Lab Report : Tensile Testing of Polymers

To better understand the properties of polymers, tensile testing will be carried out in the laboratory. Four different specimens will be tested: low-density polyethylene (LDP), high-density polyethylene (HDP), polyvinyl chloride (PVC), polycarbonates (Lexan) and natural polyisoprene (Rubber). Each sample shall be subjected to a tensile load until the point of failure or until the machine had reached its maximum displacement. Data will be collected and stress-strain curves plotted and interpreted.

1.0 - INTRODUCTION

See General Lab Report Format on line

2.0 - DATA ANALYSIS

2.1 DETAILS OF SAMPLES

- Describe the material, shape, etc. of specimens.

1) LDP: Low density polyethylene, thermoplastic polymer
2) HDP: High density polyethylene, thermoplastic polymer
3) PVC: Polyvinyl chloride, thermoplastic polymer
4) Lexan: Polycarbonates, thermoplastic polymer
5) Rubber: Natural polyisoprene, elastomer

- Use the text, library, and the internet for general properties.
- You should read Chapter 34 of your textbook prior to completing this lab report. It provides much of the information you will need.

2.2 SPECIMEN GEOMETRY

Table 1.1 Specimen Dimensions Prior to Tensile Test

	LDP	HDP	PVC	Rubber	Lexan
Width (mm) (W_o)					
Thickness (mm) (t_o)					
Gauge Length (mm) (L_o)					
Area (mm^2) (A_o)					

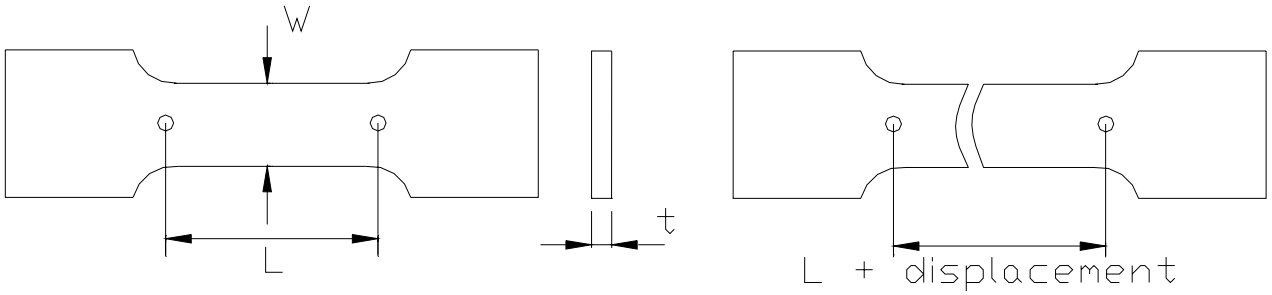

Figure 1 Specimen Dimension

2.3 DETAIL OF TESTING EQUIPMENT

- Describe the testing equipment
- Include a photo or schematic

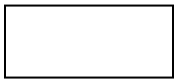

Figure 2: Test Set-up

2.4 TEST PROCEDURE

- Describe how the test was performed

2.5 MEASURED DATA

Table 1.2 Specimen Dimensions After Tensile Test

	LDP	HDP	PVC	Rubber	Lexan
Width (mm) (W_f)					
Thickness (mm) (t_f)					
Gauge Length (mm) (L_f)					
Area (mm^2) (A_f)					

- Determine the yield, maximum, and failure values of load and displacement from the load displacement data provided by the machine.

Table 2.3 Measured Load and displacement

	LDP	HDP	PVC	Rubber	Lexan
Yield Load (kN)					
Yield Disp. (mm)					
Max Load (kN0					
Max Load Disp. (mm)					
Failure Load (kN)					
Failure Disp. (mm)					

2.6 PLOTS

- Plots of Engineering Stress vs Strain are required for each specimen (Refer to the steel tensile test lab)

2.7 MECHANICAL PROPERTIES

- Describe the calculation of mechanical properties
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Table 2.4 Mechanical Properties

	LDP	HDP	PVC	Rubber	Lexan
Young's Modulus (GPa)					
Yield Stress (MPa)					
Yield Strain					
Ultimate Stress (MPa)					
Failure Stress (MPa)					
Failure Strain					
Ductility (%EL)					

3.0 DATA INTERPRETATION

3.1 Molecular Structure

- Sketch the molecular structure of different types of polymers tested in the lab (use the internet as a resource)

3.2 Molecular Properties

- Compare the properties of different types of polymers tested in the lab

3.3 Discussion

- Provide explanation for observed differences between tested polymers in regards to their microstructures.

4.0 - CONCLUDING REMARKS

5.0 - REFERENCES