

## Question Bank (G scheme)

Name of subject: Chemical Engineering Drawing

Subject code: 17647

Semester:VI

Unit Test: II

Course: CH

### Chapter 6- Process Flow Diagrams

Draw process flow diagram of following process. (16 mark questions) and engineering line diagram (9 marks)

1. Formaldehyde is produced by oxydehydrogenation of methanol. Air is heated in air preheater and methanol is vaporized in vaporizer. Then they are mixed in desired proportion and introduced into fixed bed reactor. The product gases containing, hydrogen, methanol, formaldehyde, water, oxygen and nitrogen are cooled in heat exchanger using suitable cooling medium. The exothericity associated with the reaction is removed by passing compressed water on the shell side of fixed bed reactor and utilized for producing low pressure steam. The cooled product gases are then introduced to battery of scrubber /absorber in which formaldehyde and methanol are absorbed in water. The liquid mixture leaving the absorber containing formaldehyde, methanol and water is send to intermediate storage tank. The crude formaldehyde solution from the intermediate storage tank is then fed to a distillation column from the top of which methanol is obtained and is recycled back to the vaporizer and formaldehyde in the form of formalin (37% formaldehyde solution) is removed as bottom product.
2. Absolute alcohol is obtained by carrying out the fractional distillation of 96% ethyl alcohol. The fresh feed is fed to an azeotrope column where benzene is used as azetrope breaker. The ternary azeotrope of ethanol, benzene and water is formed as an overhead which is condensed and phase separation is achieved in decanter. From decanter benzene rich layer is recycled to azetrope column as reflux and water rich layer is send to a second fractionating column where water is drained as a bottom. Almost ethanol+ benzene is removed from top of second column which is recycled to top of first column. The bottom of azetrope column gives almost pure ethanol.
3. Acetone is produced by catalytic dehydrogenation of isopropyl alcohol. Isopropyl alcohol is vaporized, heated and fed to fixed bed catalytic reactor, where it undergoes catalytic dehydrogenation to acetone. The reactor exit gases pass to condenser where most of acetone water and alcohol is condensed out. The final traces of acetone and alcohol are removed in water scrubber. The effluent from scrubber is combined with condensate from the condenser and distilled in a column to produce pure acetone and an effluent (bottom product) consists of the water and alcohol. The effluent is distilled in a second column to separate excess water. The product from second column is azeotrope of water and alcohol (11%). It is recycled to rector. Temperature in rector is 500oC and pressure is 50 psig.