Myself Ms. Aparna Juwarkar , assistant professor in chemistry from PES College of Arts and Science.
The unit we are going to study is solution and The module name is thermodynamics of ideal Solution Part 2. Which will include the thermodynamic properties of idea solution, that is enthalpy change on mixing of ideal solution, entropy change on mixing of ideal solution. At the end of the module you will be able to explain and derive the various thermodynamic properties of ideal solution. So first 2 properties we have already discussed those are Gibbs free energy change and Volume change. Now we are going to discuss the other two properties, those are we are discussing ,the third property that is enthalpy change on mixing is denoted as Delta H Mix, where Delta symbol stands for Change, H stands for enthalpy. What is enthalpy? It is all thermodynamic quantity which is equal to heat content of the system. That means heat evolved out of the system or heat is gained by the system we are measuring when mixing takes place . Now for an ideal solution we have Delta G mix is equal to n1RTlnX1 plus n2RTlnX2.
Now since we are differentiating the equation with respect to temperature and constant pressure, what we do is we divide the entire equation byT. What we get is Delta GMix value. Now we're differentiating the equation. since there is no pressure term, we can write the equation as equal to 0. Now from a well known thermodynamic equation that is Gibbs Helmholtz equation. That means the enthalpy change for any ideal solution should always be equal to zero. That means there is no heat exchanged, nor absorbed, out of the system.
Now we move on to the next property which is entropy change or mixing, denoted as delta S mix. Delta is a symbol for change. What is this entropy? Entropy is again a thermodynamic quantity which measures the disorder or randomness of the system, so we're checking when we mix 2 components, what will be the entropy change on mixing of the solutions so from a well known thermodynamic equation, we also know that Delta Delta G is equal to Delta H minus T Delta S and for the process of mixing we just add on mixing sign over there we can write Delta G mix. Delta H mix is zero for an ideal solution, so substituting this in above equation we get value of delta G mix. We also get value of delta S mix.
Now we have already discussed in the earlier module the value of energy mix. So what we're doing we're just substituting the value of Delta G. Mix . So once we substitute Delta G mix what we get is Delta's. Mix as seen on the slide. The value of x is less than one so delta S is always positive.
So when we mix 2 solution , change in entropy always comes to be a positive value.
The references I have used in this particular module is chemistry for degree students, physical chemistry by Peter Atkins and principles of Physical chemistry by Puri Sharma and Pathania.