The styrene production process begins with an equi-molar feed of benzene and ethylene, where the

molar composition of the inlet stream is 0.5 for Benzene and 0.5 for Ethylene. This feed, initially preheated to

95◦C at a constant pressure of 1.01325 bar, has a molar flow rate of 9.419034 kmol/h and a mass flow rate of 500 kg/h. The stream is then sent to a

pump to increase its pressure from 1.01325 bar to 13 bar. Following this, the pressurized feed enters a

conversion reactor, where ethyl benzene is produced with a 70% conversion rate based on benzene. The product stream from this reactor, containing ethyl benzene, unreacted ethylene, and benzene, where one mole of ethylene and benzene reactor to form ethyl benzene .It is then directed to a **cooler** that reduces its temperature to 150◦C. After cooling, the stream proceeds to a

first distillation column, which separates purified ethyl benzene as the bottom product from the distillate containing unreacted ethylene and benzene.