Ch.1 Molecules of Life

(A) Carbohydrates

- Component: C, H, O (H:O ~ 2:1)
- General Formula: C x (H_2O) y
- Release energy when broken down to carbon & H_2O during glycolysis

	Monosaccharides	Disaccharides	Polysaccharides
Chemical formula	$C_6H_{12}O_6$	$C_{12}H_{22}O_{11}$	$(C_6H_{10}O_5)_n$
Form	Simplest form of carbohydrates	condensation between two monosaccharides (H2O will be formed)	polymerization of monosaccharides
Reducing sugar	Reducing	Reducing sugar **except sucrose**	Not reducing
Taste	Sweet	Sweet	Not sweet
Solubility in water	Soluble	Soluble	Insoluble
Examples	1) Glucose 2) Fructose 3) Galactose	1) glucose + glucose → maltose 2) glucose + fructose → sucrose 3) glucose + galactose → lactose	1) Starch 2) Glycogen 3) Cellulose
Functions	1) Transport form of carbohydrates in organisms 2) As substrate to release energy during respiration in cell	1) storage in plant cell (sucrose) 2) transport in phloem (sucrose) 3) converted into respiratory substrate	1) Starch: major storage in plant 2) Glycogen: major storage form in animal in liver, muscle 3) Cellulose: major component of cell wall

	3) Building up of complex carbohydrates		

Experiment

1. Benedict's Test for reducing sugar

- Add equal volume of Benedict's solution and substance to be tested in the test tube.
- Mix and shake the test tube gently.
- Heat it in a boiling water bath for 5 mins.

✓ reducing:	give brick-red precipitate
✕ non-reducing:	remains blue

Exam corner:

- Benedict's solution can distinguish between reducing and non-reducing sugars.
- Bear in mind that sucrose is a non-reducing sugar.

Example:

Which of the following pairs of carbohydrates can be differentiated using Benedict's test?

(1) lactose and starch

(2) fructose and sucrose

(3) glucose and lactose

(4) galactose and starch

A. (1) and (3) only

B. (2) and (4) only

C. (1) and (4) only

D. (2) and (3) only

Answer: B (sucrose is not a reducing sugar)

2. Clinistix test for glucose

- Dip the clinistix paper into the solution to be tested.

✓ glucose:	turns to purple/ blue
✕ glucose:	remains pink

3. Diastix test for glucose

✓ glucose:	turns to brown
✕ glucose:	remains green

4. Iodine test for starch

- Add a few drops of iodine solution.

✓ starch:	turns to blue-black
✕ starch:	remains yellowish orange