Answer on Question #53217 – Chemistry – Physical Chemistry

What is a tieline? Explain with the help of phase rule?

Answer:

A tieline is an isotermal line which connects two adjacent phase curves. There are two lines a_2a_2' and a_3a_3' depicted in the figure of two phase diagram for two compounds.

According to the Gibbs phase rule the number of degrees of freedom for the system can be found as follows:

$F = C - P + 2$, where C – the number of components, P – the number of phases.

Thus, for the system containing two components (A and B) and two phases (liquid and gas), the number of degrees of freedom equals: $F = 2 - 2 + 2 = 2$. This means that the change of two parameters (temperature and mole fraction) results in the change of phase state. From this point of view the tieline fixes (makes it constant) one of the parameters (as rule temperature), so that it provides to measure the values of the second (the mole fractions of the components being in liquid and gas phase at this temperature).

As shown in the picture at the temperature T_2 the liquid contains a_1 of A and at the same time the gas phase over the liquid has a_4 of A