

Difference Between Plasmolysis and Hemolysis

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Key Difference - Plasmolysis vs Hemolysis

Plasmolysis and hemolysis are two processes occurring in the cells. Plasmolysis is the process of the shrinking of plant cells due to the water loss by [exosmosis](#). Plasmolysis occurs due to high water potential of the cell compared to the outside solution. Until water potentials become equal, water molecules come out from the cell. It causes the contraction of the [protoplasm](#). Protoplasm together with the [cell membrane](#) detaches from the cell wall. Hemolysis is a process that occurs in [red blood cells](#). Due to bacterial hemolytic [enzymes](#), red blood cells are destroyed or ruptured and the cell content leaks to the outside. This process is known as hemolysis. There are three types of hemolysis namely [alpha hemolysis](#), [beta hemolysis](#), and gamma hemolysis. The **key difference** between plasmolysis and hemolysis is that **plasmolysis occurs in plant cells due to the loss of water molecules from the cell while hemolysis occurs in red blood cells due to the destruction of red blood cell membranes by bacterial enzymes.**

What is Plasmolysis?

Plant cells lose water molecules when they are placed in a solution having a low water potential or high solute potential (hypertonic solution). Water molecules leave the cell by exosmosis. When water molecules come out the cell, protoplasm volume decreases. Hence, protoplasm shrinks and detaches from the cell wall. The process that causes the protoplasm shrinkage due to exosmosis is known as plasmolysis. Due to plasmolysis, plants wilt and show the loss of [turgidity](#). However, water potential and the protoplasm volume can be restored to the normal state by reverse osmosis or deplasmolysis.

