Cell Biology subunits so far:

- **Cell Parts (Organelles)**
  - Review homework
- **Diffusion**
  - Review lab
  - Review homework
- **NOW: Photosynthesis & Respiration**

LO: Construct models.

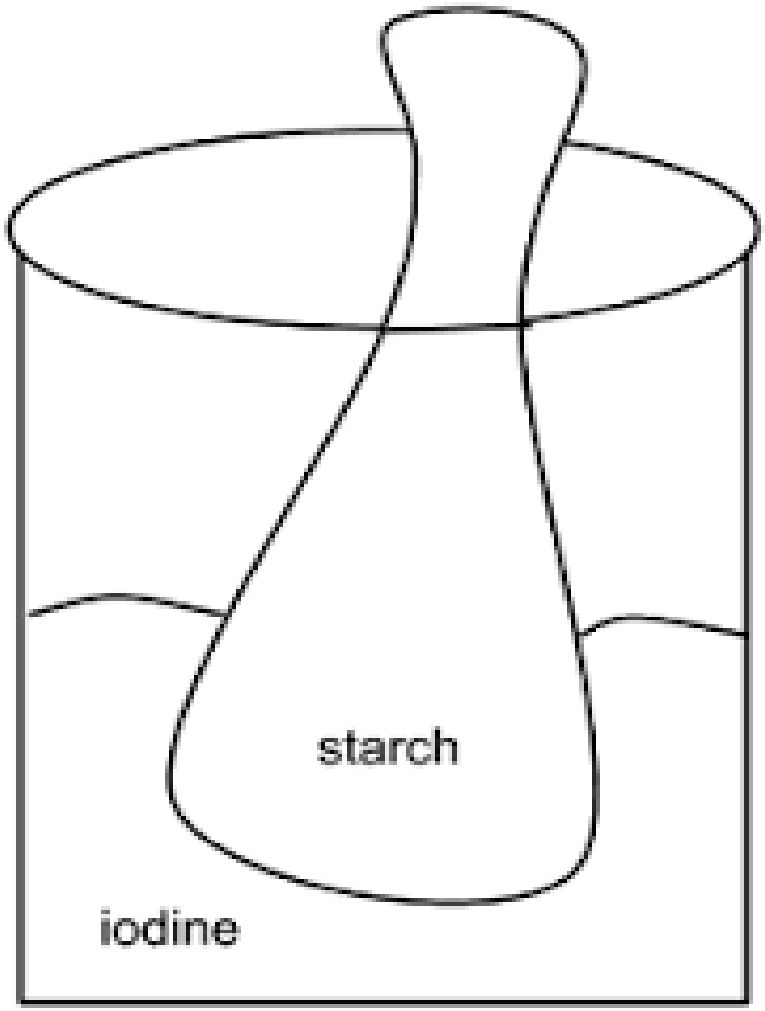
SLE: Work collaboratively.

Image: S. Freeman et al., *Biological Science* (2014)

Old homework on interacting cells

STEP	A FEATURE OF CELLS INVOLVED IN THIS STEP
Muscle cells break down food and produce CO_2.	
CO_2 diffuses out of the muscle cells into the blood.	
The blood carries CO_2 to the lungs.	
CO_2 diffuses out of the blood into the lungs.	
The lungs expel the CO_2-rich air.	

Lab & homework on diffusion



(1) Look up (on the Internet) and briefly describe whether/how each of the following can get through cell membranes

- (a) Sodium ions (Na^+)
- (b) Glucose (a sugar)
- (c) Carbon dioxide (CO_2, a gas)
- (d) Hemoglobin (a large protein)

(2) Based on all of your answers to #1, write a sentence that describes the permeability of cell membranes.

Diagram: https://www.biologycorner.com/worksheets/diffusionlab.html

Photosynthesis & Respiration

- Definitions (in words)?

- Associated with which organelles?

- Chemical bonds between atoms are made and broken.

Image: S. Freeman et al., *Biological Science* (2014)

Atoms, molecules, and bonds

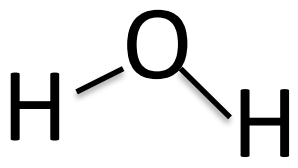
- Chemical formula for photosynthesis:

$$6CO_2 + 6H_2O + \text{light energy} \rightarrow C_6H_{12}O_6 + 6O_2$$

carbon dioxide — water — glucose — oxygen

O=C=O

O=O



Chemical structure of glucose: chemicalformula.org

Glucose

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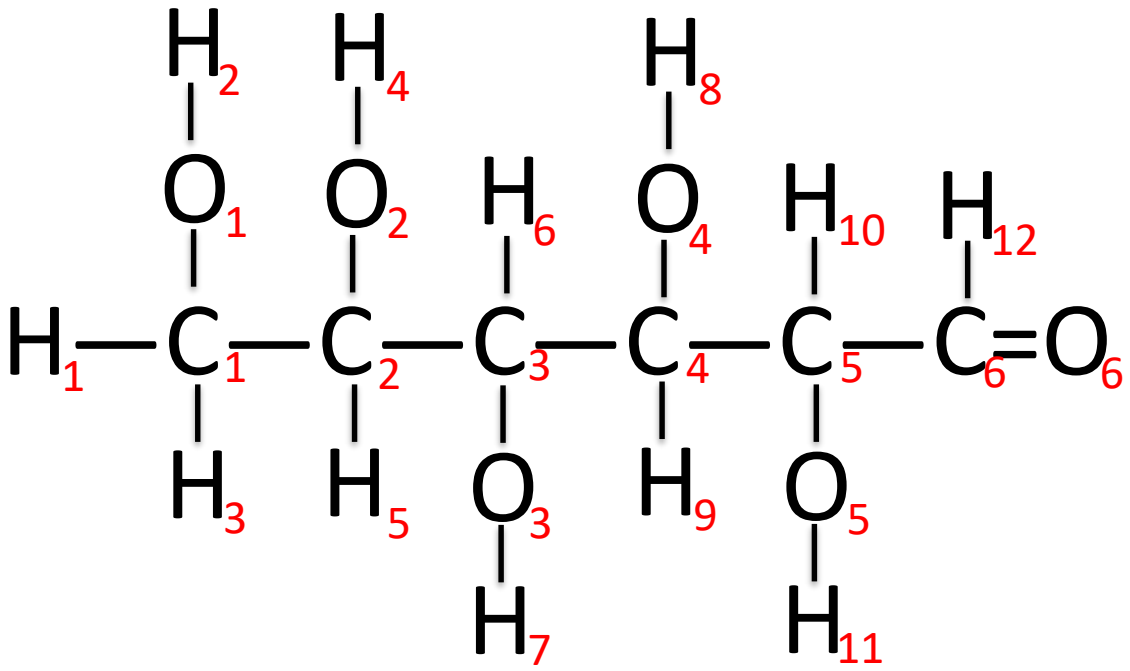

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Photosynthesis Calypso

Pho-to… Pho-to-syn-the-sis…
Daylight come and the plants make food!
Pho-to… Pho-to-syn-the-sis…
Daylight come and the plants make food!

Three carbons, four carbons, five carbons, six!
(Daylight come and the plants make food.)
That's what you get when C-O-2 is fixed!
(Daylight come and the plants make food.)
Come Mr. Tally Man, tally up the glucose!
(Daylight come and the plants make food.)
Plants convert it into starch and into sucrose!
(Daylight come and the plants make food.)

Pho-to… Pho-to-syn-the-sis…
Daylight come and the plants make food!
Pho-to… Pho-to-syn-the-sis…
Daylight come and the plants make food!

http://faculty.washington.edu/crowther/Misc/Songs/photo.shtml

Homework (due Oct. 4)

(1) Chemical reactions involve changes in which atoms (C, H, O) are bonded to which. Does photosynthesis include chemical reactions? How do you know?

(2) Building large molecules (like glucose) out of smaller ones usually requires the input of energy. Is that true of photosynthesis? If so, where does the energy come from?

(3) In the chemical equation for photosynthesis, how many C, H, and O atoms are on the left side of the arrow? How many of each are on the right side?

