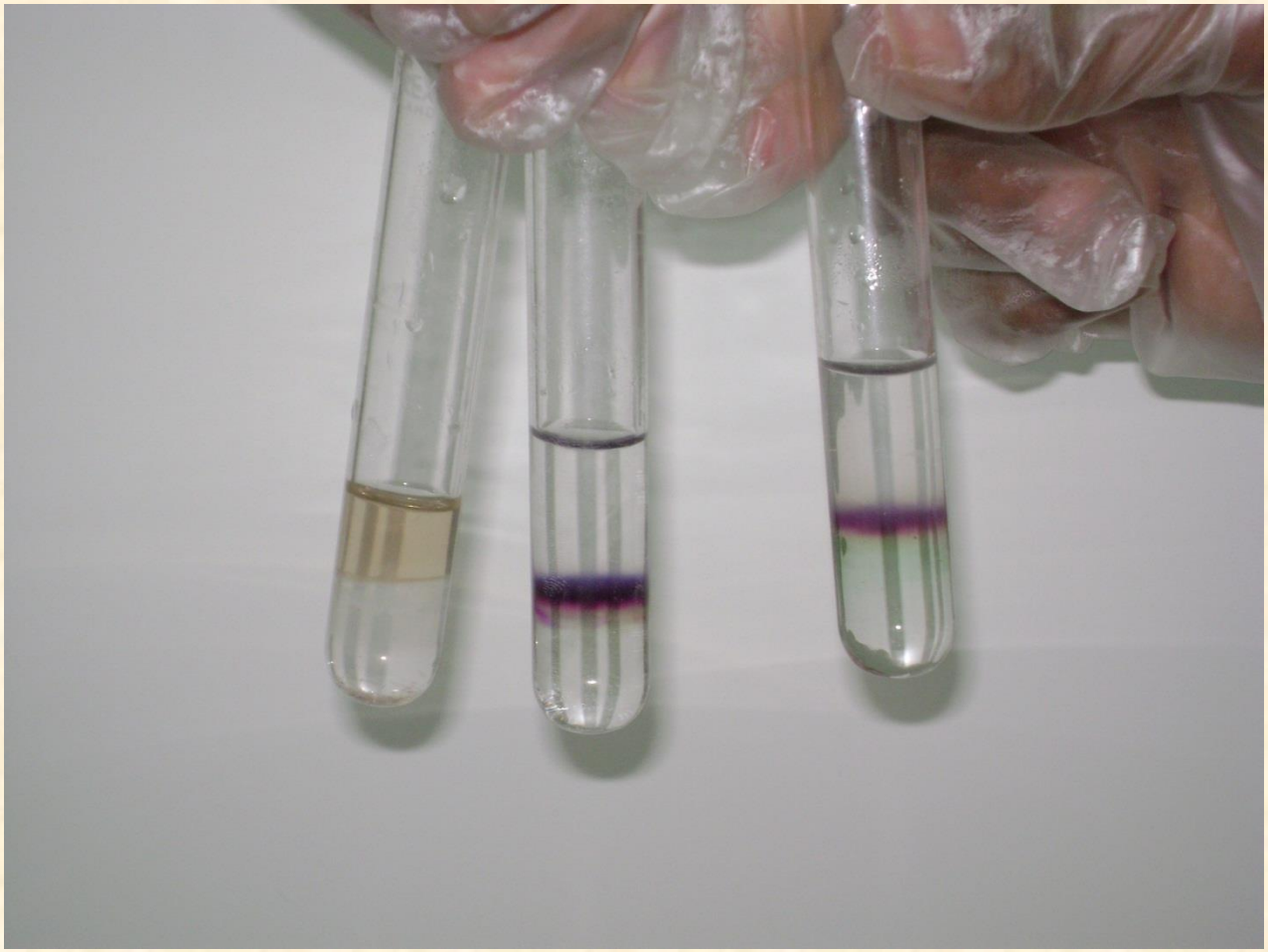
1. 1 ml of sugar
2. 5 **drops** of α-naphthol
3. 10 **drops** of H_2SO_4 <u>Slowly</u>

