Name:_____

Ex 5B: The Cell Transport Mechanisms and Permeability: Computer Simulation Data Sheet

Bio 2402 Lab: PhysioEx

Ziser, 2001

Activity #1: Simulating Dialysis

Chart 1: Dialysis Results				
	Membrane (MWCO)			
Solute	**20**	**50**	**100**	**200**
NaCl				
Urea				
Albumin				
Glucose				

Which solutes were able to diffuse into the right beaker?

Which solutes did not diffuse?

If the solution in the left beaker contained both urea and albumin, which membrane(s) could you choose to selectively remove the urea from the solution in the left beaker? How would you carry out this experiment?

Assume that the solution in the left beaker contained NaCl in addition to the urea and albumin. How could you set up an experiment so that you removed the urea, but left the NaCl concentration unchanged?

Activity #2: Simulating Facilitated Diffusion

Chart 2: Facilitated Diffusion Results			
Glucose Concentration (mM)	**Number of Glucose Carrier Proteins**		
	500	**700**	**900**
2.00			
8.00			

What happened to the rate of facilitated diffusion as the number of protein carriers increased? Explain your answer.

What do you think would happen to the transport rate if you put the same concentration of glucose into both beakers instead of deionized wat3r in the right beaker?

Should NaCl have an effect on glucose diffusion? Explain your answer. Use the simulation to see if it does.

Activity #3: Simulating Osmotic Pressure

Do you see any evidence of pressure changes in either beaker, using any of the four membranes? If so, which ones?

Does NaCl appear in the right beaker? If so, which membrane(s) allowed it to pass?

Chart 3: Osmosis Results (pressure in mm Hg)				
	Membrane (MWCO)			
Solute	**20**	**50**	**100**	**200**
Na and Cl				
Albumin				
Glucose				

Explain the relationship between solute concentration and osmotic pressure.

Will osmotic pressure be generated if solutes are able to diffuse? Explain your answer.

What do you think would happen to the osmotic pressure if you replaced the deionized water in the right beaker with 9.00 mM albumin in that run?

What would happen if you doubled the albumin concentration in the left beaker using any membrane?

In the albumin run using the 200 MWCO membrane, what would happen to the osmotic pressure if you put 10mM glucose in the right beaker instead of deionized water? Explain your answer.

What if you used the 100 MWCO membrane in the albumin/glucose rune described in the previous question?

Activity #4: Simulating Filtration

Chart 4: Filtration Results
(Filtration Rate, Solute Presence or Absence)

Solute		20	50	100	200
	Rate				
NaCl	**Filtrate**				
	Residue				
Urea	**Filtrate**				
	Residue				
Glucose	**Filtrate**				
	Residue				
Powdered Charcoal	**Filtrate**				
	Residue				

Did the membrane's MWCO affect the filtration rate?

Which solute did not appear in the filtrate using any of the membranes?

What would happen if you increased the driving pressure?

Explain how you can increase the filtration rate through living membranes.

By examining the filtration results, we can predict that the molecular weight of glucose must be:

Activity #5: Simulating Active Transport

The Na transport rate slows and then stops before transport has completed. Why do you think that this happens?

What would happen if you did not dispense any ATP?

After step 7; has the amount of Na transported changed?

Do these results support your ideas in step 6 above"?

What would happen if you decreased the number of Na-K pumps?

Explain how you could show that this phenomenon is not just simple diffusion.

After step 8; Is Na transport affected by this change? Explain your answer.

What would happen to the rate of ion transport if we increased the number of Na-K pump proteins

Would Na and K transport change if we added glucose solution?

When you have finished print your recorded data from one of the activities above and attach it to this report.