Next 24 slides:
printouts for a human model
of a glucose molecule

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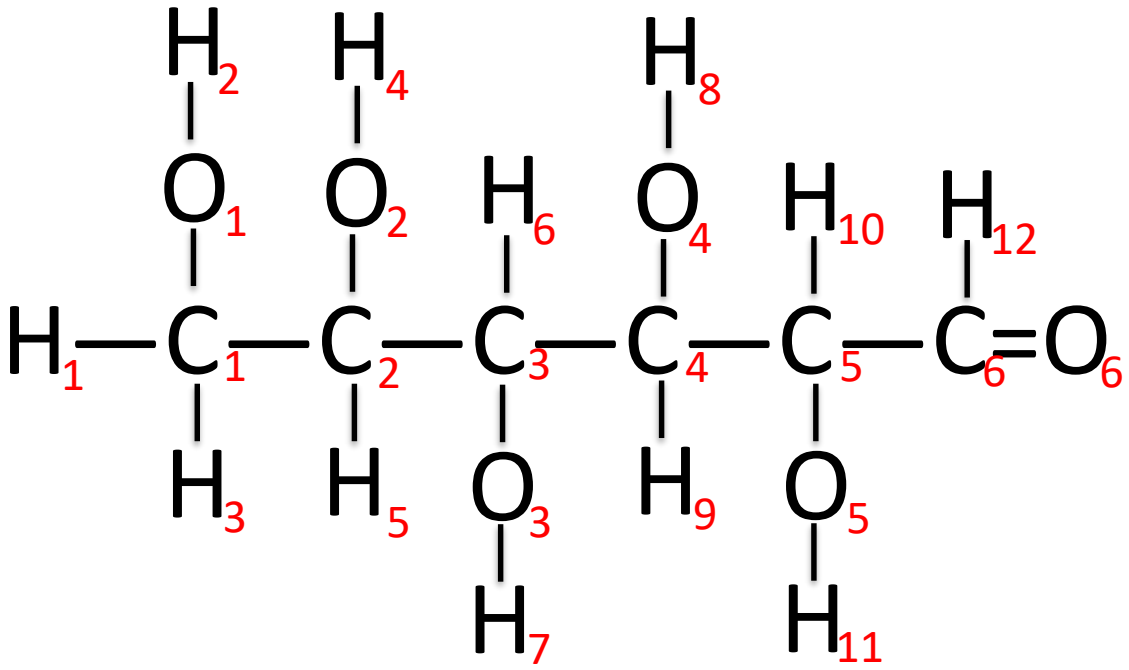

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You are C_1

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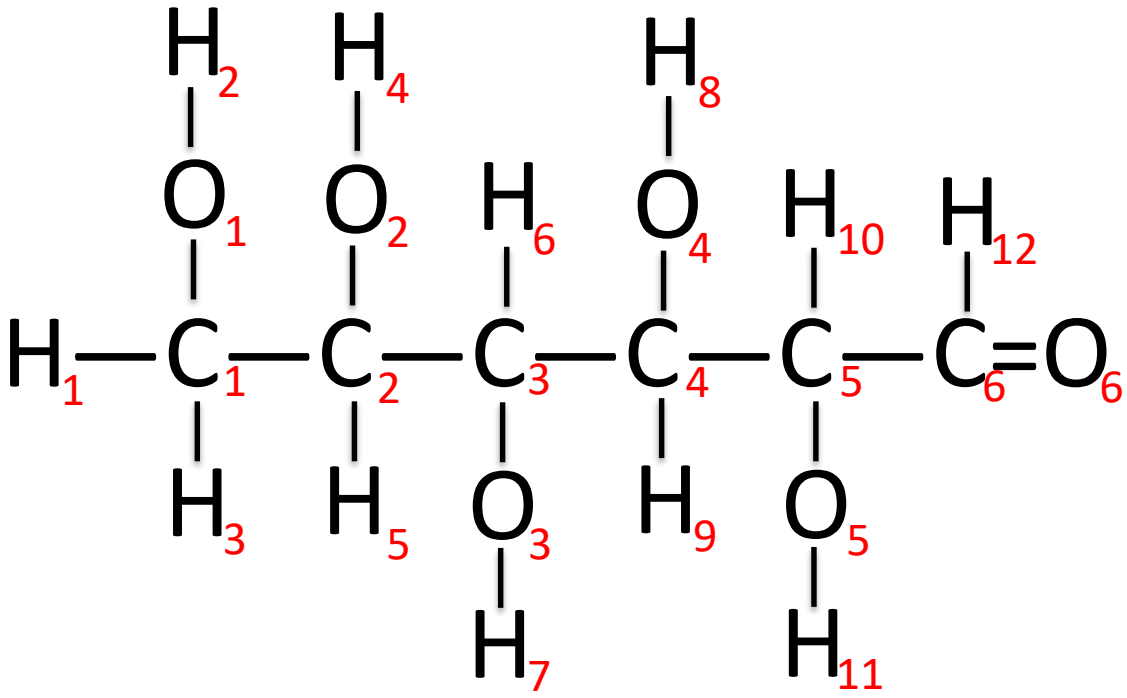

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You are C_2

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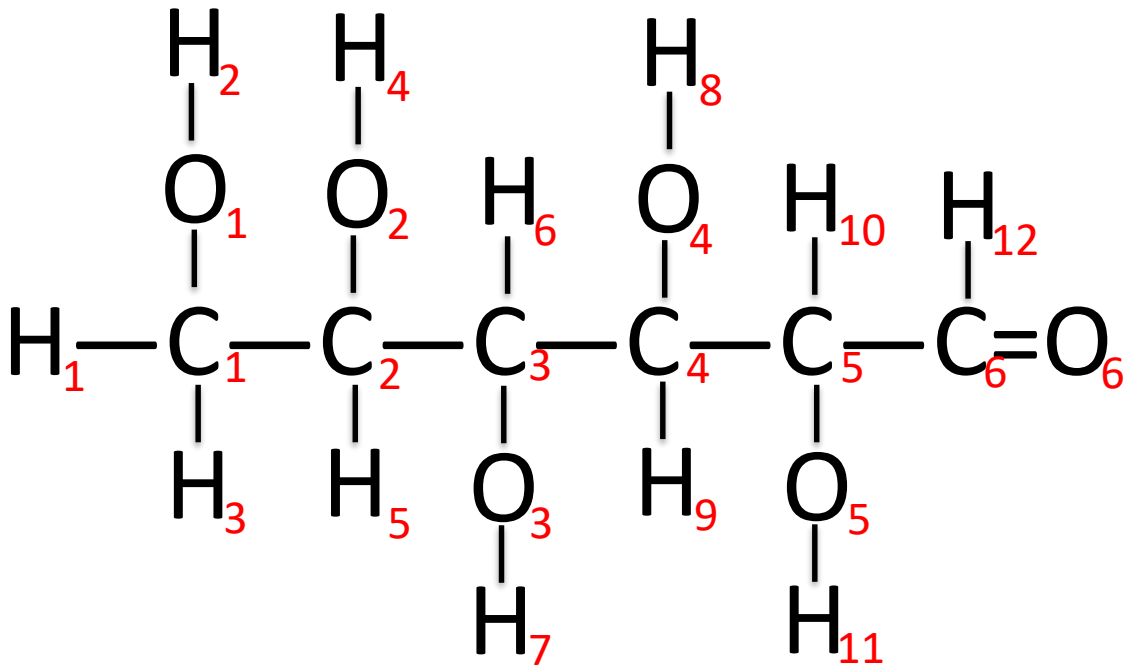

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You are C_3

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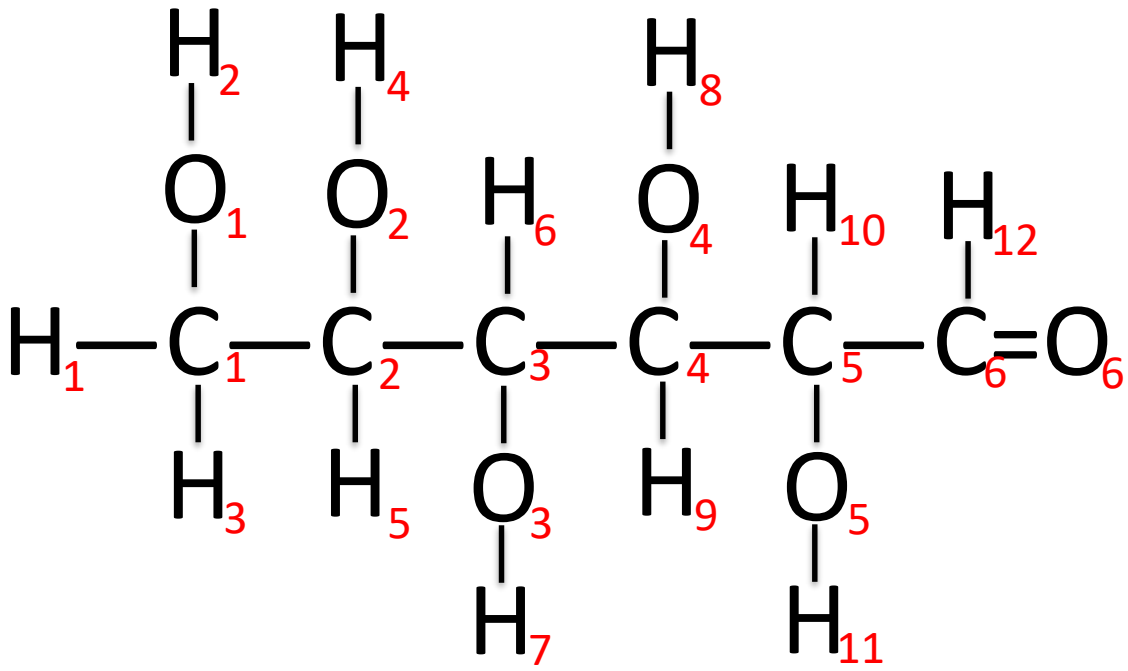

