

**State of Libya  
Ministry of Higher Education  
and Scientific Research  
Al Asmarya Islamic University  
Faculty of Engineering**



**DESIGN OF GAS MIXTURE SWEETENING UNITS:  
A CASE STUDY OF WASTE TIRES  
PYROLYSIS GAS**

**B.Sc. Project**

**Submitted to Department of Chemical Engineering in Partial Fulfilment of the  
Requirement for the Bachelor of Science (B.Sc.) Degree in  
Chemical Engineering**

**SUBMITTED BY:**

**Aisha Mohammed Esmeda**

**SUPERVISION by:**

**Dr. Almahdi Atteya Alhwaige**

**Dr. Mustafa Ahmed Alhaleeb**

**Zliten, Libya**

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## Abstract

Disposal of waste tires is prohibited a major issue on the environmental concern. Therefore, studies on utilization of recycling waste tires as a gas fuel production may reduce waste tires pollution. However, gas impurities have been found in the gas fuel production from pyrolysis of waste tires. Design of CO<sub>2</sub> removal unit of pyrolysis gas stream using commercial software simulators is still under investigation. The main goal of the research is to design a process of amine absorption column for CO<sub>2</sub> removal from gas stream that results from pyrolysis of waste tires. The Aspen Plus simulator was used for modeling of the absorption process, which analyzed the effect of design and operating parameters for CO<sub>2</sub> adsorption efficiency. The analysis of the simulation results indicated that number of trays and applied pressure have significant role on the CO<sub>2</sub> removal from gas mixture. However, the increase in the feed flow rate, operating temperature, and amine/water ratio decreases the adsorption efficiency of CO<sub>2</sub> capture. The interesting of this study is that the above conditions have no effect on the adsorption of CH<sub>4</sub> and H<sub>2</sub>.