Violet colored ring

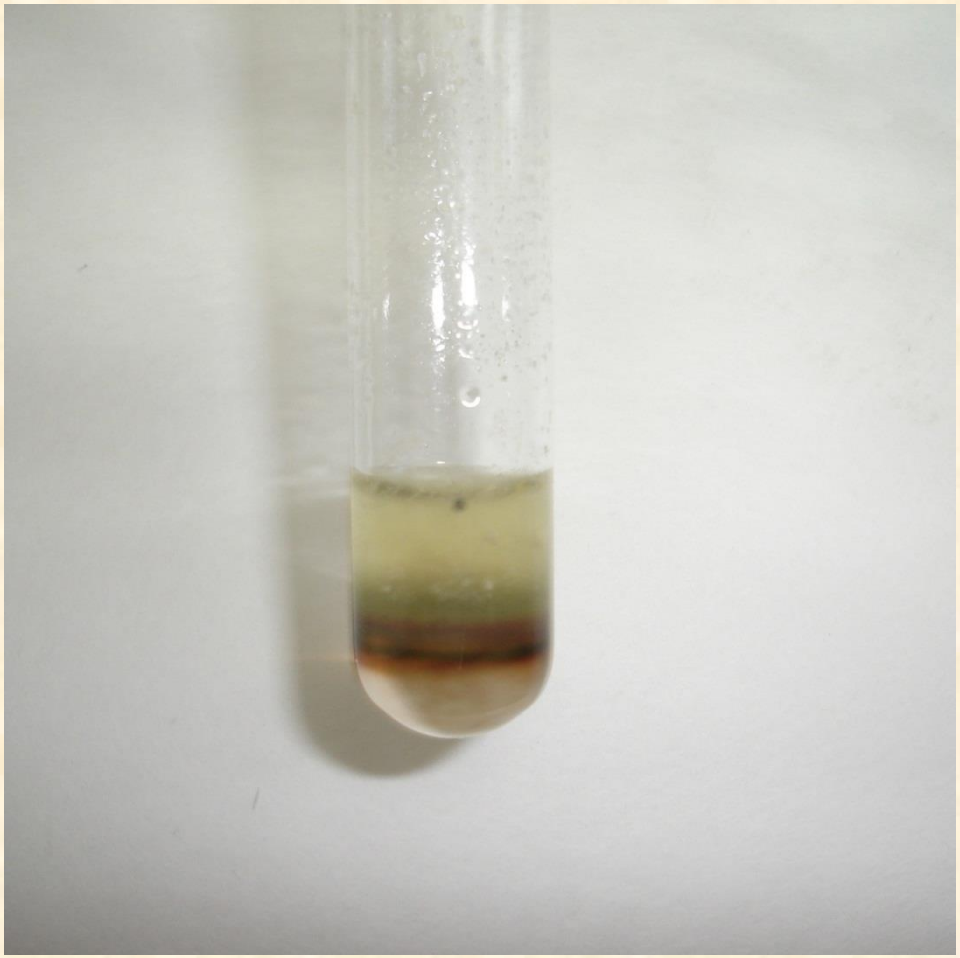
Molisch's Test



Molisch's Test



Molisch's Test



Principle of Benedict test

Heating a mixture of benedict reagent and a reducing sugar in a basic medium (PH 10.5) leads to the reduction of cupric ions to cuprous ions with the formation of cuprous oxide as a yellow – red precipitate .