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You are C_4

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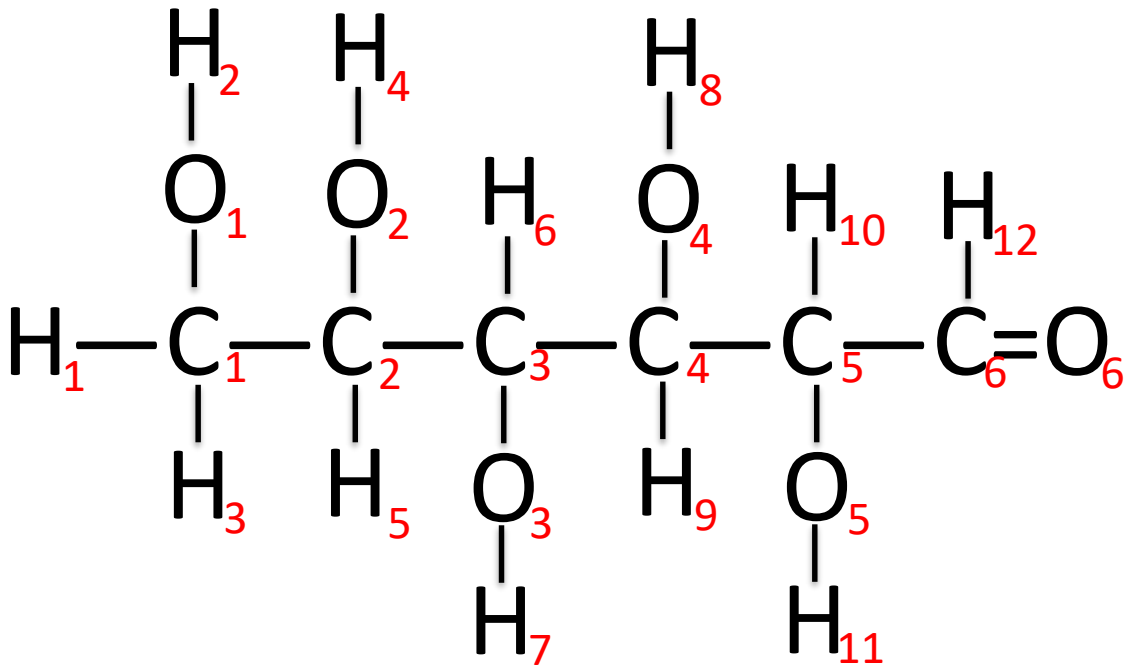

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You are C_5

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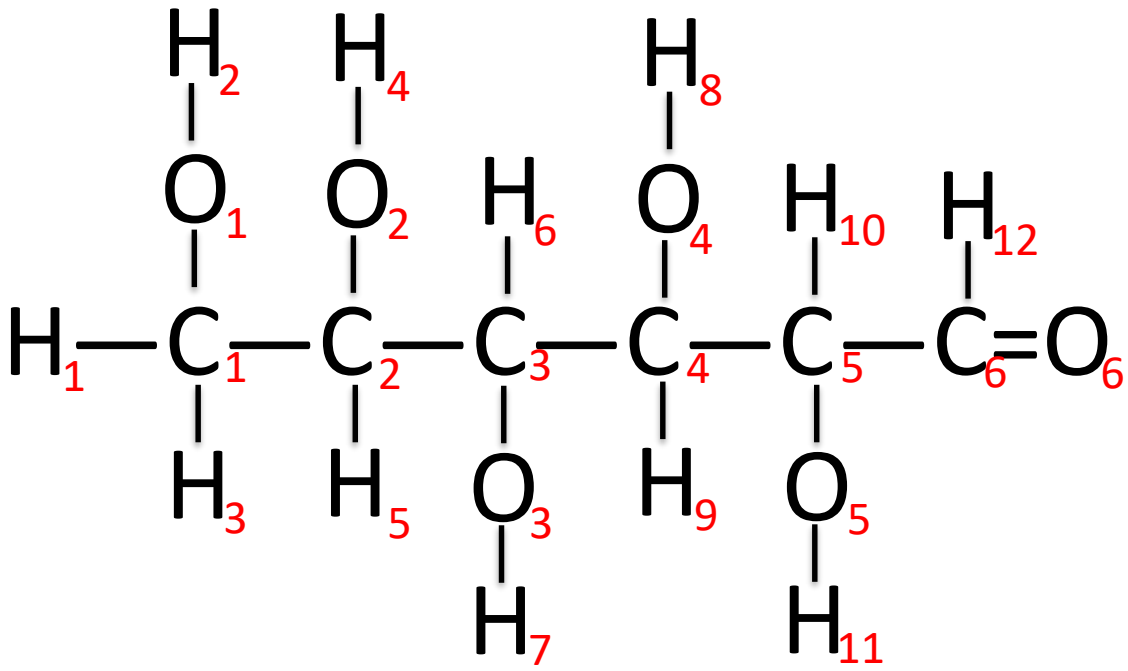

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You are C_6

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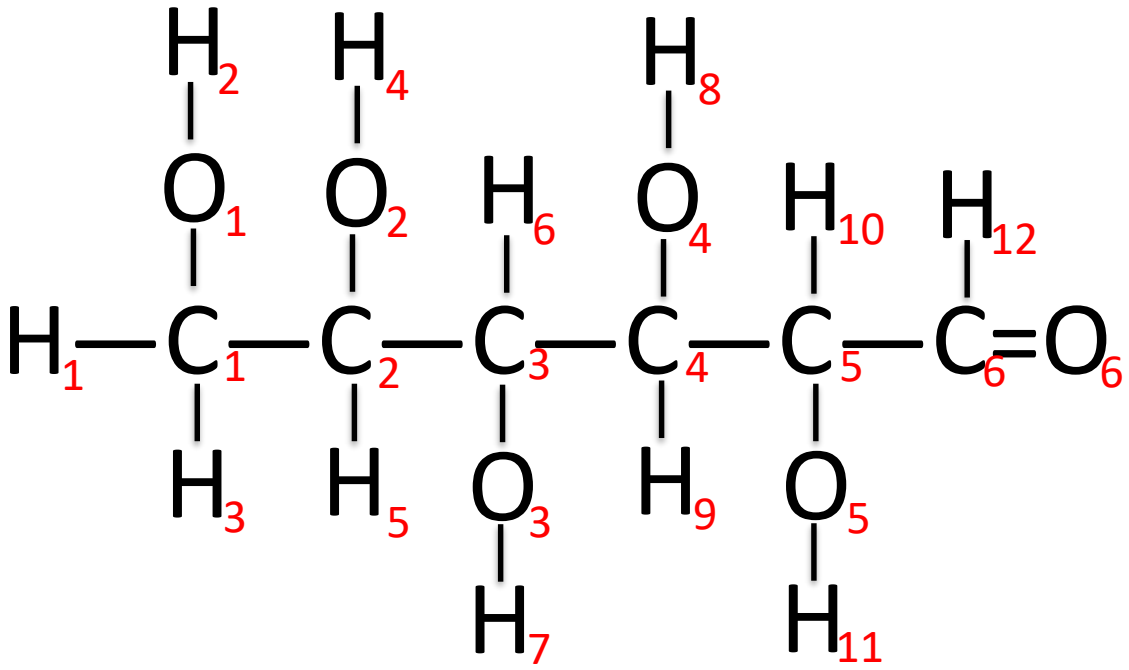

