

Azeotropic mixture.

Azeotropes are defined as the mixtures of liquids which boil at constant temperature like a pure liquid and possess same composition of components in liquid as well as in vapor phase.

Azeotropes are also called constant boiling mixtures because whole of the azeotropes changes into vapor state at constant temperature and their components cannot be separated by fractional distillation. Azeotropes are of two types as described below:

(1) **Minimum boiling azeotrope:** For the solutions with positive deviation there is an intermediate composition for which the vapor pressure of the solution is maximum and hence, boiling point is minimum. At this composition the solution distills at constant temperature without change in composition. This type of solutions are called minimum boiling azeotrope. e.g.

Components		Mass % of B	Boiling points (K)		
A	B		A	B	Azeotrope
H_2O	C_2H_5OH	95.57	373	351.3	351.1
H_2O	$C_2H_5CH_2OH$	71.69	373	370	350.72
$CHCl_3$	C_2H_5OH	67	334	351.3	332.3
$(CH_3)_2CO$	CS_2	6.8	329.25	320	312.2

(2) **Maximum boiling azeotrope:** For the solutions with negative deviations there is an intermediate composition for which the vapor pressure of the solution is minimum and hence, boiling point is maximum. At this composition the solution distills at constant temperature without the change in composition. This type of solutions are called maximum boiling azeotrope. e.g.

Components		Mass % of B	Boiling points (K)		
A	B		A	B	Azeotrope
H_2O	HCl	20.3	373	188	383
H_2O	HNO_3	58.0	373	359	393.5
H_2O	$HClO_4$	71.6	373	383	476