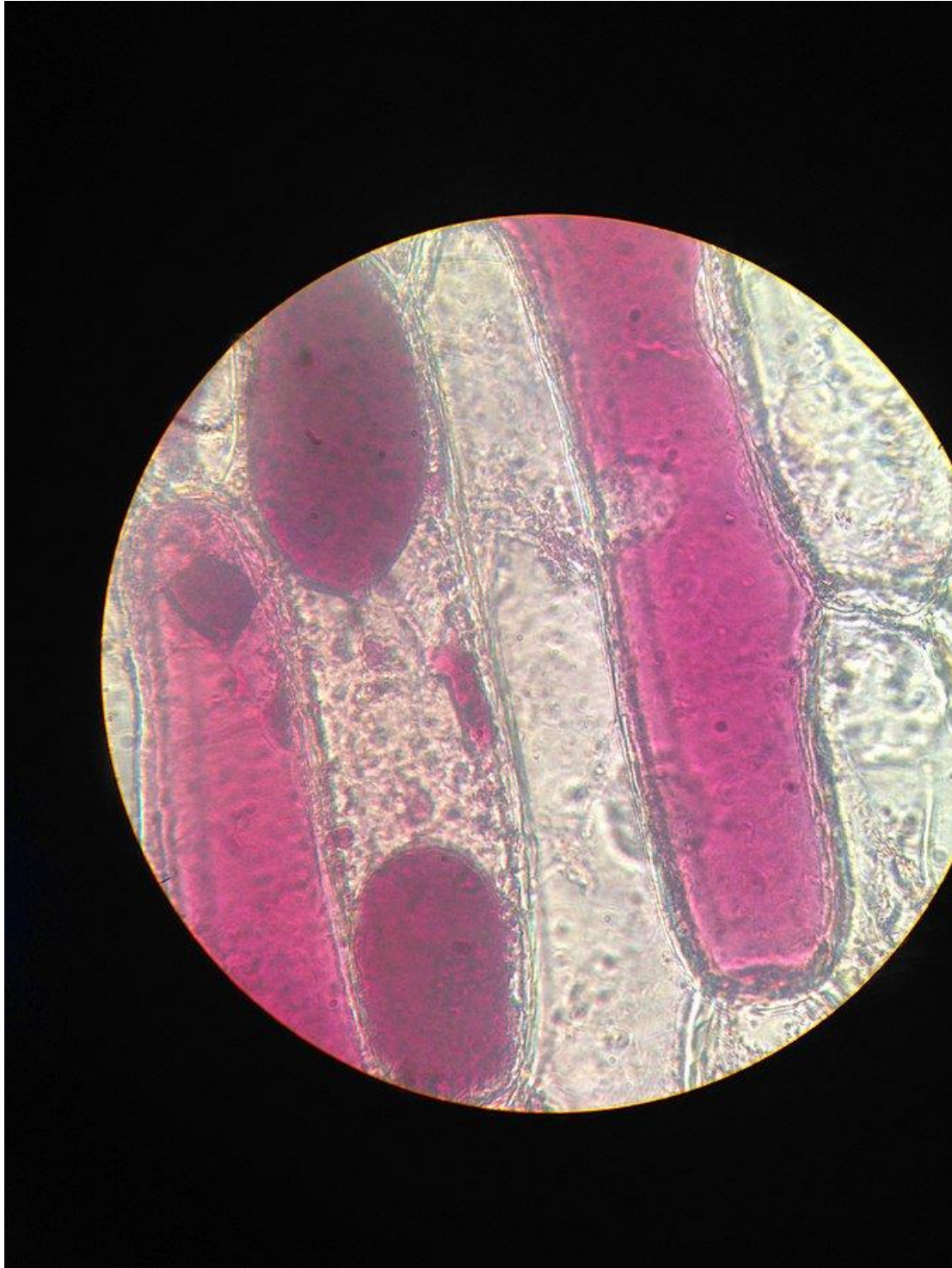


Figure 01: Plasmolysis and Deplasmolysis

Plant cell has rigid cell walls. Due to this rigid cell wall, plant cells do not rupture. Therefore, plant cells are not ruptured during these processes.

What is Hemolysis?

Red blood cells transport oxygen throughout the body. Red blood cells contain an iron-containing metalloprotein called [hemoglobin](#) for this process. Hemoglobin molecules located inside the red blood cells. The destruction of the red blood cells causes the release of hemoglobin from the red blood cells to the blood plasma. This process is known as hemolysis. Some bacteria produce an enzyme called hemolysin, which catalyzes the breakdown of red blood cells. Hemolysis is in three types; alpha hemolysis, beta hemolysis, and gamma hemolysis. In alpha hemolysis, red blood cells are partially broken down while in beta hemolysis, red blood cells are completely broken down.

Alpha hemolysis is catalyzed by the bacterial hemolytic enzyme called alpha hemolysin. Several bacterial species are responsible for the alpha hemolysis and they are *S. pneumoniae*, *Streptococcus mitis*, *S. mutans*, and *S. salivarius*. When these bacteria are grown in blood agar medium, around their colonies, greenish colour develops due to the incomplete destruction of red blood cells. Greenish colour is due to the presence of biliverdin and this compound is a byproduct of hemoglobin breakdown.



Figure 02: Hemolysis

Beta hemolysis is the process of complete destruction of red blood cells. The cell membranes of the red blood cells are destroyed by the bacterial hemolytic enzymes. Therefore, hemoglobin molecules are released into the blood plasma. Beta hemolysis occurs due to the bacterial enzyme called beta hemolysin. The bacteria that cause

beta hemolysis are known as beta hemolytic bacteria and the common species are *S. pyogenes* and *S. agalactiae*. When these bacteria are grown in blood agar medium, they release beta-hemolysin into the medium. Beta hemolysins breakdown the red blood cells completely. Hence, clear zones are produced around the bacterial colonies. Beta hemolysis is identified by the clear zones produced around the bacterial colonies.

What are the Similarities Between Plasmolysis and Hemolysis?

- Both Plasmolysis and Hemolysis are processes associated with cells.
- Both Plasmolysis and Hemolysis processes are not good for the organisms.

What is the Difference Between Plasmolysis and Hemolysis?

Plasmolysis vs Hemolysis	
Plasmolysis is the shrinking of the plant cell protoplasm due to exosmosis.	Hemolysis is the rupturing of red blood cells.
Occurrence	
Plasmolysis occurs in plant cells.	Hemolysis occurs in red blood cells.
Organisms	
Plasmolysis is a process that happens in plants.	Hemolysis is a process that happens in animals.
Types	
Plasmolysis is only one type.	Hemolysis is three types; alpha hemolysis, beta hemolysis and gamma hemolysis.
Cell Rupture	
Plant cell does not rupture due to plasmolysis	Red blood cells rupture due to hemolysis
Outcome	

Plasmolysis causes the wilting of plants.	Hemolysis causes hemolytic anemia.
Possibility of Reversing the Process	
Plasmolysis can be reversed (deplasmolysis).	Hemolysis cannot be reversed.
Lysis of the Cell	
Cells do not lyse due to plasmolysis.	Cell lysis occurs in hemolysis.

Summary - Plasmolysis vs Hemolysis

Plasmolysis is the process of contraction of the protoplast of a plant cell as a result of the loss of water from the cell. Water loss occurs via exosmosis. The protoplasm of the plant cell detaches from the cell wall. Hemolysis is the breakdown of red blood cells by the bacterial enzymes. When the cell membranes of the red blood cells are disrupted, hemoglobin molecules leak into the blood plasma. The enzymes that are involved in hemolysis are known as the hemolysin. Many bacteria are able to produce hemolysin enzymes. There are three types of hemolytic reactions; alpha hemolysis, beta hemolysis and gamma hemolysis. Hemolytic anemia is the disease condition that causes due to the excessive destruction of red blood cells in the blood

Reference:

- 1, "Hemolysis." Hemolysis - an overview | ScienceDirect Topics. [Available here](#)
2. Study.com, Study.com. [Available here](#)

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