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You are O_1

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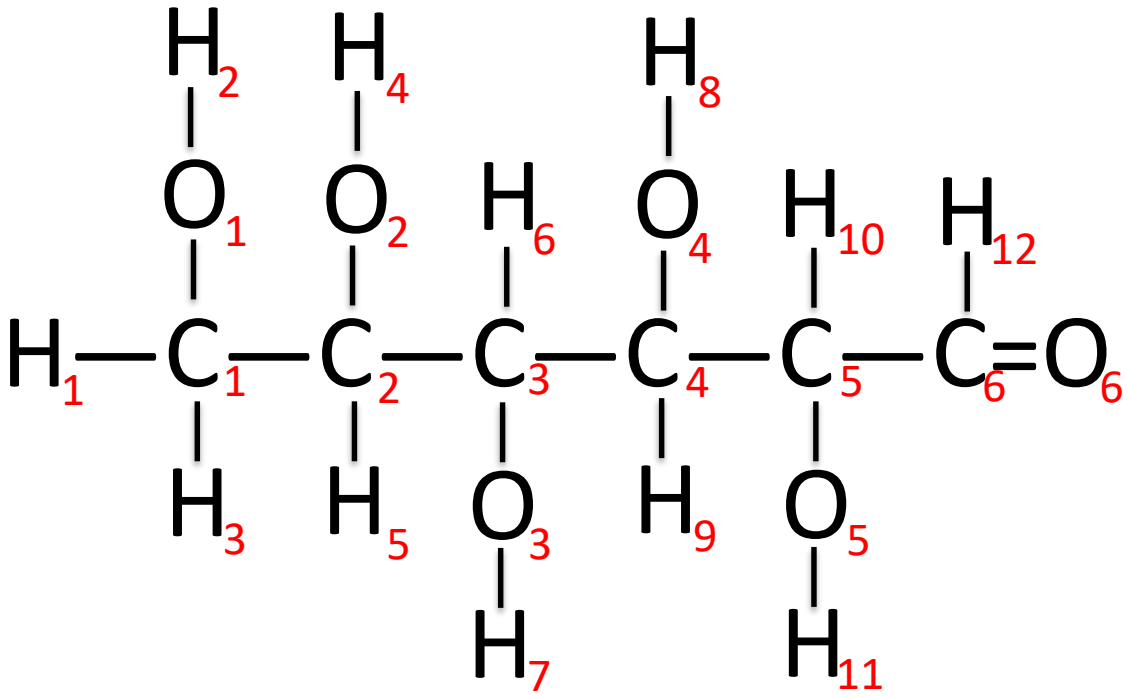

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You are O_2

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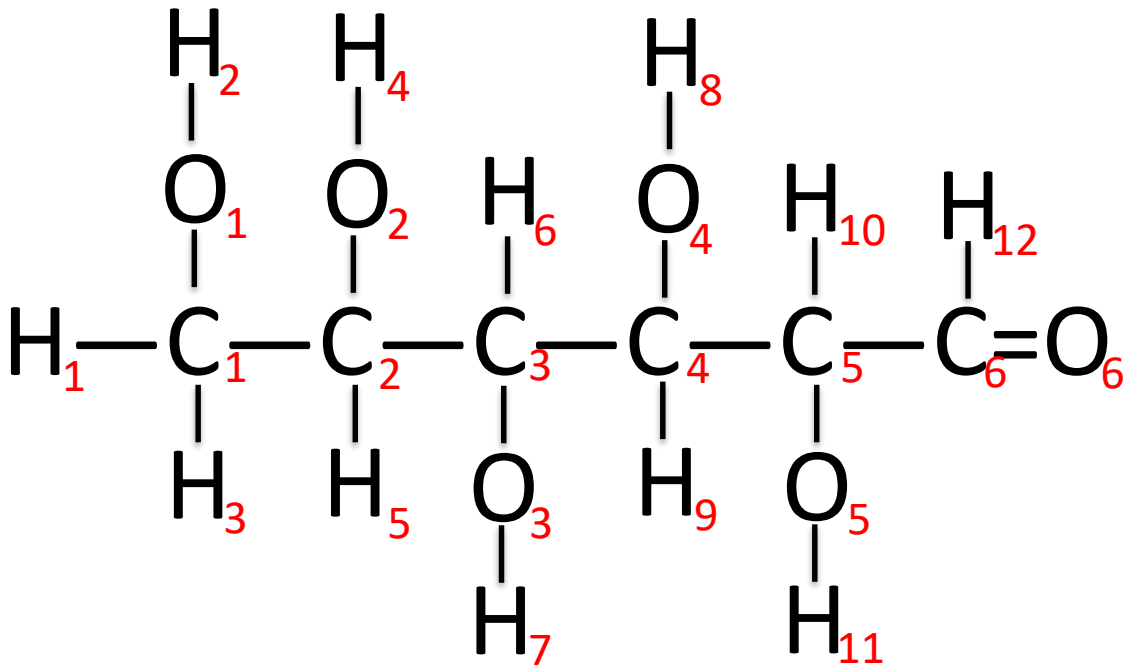

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You are O_3

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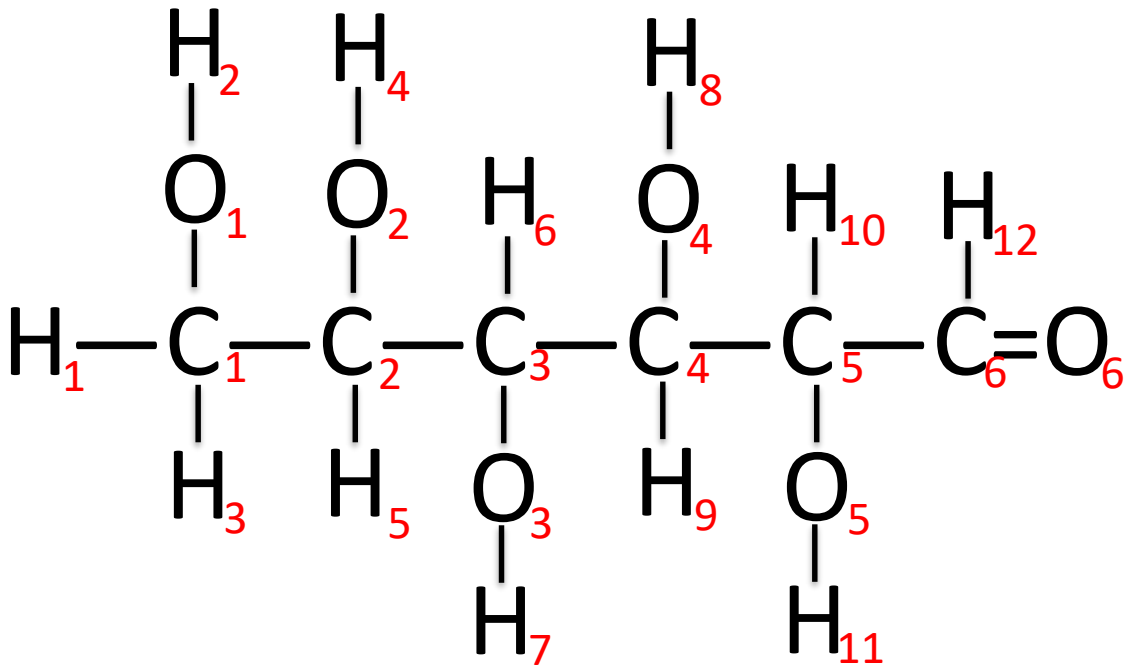

