A simple Gibbs energy-driving force method for the design of non-reactive distillation columns (NRDC) and reactive distillation columns (RDC) is proposed. The design method exploits the connection between the driving force values and the equilibrium Gibbs energy to determine the number of stages, the optimal feed location, and the heat required at the top and bottom of the column and the minimum reflux ratio. The final design guarantees an optimal operation since maximum thermodynamic efficiency is achieved. The maximum thermodynamic efficiency criterion is equivalent to the minimum entropy condition required for a stable operation of the distillation columns. The method is applied for the design of two non-reactive systems: a) Benzene-Toluene ideal system and b) Ethanol-Water non-ideal system. A reactive distillation column considering the isomerization of n-butane in the presence of an inert compound is designed. The optimal thermal feed condition obtained through the maximum separation efficiency guarantees that the final designs obtained correspond to the minimum energy requirements for the design target of separation.