Phase rule

P42. What is the number of components, phases and degrees of freedom for a Na_2SO_4 solution in equilibrium with its vapor in a closed test tube when the solution is visibly saturated (a) and when it is visibly unsaturated (b)? *[(a) P = 3, C = 2, F = 1; (b) P = 2, C = 2, F = 2]*

P43. Blue crystals of $CuSO_4.5\ H_2O$ lose their crystalline water by heating. How many phases and components are present in a heated tank containing initially only $CuSO_4.5\ H_2O$? What is the number of degrees of freedom? *[P = 3, C = 2, F = 1]*

P44. Ammonium chloride decomposes when heated.

a) Give the number of phases and components in a system containing only ammonium chloride when heated. What is the number of degrees of freedom? *[P = 2, C = 1, F = 1]*

b) Suppose ammonia is also added to the system. What is the number of components, phases, and degrees of freedom? *[P = 2, C = 2, F = 2]*

P45. Give the number of components in the following systems:

a) Unsaturated NaH_2PO_4 solution in equilibrium with water vapor but disregard the dissociation of the salt. *[C = 2]*

b) Unsaturated NaH_2PO_4 solution in equilibrium with water vapor but take into account that the salt dissociates and dissociated ions participate in acid-base equilibria. *[C = 2]*