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You are O_4

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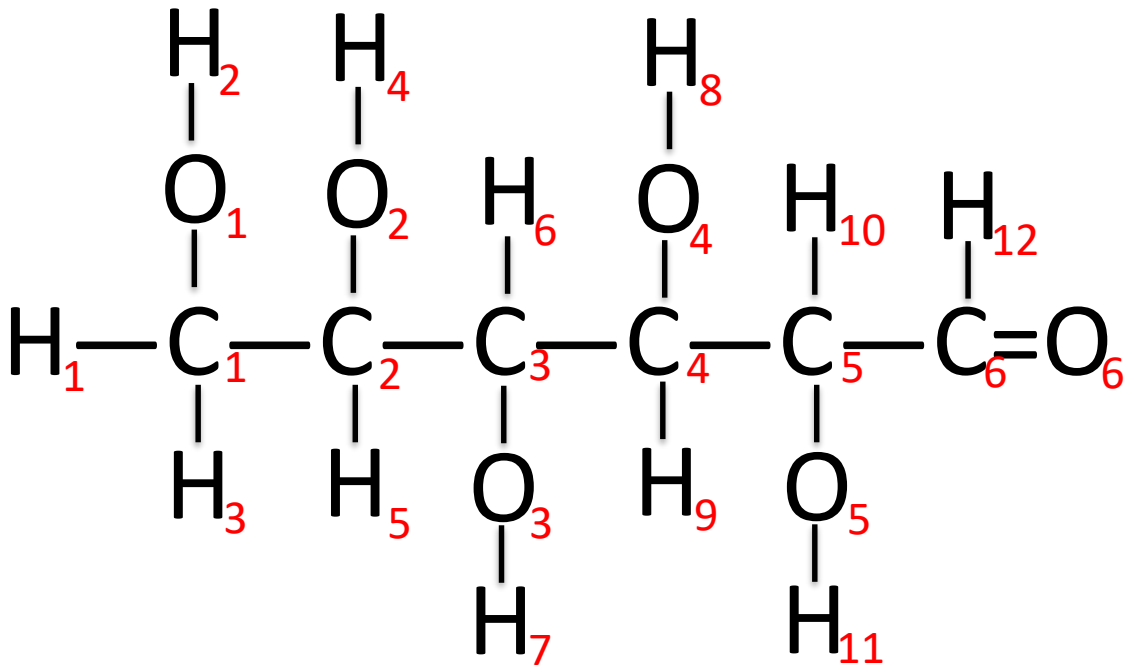

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You are O_5

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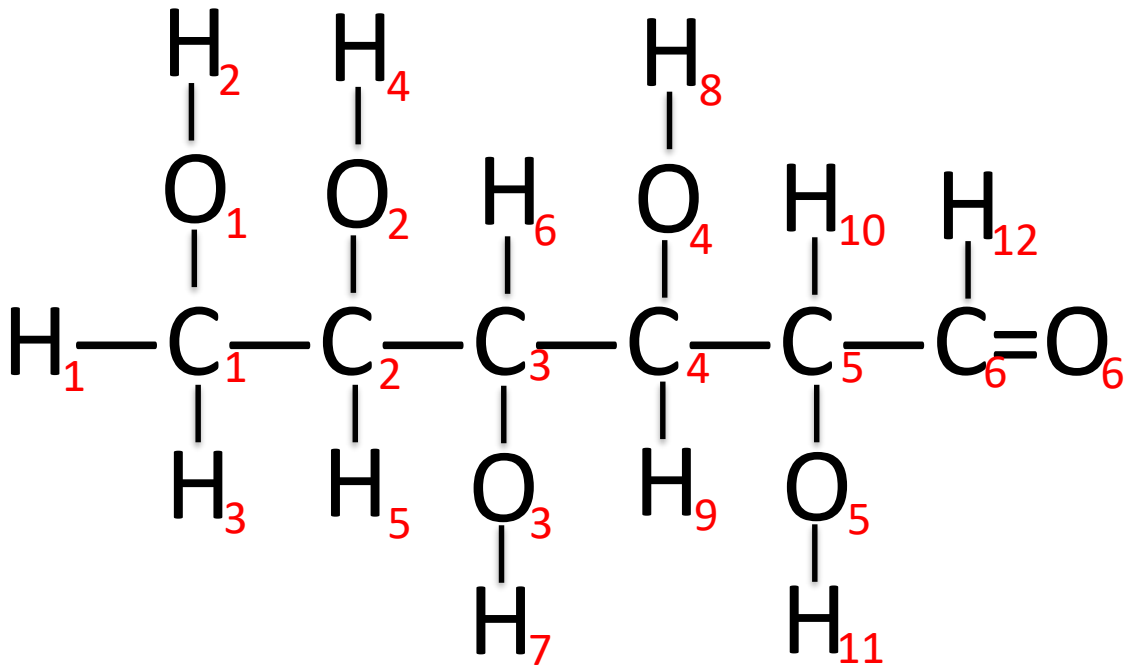

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You are O_6

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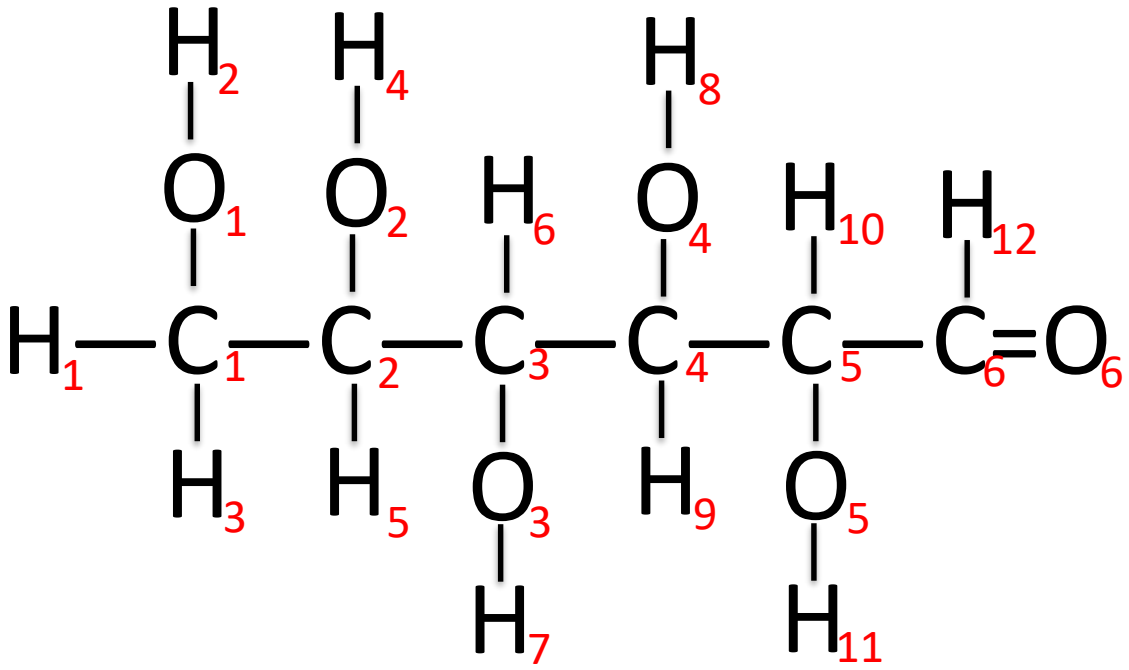

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You are H_1

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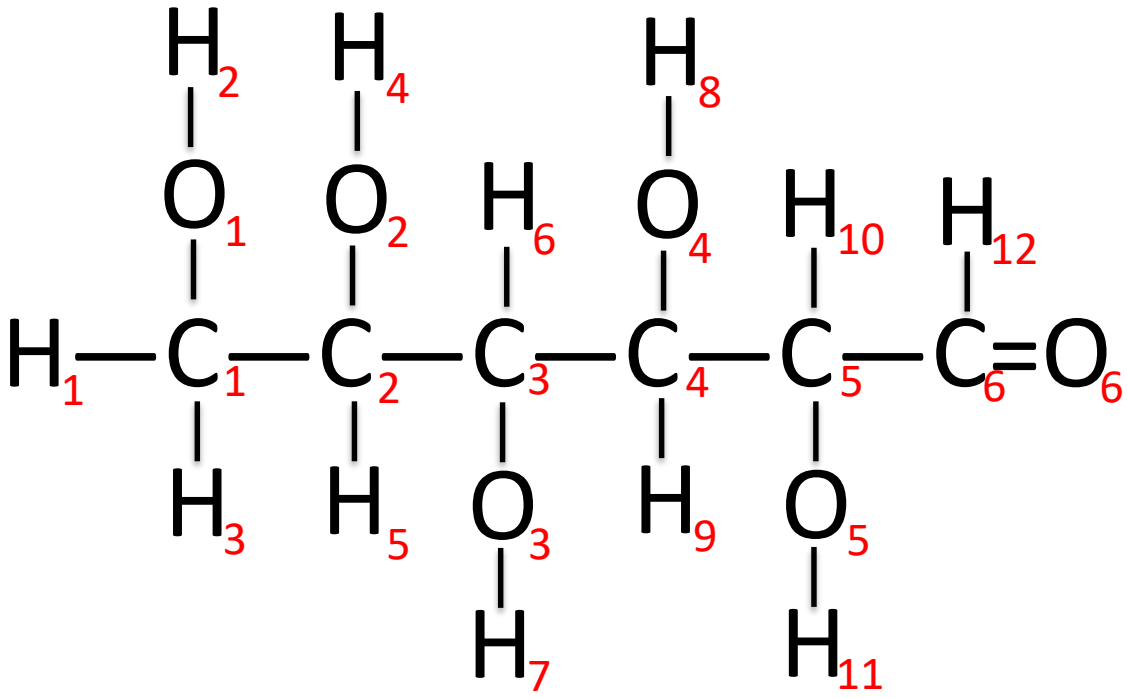

