Permeability of Red Blood Cells

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BIO1140 Section B6

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Table 1.1: Samples and Trials for Blood Hemolysis

Solution	Time1[1]	Time2	Time3	Mean	SD[2]	SE[3]
Ethylene Glycol	20	10	7.26	12.42	6.705908	3.871658
ddH_2O[4]	>2[5]	>2	>2	>2	0	0
Glycerol	996	662.4	720	792.8	178.3175	102.9516
Sucrose	<1200[6]	<1200	<1200	<1200	0	0
Urea	>2	>2	>2	>2	0	0

[1] Time is in seconds (s)
[2] SD stands for Standard Deviation
[3] SE stands for Standard Error
[4] ddH2O is distilled water
[5] >2 means that the time was less than 2 seconds
[6] <1200 means that the time was greater than 1200 seconds

Questions:

1.) **What are the factors that affect the diffusion of the solutes tested in the permeability experiment?** → There are many factors that can affect the diffusion of the solutes tested in the permeability experiment, such factors include polarity, the size of the molecules, and temperature.
2.) **How do each of the factors listed in (1) affect the diffusion of solutes? →** The polarity of solutes affects the diffusion. To be able to diffuse, molecules have to cross a cell membrane, this membrane is lined with hydrophilic (polar) heads and hydrophobic (non polar) tails called the lipid bilayer. Non polar molecules such as O2 can easily diffuse across the membrane, however, polar molecules require proteins to help them get across by a process called facilitated diffusion. The size of the molecule can also affect the diffusion of solutes. Larger molecules take longer to get across the membrane, which will increase the time for diffusion to be completed. The cell membrane is considered to be a fluid mosaic model, which means that it is dynamic and always moving. The liquid-like structure and movement of this membrane can be affected by temperature. If the temperature is increased, the membrane becomes more fluid and therefore the rate of diffusion is increased. The same applies to a temperature decrease, the membrane will become less fluid and therefore the rate of diffusion will slow.