Tests for Carbohydrate

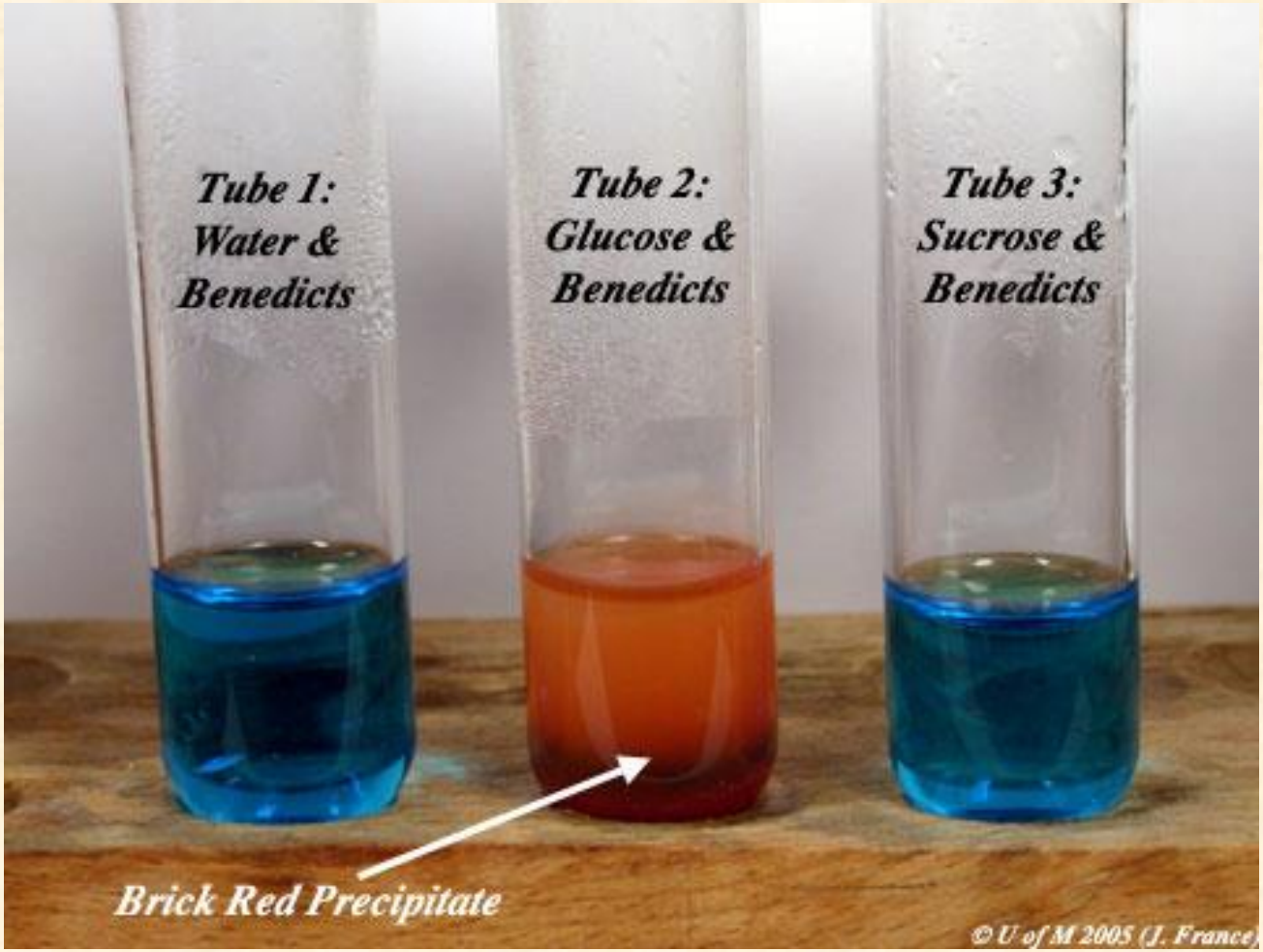
- **Benedict's Test**

  Test for reducing sugars

1. 0.5 ml of sugar solution
2. 1 ml of Benedict's reagent
3. Boiling water bath for 3 minutes

Change in colour due to red ppt. of Cu_2O

Benedict's Test



Principle of Barfoed's test

Monosaccharides reduces the cupric ion cu^{+2} (within 2 min) forms the cupper (Cu^{+1}) oxide (Cu_2o) faster than disaccharides which forms within (7-10 min) in slighthly acidic solution , and produce to Red ppt.

