CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter will discuss on the methods and parameters used in carrying out this research. Basically, this research was done to initialize productions of products made from the mixture of recycled polypropylene and pure or virgin polypropylene. The procedures in carrying out this research was first to design and fabricate a mould to produce the specimen of the size of standard ASTM D638, then, crushing of the specimens into smaller sizes in order to enable the recycled polypropylene-made specimen to mix well with virgin polypropylene, and finally the injection moulding process itself to produce new specimens of mixed recycled polypropylene with virgin polypropylene.

After the specimen of a mixture of recycled polypropylene and virgin polypropylene was produced, the Ulimate Tensile Strength of the new specimen is then carried out and analyzed. The Ultimate Tensile Strength (UTS) test is carried out by using a Universal Testing Machine (UTM). The Ultimate Tensile Strength (UTS) or in other words, tensile strength was carried out in order to determine the tensile strength of the specimen at a specific load or force. Since there were six different experiments carried out, the results differentiate according to the contents of ratio of mixture of recycled polypropylene to virgin polypropylene. For a better view and understanding of the methodology, the flow chart in Figure 3.1 is given.

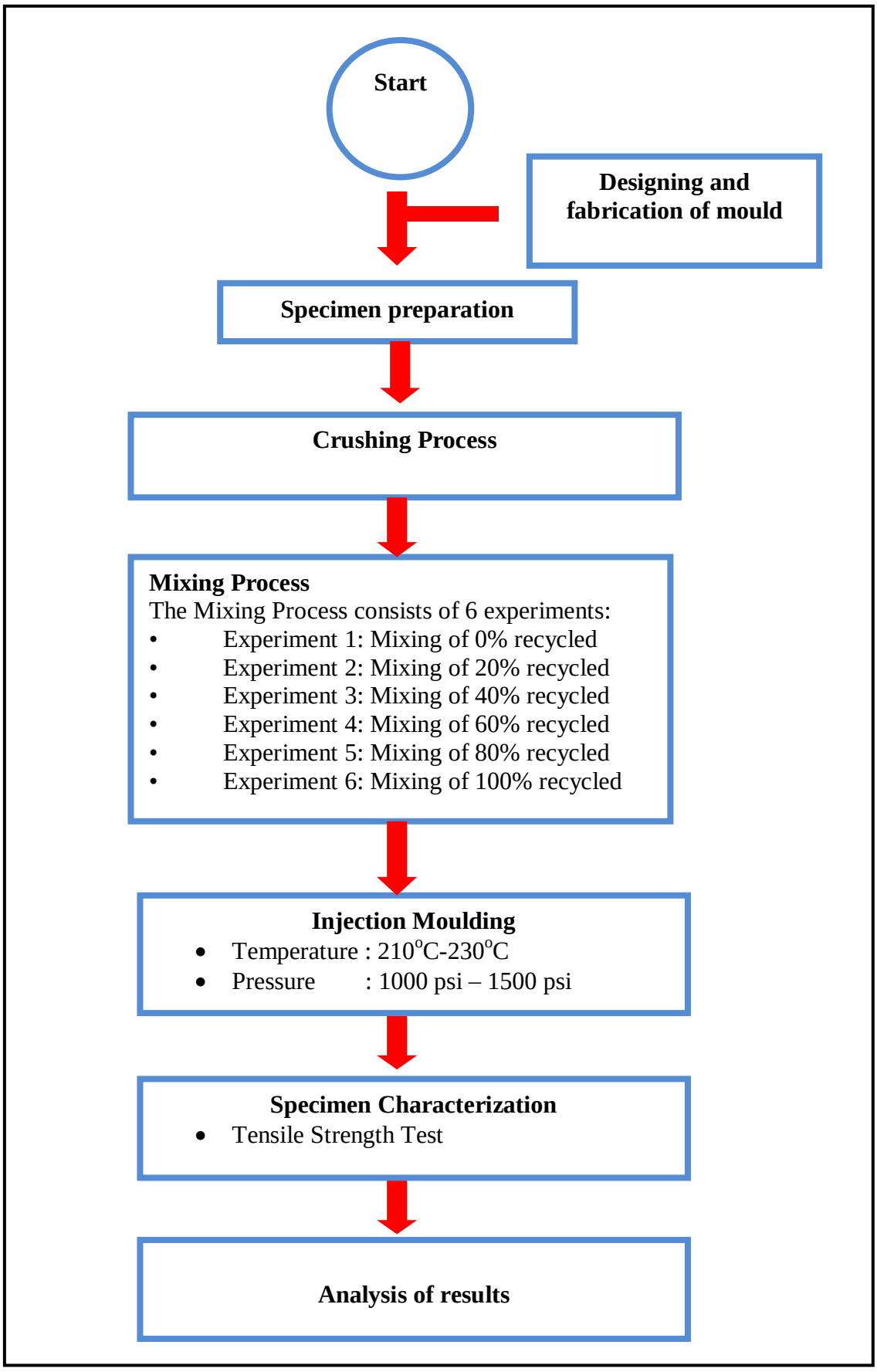

Figure 3.1: Methodology Flow Chart

3.2 DESIGN OF EXPERIMENT

Referring to the previous flow chart, there were six types of experiments carried out in this research according to the percentage of recycled polypropylene that were mixed with virgin polypropylene to produce a new product. The percentages of recycled polypropylene used in this research were 0%, 10%, 30%, 50%, 70% and 90%. The different percentage of recycled polypropylene mixed with virgin polypropylene was the testifying factor in the tensile strength test. The six types of experiments carried out in this research were as follows:

a) Experiment 1: 0% of recycled polyprolylene + 100% of virgin polypropylene
b) Experiment 2: 20% of recycled polyprolylene + 80% of virgin polypropylene
c) Experiment 3: 40% of recycled polyprolylene + 60% of virgin polypropylene
d) Experiment 4: 60% of recycled polyprolylene + 40% of virgin polypropylene
e) Experiment 5: 80% of recycled polyprolylene + 20% of virgin polypropylene
f) Experiment 6: 100% of recycled polyprolylene + 0% of virgin polypropylene

Referring to the experiments above, after the mixture of recycled polypropylene and virgin polypropylene was injected into the dog-bone shape specimens, they were then prepared to be tested under the Ultimate Tensile Strength (UTS) test on the Universal Testing Machine (UTM) to determine its tensile strength at a maximum load.

3.3 EXPERIMENTAL PREPARATION

3.3.1 Mold Design and Fabrication of Mould

The testing of the polypropylene specimens was carried out in a dog-bone shape with a standard ASTM-D638. The standard dog-bone shape was designed by using AutoDesk Inventor and AutoCAD computer-aided design software. The standard size of dog-bone shape was design according to the American Society of Testing and Materials (ASTM) D638.