

Physical Chemistry Cume
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April 2016

In this cume you can show how you understand some principles of thermodynamics. (try to answer as many problems as possible – partial answers are welcome too) ☺

1. Imagine that a thermodynamic system goes spontaneously from one equilibrium state to another. What can you say about the entropy change of the system and its environment? How could you calculate the entropy change of the system?
2. a) Imagine the following reaction: $\text{C}_2\text{H}_6(\text{g}) + 3.5\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\text{l})$,
How would determine if the reaction proceeds in one or the other way at some chosen conditions? Show the calculations that you need to do.
b) If the picture right describes some reaction of interest (going from left to right), what determines the reaction rate and the equilibrium state of the system? Can you change some of this? How?
3. Imagine that you have an equilibrium system formed by c components and φ phases. Could you explain the conditions under which the system become stabilized (fluxes, chemical potentials,...)? Would you be able to describe the conditions that characterize coexistence lines between phases?
4. Could you explain in a simple way what determines a gas pressure of a component above its pure liquid phase and above its solution (add salt or so)? Can you give a microscopic picture of this?
5. Imagine two charged proteins in an ionic solution. At which distance they can start to recognize each other surfaces? Explain.

