ACETONE PLANT FROM ISOPROPYL ALCOHOL WITH DEHIDROGENATION PROCESS

Name: Wahyu Mayangsari (2308 030 047)
      Hanifia Ilmawati (2308 030 095)
Department: DIII Chemical Engineering FTI-ITS
Supervisor: Prof. Dr. Ir. Suprapto, DEA

Abstract

Acetone is a ketone’s derivative of which is an important compound in the chemical industry. Acetone is a colorless liquid that has a density of 0.79 g/cm³. Acetone plant will be established in Cilegon Banten with a capacity production of acetone is 63636.364 kg/day.

Acetone making process consists of four stages, such as vaporization, dehydrogenation, absorption and distillation. In the vaporization, isopropyl alcohol is heated at 527 K with indirect steam to change a phase of raw material from liquid to vapor. Then dehydrogenation is to cracking isopropyl alcohol to be acetone and hydrogen with 95% conversion using ZnO catalyst in a multi tubular fixed bed reactor at 624 K and pressure 1.77 bar. Absorption is to separate a mixture of isopropyl alcohol and acetone from hydrogen. Hydrogen is discharged into environment. Furthermore, the distillation is to separate isopropyl alcohol and acetone to obtain acetone with a purity of 99.98%. The residue of isopropyl alcohol will be used for raw material to next process.

Acetone plant is planned to operate semi continuously for 330 days, 24 hours/day, is required for 61888.32 kg/day of isopropyl alcohol with the catalyst is ZnO. Needs utilities include process water, boiler make up water, sanitation, cooling water, refrigerant water, steam and natural gas respectively each amounting to 128666.361 kg/day; 114937.472 kg/day; 166131.629 kg/day; 93940 kg/day; 1538.84 kg/day; 355988.879 kg/day and 30203499.676 kg/day.

Key words: Acetone, Isopropyl alcohol, Dehydrogenation