Exercises in Statistical Mechanics

Based on course by Doron Cohen, has to be proofed

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This exercises pool is intended for a graduate course in "statistical mechanics". Some of the problems are original, while other were assembled from various undocumented sources. In particular some problems originate from exams that were written by B. Horovitz (BGU), S. Fishman (Technion), and D. Cohen (BGU).

======= [**Exercise 5955**]

Change of boiling point with altitude

Consider an atmosphere as an ideal gas whose average mass is 30 gr/mole, with uniform temperature $T_A = 27^oC$. The atmospheric pressure at sea level ($h = 0$) equals P_0.

We take liquid whose latent heat is $Q = 1000$cal/mole, and we find that its boiling point is 105^oC at sea level, and 95^oC at the top of a mountain. Asume that the gas phase of this liquid is an ideal gas with density much lower than that of the liquid.

(1) Calculate the atmospheric pressure P_A as a function of height h.

(2) Calculate the liquid vapor pressure as a function of its temerature.

(3) From above deduce what is the height of the mountain.