CHEM-E3150 - Biophysical chemistry. Exam 25.02.2021.

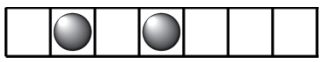
READ THIS FIRST: You may use the course material for answering the questions. In the evaluation of the exam I will assess the maturity of you answers and how they relate to the course content. The clarity of your answer is essential. Lengthy answers with unclear logic or excessive and unprocessed information will not receive high points. Read carefully what I ask for in the question. Answers should be typed through your keyboard, not handwritten. Figures may be drawn by hand and included as pictures. Answer all questions and turn in as a pdf document.

1. The energy difference between two states, 1 and 2, can be calculated using the formula: $\frac{p_2}{p_1} = e^{\frac{-(U_2-U_1)}{RT}}$

Explain in your own words from where the formula came from. What background understanding did the equations require and through which steps did we develop this understanding during the course.

2. You are asked how long does it take for one molecule to diffuse from one side of a cell to another. Explain you answer through the understanding for diffusion that was developed in this course. Include descriptions of quantitative analysis.

3. In a hypothetical model two atoms are in a one-dimensional space as shown in the figure below. Develop a formula for the free energy of the dimer formation and explain how you reach your conclusion. The dimer has a bond energy "a".



4. What understanding of the driving forces of protein folding were developed during the course? Include descriptions of quantitative analysis.

5. Describe effects of colocalization and competition in relation to biomolecular binding events. Include descriptions of quantitative analysis.