Tests for Carbohydrate

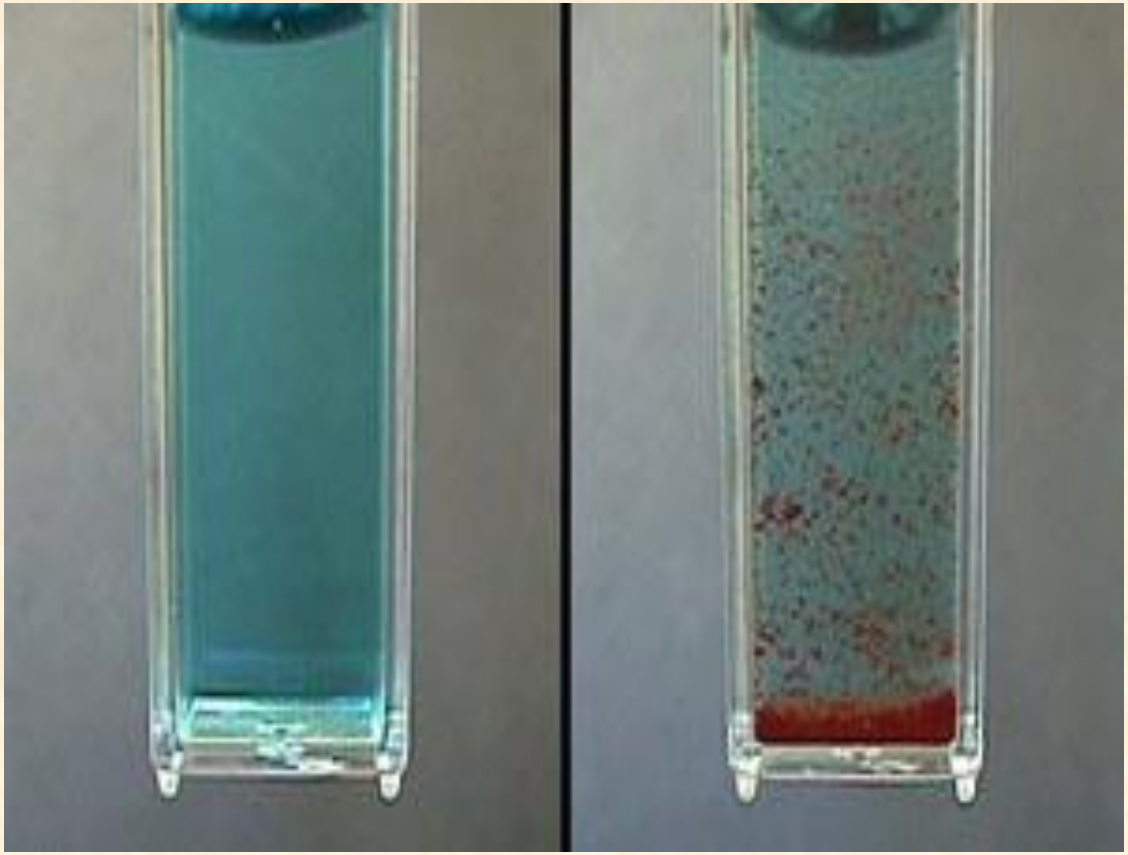
- **Barfoed's Test**

  Distinguish mono from disaccharides

1. 1 ml of sugar solution
2. 1 ml of Barfoed's reagent
3. Boiling water bath for 2-3 minutes

Red ppt. of Cu_2O

Barfoed's Test



Report

Test	G	F	P	L	S	St	Conclusion
Molisch							
Benedict							
Barfoed							
Bials							
Seliwanoff							
Iodine							

Report

Test	G	F	P	L	S	St	Conclusion
Molisch	+	+	+	+	+	/	
Benedict							
Barfoed							
Bials							
Seliwanoff							
Iodine							

Report

Test	G	F	P	L	S	St	Conclusion
Molisch	+	+	+	+	+	/	
Benedict	+	+	+	+	-	/	
Barfoed							
Bials							
Seliwanoff							
Iodine							

Report

Test	G	F	P	L	S	St	Conclusion
Molisch	+	+	+	+	+	/	
Benedict	+	+	+	+	-	/	
Barfoed	+	+	+	-	-	/	
Bials							
Seliwanoff							
Iodine							