



**Universitat
Rovira i Virgili**



**Escola Tècnica Superior
d'Enginyeria Química**



**REPSOL
Repsol
Química**

**DESIGN OF A
GAS-MOLTEN POLYMER
SEPARATOR:
AN INCREMENT OF LOW DENSITY
POLYETHYLENE PRODUCTIVITY**

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to obtain the Master degree in Chemical
Engineering from the Universitat Rovira i Virgili

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Tarragona, February 2023

SUMMARY

Polyethylene (PE) is, from a chemical point of view, the simplest plastic and, therefore, its manufacture is very cheap and around 65 million tons of this plastic are generated annually throughout the world. It is a thermoplastic polymer with numerous applications in everyday products.

Polyethylene is made by various polymerization processes depending on the intended use and the type of products to be formed. The main use of this polymer is for packaging, but it also can be used for high tension cables, pipes, multilayer sheets, etc.

The low-density polyethylene plant of the company *Repsol Quimica* in Tarragona is located in La Pobla de Mafumet, and is made up of two low-density polyethylene production units.

The aim of this work is to design a new high pressure separator that will recover what remains of waxes in the ethylene gas, which causes a continuous decrease in the heat exchangers of the recirculate gas and so a loss of conversion from ethylene to PE. This recovery could mean an important asset from an economical point of view, as it would increase the productivity of polyethylene.

In the following pages, the description of the production process of polyethylene is to be given, as well as both the equipment design and mechanical design of the separator, the control system and the instrumentation of the unit, a safety study of the new installation, and finally an economical study that englobes all the items taken into account for this study.

The dimensions of the new separator will be 0.55 m for diameter and 3.5 m for height, therefore the volume is 0.8 m^3 . The particle size of polyethylene calculated with a balance force is $258 \text{ }\mu\text{m}$ and the terminal velocity of ethylene gas is 0.1 m/s . This new separator has an entrainment of 0.01%, which means 0.00009 kg/h of waxes. The material of construction will be carbon steel.