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You are H_2

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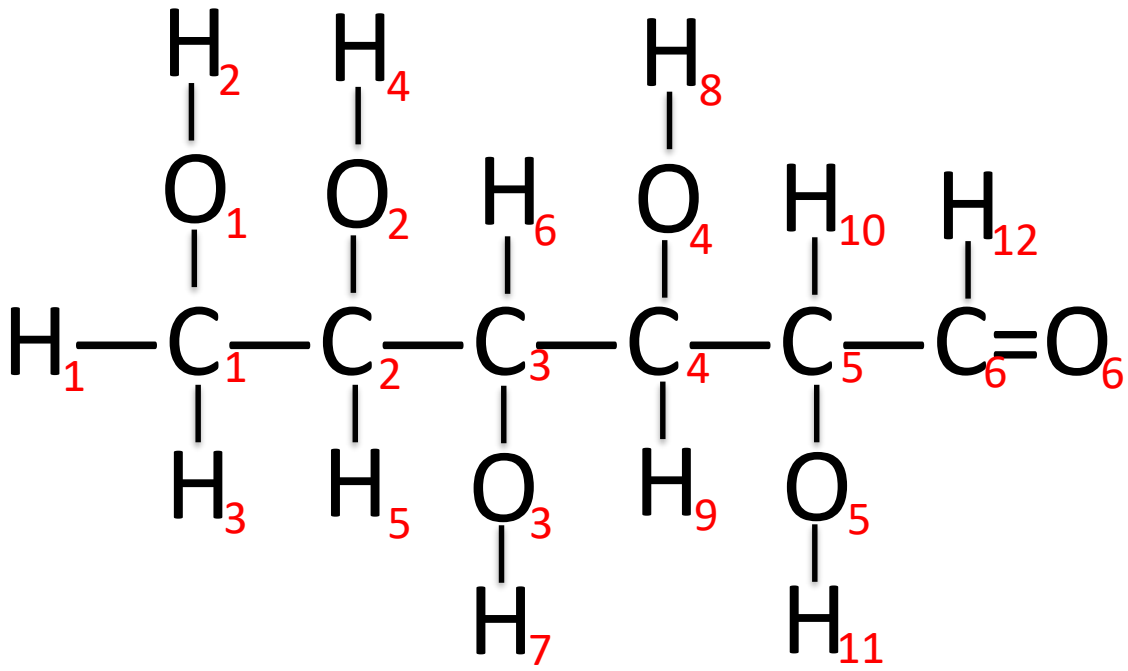

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You are H_3

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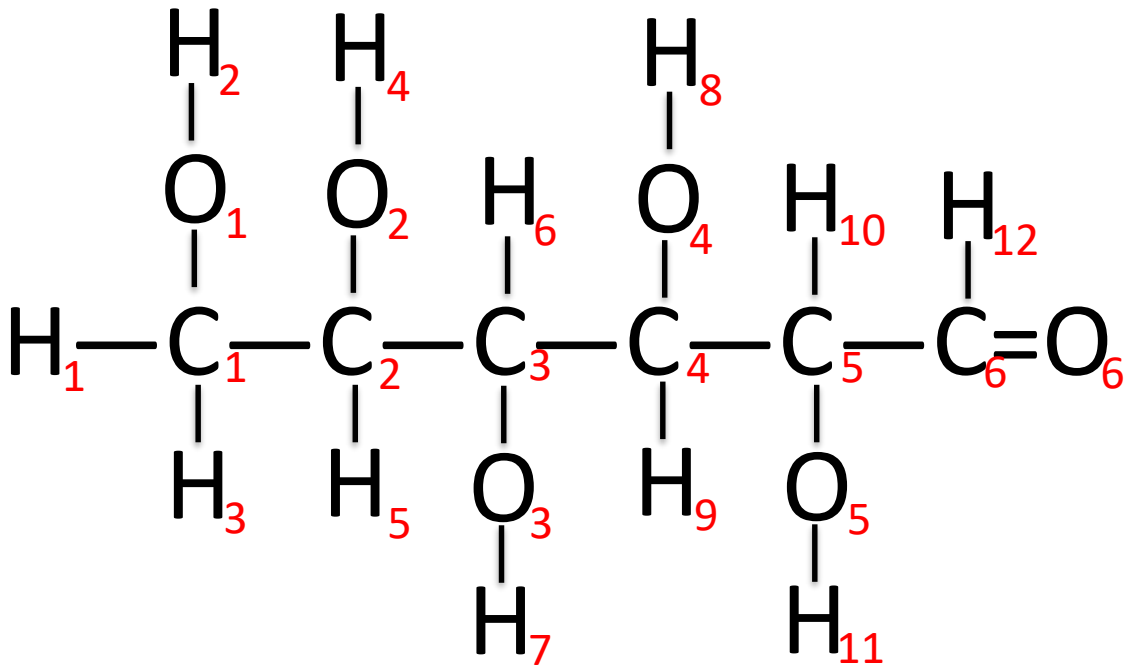

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You are H_4

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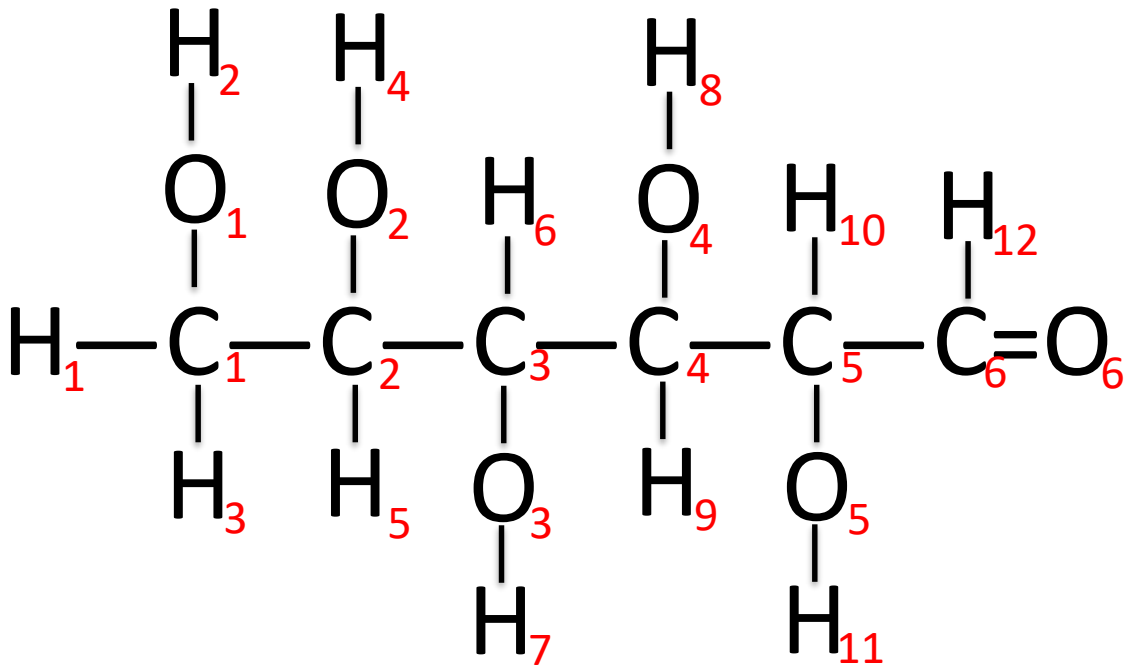

