corrected

D-277 Dental Physiology Quiz 1
Monday, April 25, 2005

1. Diffusion of a nonelectrolyte is being studied in a laboratory apparatus under the conditions shown in the table. Which of the following experiments, **a**, **b**, **c**, or **d**, will have the same net flux as experiment #1? The diffusion coefficient (D) is the same for all.

	Concentration, side 1	Concentration, side 2	Membrane thickness
Experiment #1	20 mM	10 mM	1 mm
Experiment a	40 mM	20 mM	0.5 mm
Experiment b	30 mM	20 mM	2 mm
Experiment c	40 mM	20 mM	2 mm
Experiment d	200 mM	100 mM	2 mm

a. Experiment a
b. Experiment b
*c. Experiment c
d. Experiment d

2. Use the Nernst equation to calculate E_{Cl} (the Nernst equilibrium potential for Cl^-) under these conditions: $[Cl^-]_{outside}$ = 100 mM; $[Cl]_{inside}$ = 20 mM; temperature = 37°C. E_{Cl} is:

*a. -42.6 mV
b. +42.6 mV
c. -98.2 mV
d. +98.2 mV

3. Calculate the resting membrane potential (E_m) for a cell that is only permeable to Na^+ and K^+. The cell's K^+ conductance (g_K) is 30 nanoSiemens and its Na^+ conductance (g_{Na}) is 10 nanoSiemens. Assume that E_{Na} = +60 mV and E_K = -90 mV. E_m is:

a. -82.5 mV
b. -75 mV
*c. -52.5 mV
d. +60 mV

4. Suppose a normal red blood cell has a volume of 100 picoliters when in whole blood, and then it is removed and placed in a large volume of each of the solutions below. In which of these solutions will the cell volume be the closest to its volume in normal blood?

a. 580 mM sucrose (σ = 1.0)

b. 580 mM urea (σ = 0.2)

c. 100 mM NaCl (σ = 1.0)

*d. 145 mM NaCl plus 100 mM urea