PROCESS DESCRIPTION :-

The cold feed of secondary butyl alcohol is pumped from the storage to a steam heaterand then to a vertical thermo-syphon reboiler (vaporizer) in which the alcohol is vaporized. Thethermo-syphon reboiler will be heated by the reaction products discharge from the reactor andthe wet alcohol vapors will be passed to a knock-out drum (separator) to remove any entrainedliquid. The liquid separated will be recycled and the dry alcohol vapors will be fed to a superheater 1 where they are super heated to a temperature of 573 K. The super heated vapors are thencompressed to a second super heater 2 where they are heated to a temperature of 773 K. In thesesuper heaters, the vapors are heated with the help of flue gases at high temperature. Thesuperheated butyl alcohol vapours are fed to the reactor at 400-500 ºC where 90% is convertedon a zinc oxide_ brass catalyst to methyl ethyl ketone and hydrogen. The reaction is,

$$CH_3CH_2\text{-}CHOH\text{-}CH_3 \text{ ----------} CH_3CH_2\text{-}CO\text{-}CH_3 + H_2$$

(2- butanol) **(methyl ethyl ketone)** **(hydrogen)**

The reaction products are then cooled in a vaporizer where there heat is utilized to vaporizethe butanol feed liquid. The cooled products gases are then condensed in a water cool partialcondenser where almost 80% of the MEK and unreacted butanol is condensed and thecondensate is passed to a distillation unit. The gases effluent from the partial condenser is send tothe absorber to recover remaining uncondensed MEK and alcohol. In the absorber, water is used as an absorbent which absorb MEK and alcohol and leave from the bottom of the absorber. Theoff gases from the absorber containing all hydrogen, negligible water, MEK and alcohol aredried and used in a plant fuel system. The liquid discharged from the absorber is sent to a liquid-liquid extraction column where trichloroethane is used to extract the MEK and alcohol and theraffinate contains water is recycled back to the absorber along with the small amount of makeupwater. The extract from the liquid-liquid extraction column is sent to a solvent recovery columnwhere trichloroethane is recovered at the bottom and is recycled back to a liquid-liquid extractioncolumn. The top product from the solvent recovery unit is sent to a distillation column alongwith the condensate from the partial condenser. In the distillation column, 99% pure MEK isobtained as distillate and send to a storage where as the butyl alcohol obtained as a bottomproduct, is recycled back and mix with a fresh feed for reprocessing.