

Permeability of Red Blood Cells

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Table 1. Average, standard deviation and standard error calculation derived from the time (in seconds) observed for erythrocytes of a horse to reach hemolysis with variation solution.

Solutions	Trials(s)			Mean	Standard error
	Trial 1	Trial 2	Trial 3		
Distilled Water^a	2	2	2	2	0
Thiourea	1.15	1.13	1.05	1.11	
Ethanol	15	20	18	17.6	
Dextrose^b	1200	1200	1200	1200	0
Triton^a	2	2	2	2	0

^a Solutions with hemolysis less than 2 seconds

^b Solution with hemolysis more than 20 minutes

Discussion

Certain factors affected the diffusion of solutes which were tested in the permeability, the factors include; the size of the molecule and the other is the polarity of the molecule.

The size of the molecule determines how fast a solute can or will diffuse across the membrane of the red blood cell. If the molecule is big it will take longer time for the solute to dissolve across the membrane than a molecule that is small. This is clearly seen in Dextrose, it took over 1200 seconds for it to diffuse across the membrane of the red blood cell as compared to Triton or Thiourea which took less than 2 seconds to diffuse. Per the data above, it is clearly seen that Dextrose, a type of glucose with a chemical formula of $C_6H_{12}O_6$, is a bigger and it's a more complex molecule as compared to Thiourea with a chemical formula $SC(NH_2)_2$ which shows that its relatively a smaller molecule. Overall it is very evident that size of a molecule is a major factor that affects the diffusion of solutes in the permeability of red blood cells

Another factor that contributed to the diffusion of solute is the polarity of the molecule. For molecule to diffuse across the membrane of the red blood cell we need to know if it is polar or a non-polar molecule. Non-polar molecules can easily pass the membrane as compared to a polar. Per data above, Thiourea has a chemical formula of $SC(NH_2)_2$ which makes it a polar molecule and urea is an uncharged polar molecule and its small it can pass through the membrane easily as compared to a larger polar molecule like Ethanol. Ethanol has a chemical formula of C_2H_6O which makes it a polar molecule. However, it is a large uncharged polar molecule, it is not as permeable across the membrane as thiourea making the time of time of diffusion to be longer. In conclusion, the factors which affects the rate of diffusion of the solutes tested permeability are, the size of the molecule and polarity.

