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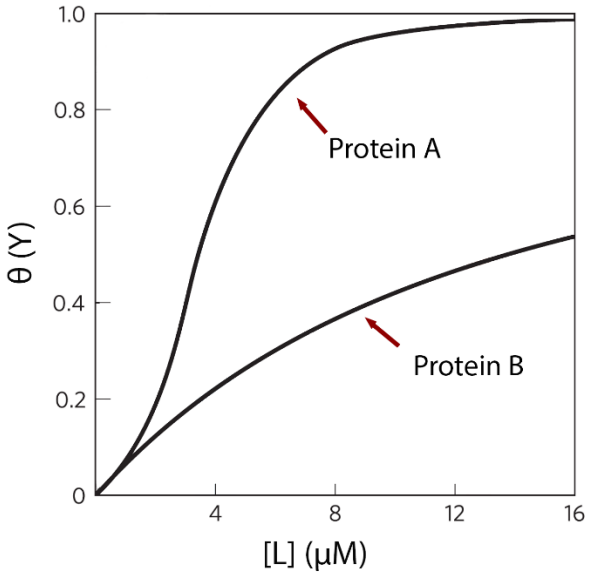
Worksheet 9: Binding Curves

1. Use the graph below to answer the following questions.



a. On the graph show where you can find the K_d for each protein. Label the K_d values as "K_{dA}" and "K_{dB}".

b. Which protein has a higher affinity for the ligand L? _____

c. Which protein is most likely a multi-subunit protein? _____

d. If a third protein, Protein C, has 42.0% of its binding sites saturated when the [L] = 4.5 μM, what is the K_d value? Show your calculations in the space below. Include appropriate units and significant figures.

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2. Enzyme 1 and Enzyme 2 both bind Ligand A. Enzyme 1 has multiple binding sites for Ligand A and displays positive cooperativity while Enzyme 2 has only one binding site for Ligand A. Enzyme 1 binds ligand A with a K_d = 150 nM. Enzyme 2 binds ligand A with a K_d = 6.0 μM.
    a. Draw a binding curve for Enzyme 1 binding Ligand A. On the same graph draw a curve for Enzyme 2 binding Ligand A. Label your axes and the K_d for each enzyme. Indicate which curve belongs to Enzyme 1 and which belongs to Enzyme 2.

    b. Calculate the percentage of unoccupied binding sites for Enzyme 2 when the concentration of Ligand A is 250 nM.

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3. When the ligand concentration is 6 μM, the protein is 75%**.** What is the dissociation constant?

4. A receptor binds a ligand with K_d = 5 μM. If Y = 0.75, what is the ligand concentration?

5. A protein binds a ligand with a K_d of 4.0 μM. If the ligand concentration is 8.0 μM, what fraction of binding sites are occupied?