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You are H_5

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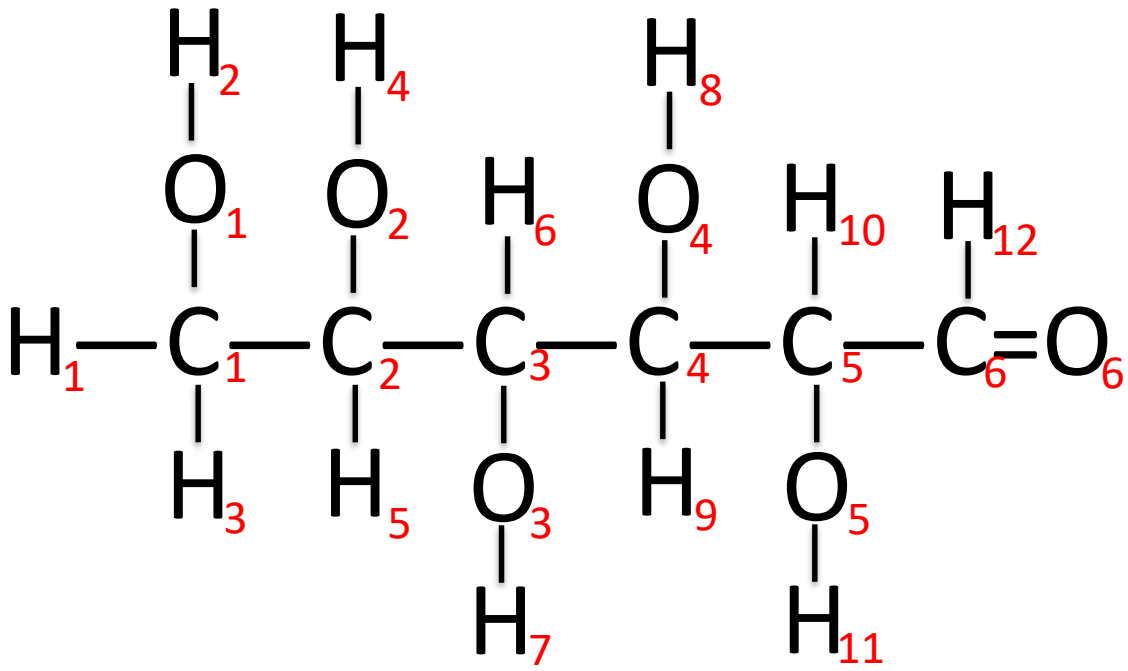

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You are H_6

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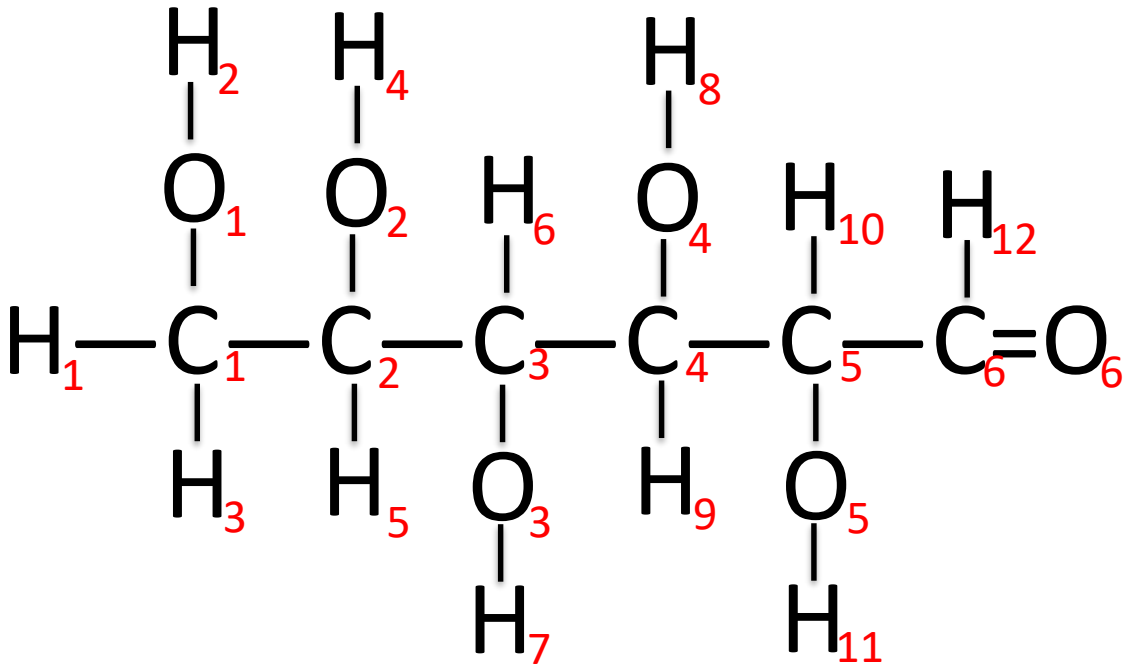

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You are H_7

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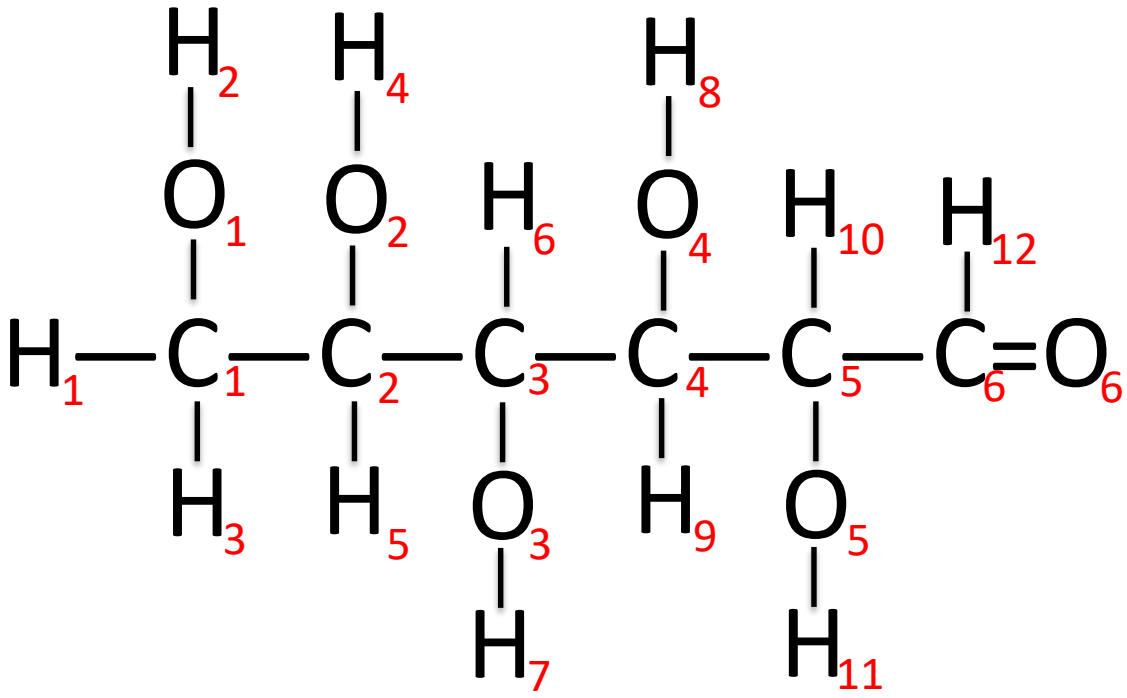

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You are H_8

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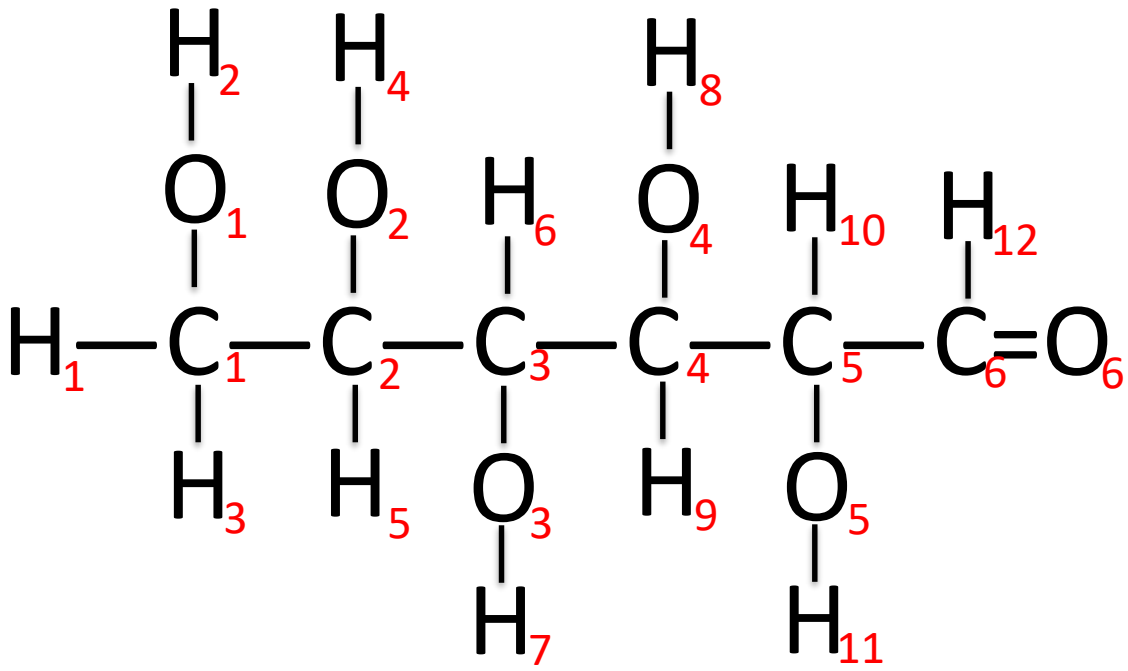

