

**Ministry of Higher Education
and Scientific Research
Al-Muthanna University
Engineering College
Chemical Engineering Department**



PRODUCTION OF ACETONE

(10,000 TON/YEAR)

Research Project

**Submitted to the Faculty of Engineering college /Chemical
Engineering Department in Partial of Fulfillment of the
Requirements for the Degree of Bachelor in Chemical
Engineering**

Supervised by: Assist. Prof. Ihsan H. Dakhil

Prepared by:

Hadi Mohammed Jabbar

Karar Ali Kazem

Ahlam Shallal Dreeowil

Zahraa Saad abdul husaain

Mustafa Saad jassim

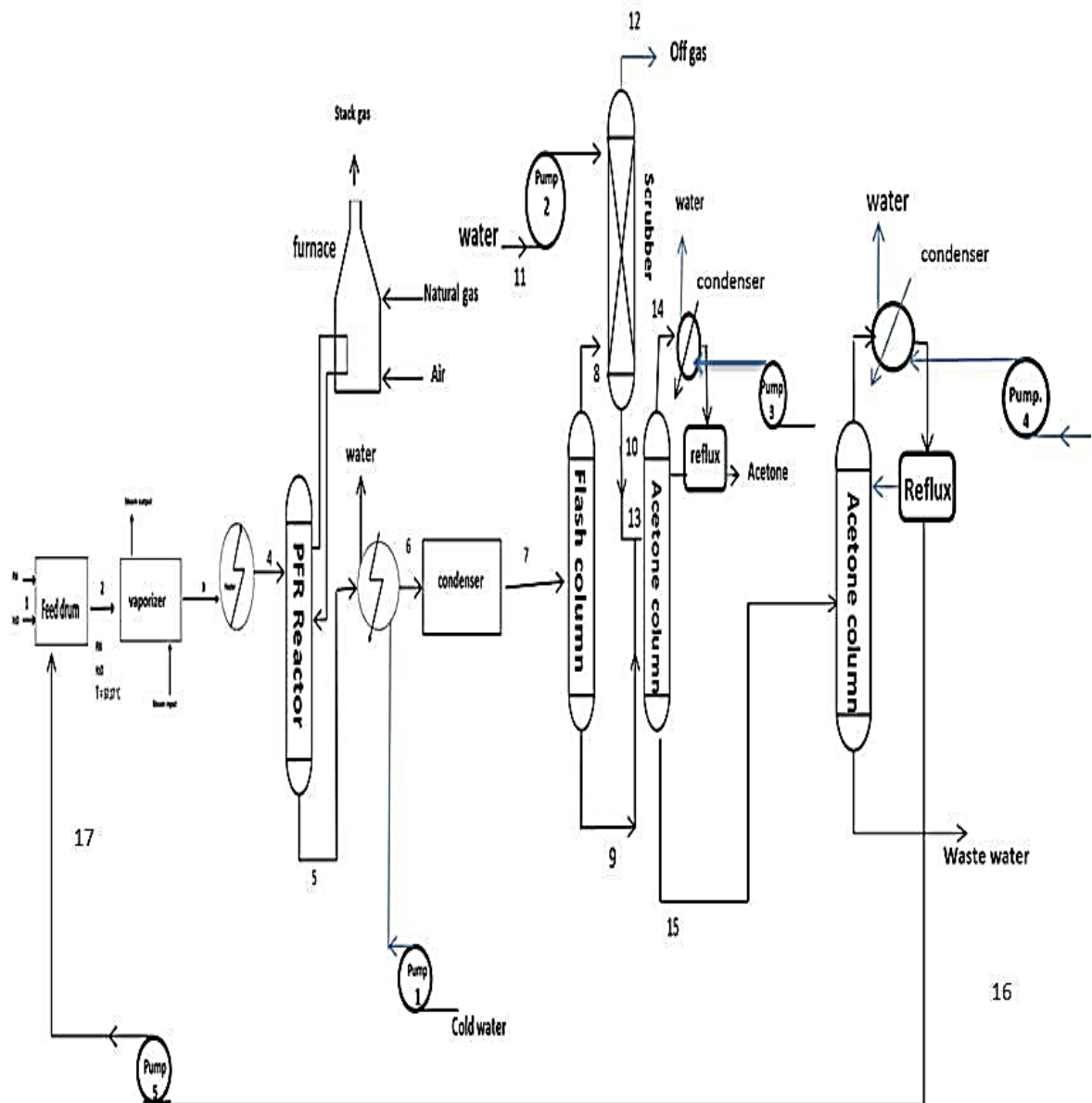
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1.1- Introduction

Acetone is the simplest ketone and one of the most abundant volatile organic compounds in the atmosphere. Formulation and production of other chemicals can account for up to 75 percent of all uses of acetone. Acetone is a volatile organic compound that is considered to have low toxicity, though improper use of it can cause serious problems. There are a number of uses for acetone, including in chemicals, solvents and nail polish remover. The most common use of acetone is to formulate other chemicals. Beyond chemicals and solvents, other uses for acetone exist in the production of cosmetics and household and personal care products. Acetone is classified as a low-toxicity. It easily evaporates in the air, dissolves in water and is highly flammable. Chemical manufacturers can produce acetone, although it also can be found in the environment as a naturally occurring substance. However, by the late 1950s routes to produce solvents from petroleum were made cost-competitive with fermentation. In addition, the major feedstock at the time was molasses, which spiked in price because of animal feed demand. Acetone is typically produced in commercial quantities as a by-product during the formation of phenol. However, acetone manufactured thus generally contains small amounts of the reactant benzene and the desired product phenol. In the past, these impurities were deemed to be within allowable limits. Acetone is also called 2-propanone, beta-ketopropane, propan-2-one and dimethyl ketone.

1.2- Historical Background

In 1914, acetone was manufactured by the dry distillation of calcium acetate, which was obtained by neutralizing pyroligneous acid (wood distillate) with lime and evaporating to dryness. In 1914, new methods of manufacture were explored. Calcium acetate by fermentation of alcohol or from acetylene. However, this method could not compete with the fermentation process developed by Weizmann and Hamlyn for the conversion of carbohydrate (cornstarch or molasses) to acetone and butyl and ethyl alcohol by use of a special bacillus. Publicker Industries, Commercial Solvents, and National Distillers, at one time, had combined bio-fermentation process acetone capacity of 22,700 metric tons per year. This method, in turn, became non-competitive in the late 1950s and early 1960s owing to the economics of scale of the cumene hydro-peroxide-to-phenol and the isopropyl alcohol dehydrogenation processes. Production of acetone by dehydrogenation of isopropyl alcohol actually began in the early 1920s. It remained the dominant production method through the sixties, in 1976, 60% of United States acetone capacity was based on cumene hydroperoxide. In 1974, about 65% of the acetone produced was via the cumene hydro-peroxide process. The process for direct oxidation of propylene to acetone was developed in the early to middle 1960s by



Figure(1.3) Production of acetone by dehydrogenation of isopropanol