

Physical Chemistry Cume
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1. Could you explain in your words what exact and inexact differentials are? Could you show some examples of these differentials in thermodynamics and clarify on examples that they these are indeed exact and inexact differentials.
2. Could you explain in your words what the second law of thermodynamics is and illustrate why it must be fulfilled?
3. Imagine a closed container that is half filled with water at $T=300$ K. How will the pressure in the container change when we decrease the volume of the container to 75% of its original size? Do the same when 1M NaCl solution is present in the container.
4. Imagine that you have a polymer of noninteracting atoms forming a chain of a length L that is well solvated in some solution at room temperature. What is the average size of the fluctuating polymer (roughly)? What would it be if temperature is raised by 50 K?
5. How could a gas law of noninteracting weakly degenerate Fermions and Bosons look like? How could such strongly degenerate but noninteracting gasses behave? Explain.
6. How large do you think are the entropy contributions from different degrees of freedom in a N_2 gas at a room temperature and a normal pressure?