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You are H_9

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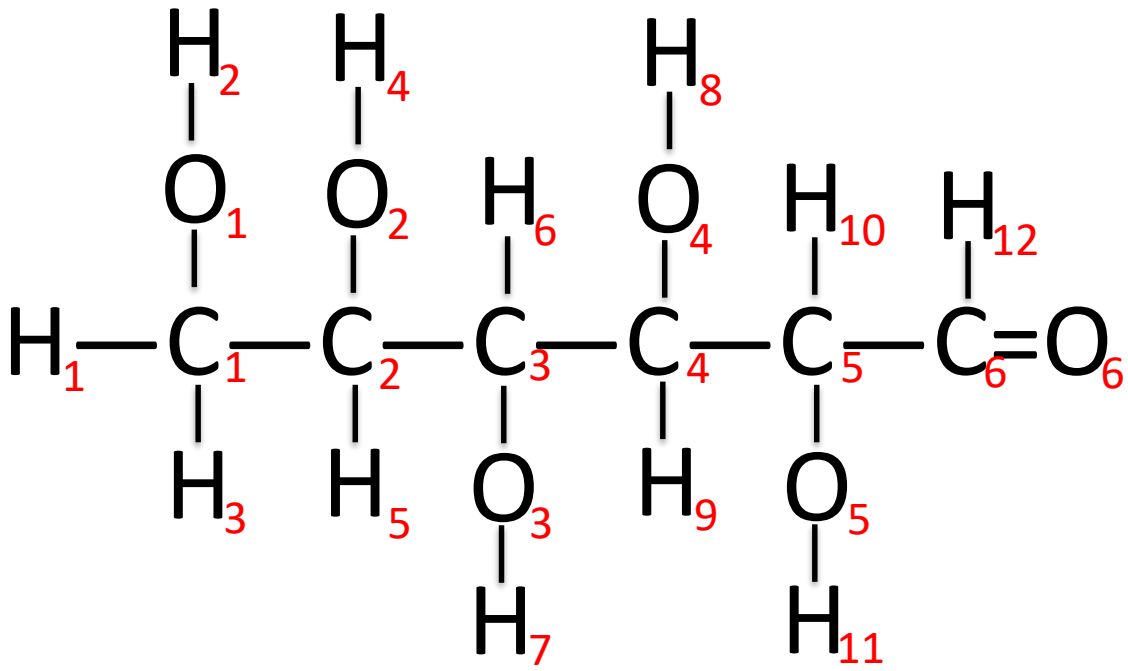

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You are H_{10}

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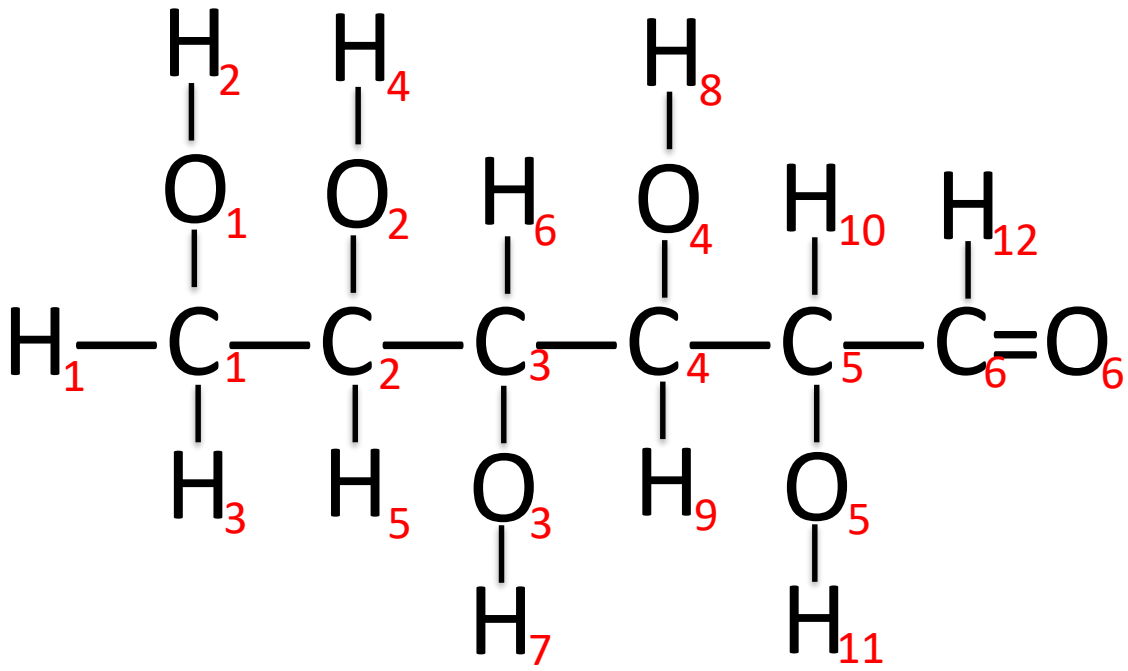

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You are H_{11}

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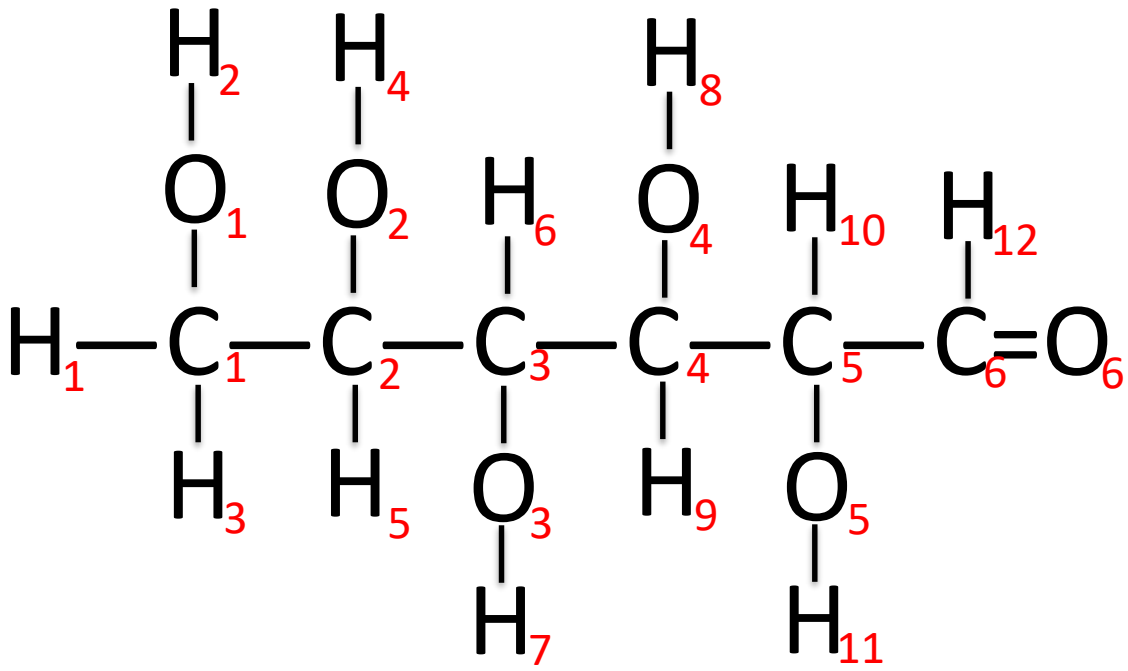

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You are H_{12}